



Formative research contributions to the development of Risaralda



Universidad Tecnológica
de Pereira



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Formative research contributions to the development of Risaralda



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Universidad Tecnológica de Pereira
Vicerrectoría de Investigaciones, Innovación y Extensión
Editorial Universidad Tecnológica de Pereira
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Coordinador editorial:
Luis Miguel Vargas Valencia
luismvargas@utp.edu.co
Teléfono 313 7381
Edificio 9, Biblioteca Central “Jorge Roa Martínez”
Cra. 27 No. 10-02 Los Álamos, Pereira, Colombia
www.utp.edu.co

Montaje y producción:
María Alejandra Henao Jiménez
Universidad Tecnológica de Pereira
Pereira

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RETOS DE LA INVESTIGACIÓN EN PREGRADO

German Oved Acevedo Osorio¹

La investigación se ha convertido en un proceso dinámico, generador de conocimiento y, a su vez, indeleble con el pasar de los tiempos, formando parte integral de la formación de profesionales en las diferentes áreas académicas. La educación superior es esencial en el desarrollo de habilidades intelectuales y de producción de conocimientos mediante el continuo aprendizaje y actualización de estos.

La investigación de pregrado se define como “una indagación o investigación realizada por un estudiante que hace una contribución intelectual o creativa a una disciplina”. La investigación formativa debe generarse mediante la transversalidad y la implementación de estrategias, que permitan generar en el estudiante la necesidad de resolver problemas actuales y de vital importancia, enfocados al cumplimiento o aporte a los objetivos de desarrollo sostenible. Para este caso, los semilleros de investigación cumplen un papel fundamental al convertirse en un ambiente diseñado para identificar y, a su vez, integrar la vocación investigativa en estudiantes. La asignatura de metodología de la investigación debe convertirse en una generadora de conocimientos teóricos/prácticos para el desarrollo y resolución de problemas producidos por la transversalidad del currículo.

¹ Docente, Grupo los Asépticos, Fundación Universitaria del Área Andina, Seccional Pereira.

De esta manera, es preciso establecer que la investigación de pregrado contempla beneficios para todas las disciplinas que trabajan con estudiantes, en la cual los asesores evidencian que el trabajo productivamente desafiante e intelectualmente estimulante. La investigación de pregrado es una “práctica de alto impacto” que involucra más a los estudiantes en su propia educación.

Las universidades deben ser conscientes que un gran porcentaje de los graduados no enfocará la investigación como su actividad principal; sin embargo, deben tener la capacidad de hacer investigación y realizarla de una manera eficaz y práctica en su área laboral. Con este fin, las universidades deben tener definido un objetivo dirigido a la investigación formativa, no como un complemento a la malla curricular, sino como un proceso de continuo aprendizaje y formación académica.

Es importante establecer y visibilizar a los estudiantes los beneficios relacionados con la formación en investigación, dentro de los cuales encontramos el fortalecimiento de las capacidades de liderazgo así como el compromiso activo y las experiencias en independencia y colaboración. Así mismo, la formación integral hacia una mayor apreciación del valor de la literatura disciplinaria, generando de esta manera habilidades de pensamiento crítico, indagación y análisis. Además, esto permite forjar la confianza en sí mismo para presentar las propias ideas a la comunidad, permitiendo al estudiante la preparación de futuras actividades académicas, incluidos estudios de posgrado.

La investigación formativa tiene como propósito la difusión de la información existente y permitir que el estudiante la integre como conocimientos, considerándolo como un aprendizaje permanente necesario. Uno de los principales problemas que debe enfrentar la investigación formativa es el número de docentes con las capacidades necesarias para generar en el estudiante capacidades investigativas, exigiendo al profesor universitario adoptar una actitud contraria al objeto de enseñanza, generando un carácter complejo y dinámico del conocimiento.

Se puede concluir que la incursión de los estudiantes en semilleros de investigación se convierte en un proceso necesario para formación profesional, con el fin de generar pensamientos críticos dirigidos hacia

la búsqueda de problemas no resueltos y poder plantear soluciones apreciables en su entorno laboral y aportando al desarrollo local o a nivel nacional.

CHALLENGES OF UNDERGRADUATE RESEARCH

German Oved Acevedo Osorio¹

Research has become a dynamic process, generating knowledge and once indelible with the passing of time, forming an integral part of the training of professionals in different academic areas. Higher education is essential in the development of intellectual skills and knowledge production through continuous learning and updating of these.

Undergraduate research is defined as “an inquiry or investigation carried out by a student who makes an intellectual or creative contribution to a discipline.” Formative research must be generated through transversality and the implementation of strategies that allow the student to generate the need to solve current and vital problems, focused on the fulfillment and / or contribution to the sustainable development objectives. In this case, the research hotbeds play a fundamental role by becoming an environment designed to identify and in turn integrate the research vocation in students. The subject of research methodology must become a generator of theoretical / practical knowledge for the development and resolution of problems produced by the transversality of the curriculum.

In this way, it is necessary to establish that undergraduate research

¹ Docente, Grupo los Asépticos, Fundación Universitaria del Área Andina, Seccional Pereira

contemplates benefits for all disciplines that work with students, in which the advisors show that the work is productively challenging and intellectually stimulating. Undergraduate research is a “high impact practice” that involves students more in their own education.

Universities must be aware that a large percentage of graduates will not focus on research as their main activity, however they must have the ability to do research and carry it out in an effective and practical way in their work area. To this end, universities must have a defined objective aimed at formative research, not as a complement to the curriculum, but rather as a process of continuous learning and academic training.

It is important to establish and make visible to students the benefits related to research training, within which we find the strengthening of leadership capacities as well as active commitment and experiences in independence and collaboration. Likewise, comprehensive training towards a greater appreciation of the value of disciplinary literature, thus generating critical thinking, inquiry and analysis skills. In addition, this allows building self-confidence to present their own ideas to the community, allowing the student to prepare for future academic activities, including postgraduate studies.

The purpose of formative research is to disseminate existing information and allow the student to integrate it as knowledge, considering it as permanent and necessary learning. One of the main problems that formative research must face is the number of teachers with the necessary capacities to generate investigative capacities in the student, requiring the university professor to adopt an attitude contrary to the object of teaching, generating a complex and dynamic nature of knowledge.

It can be concluded that the incursion of students in research hotbeds becomes a necessary process for professional training, in order to generate critical thoughts directed towards the search for unsolved problems and to be able to propose appreciable solutions in their work environment and contributing to the local or national development.

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CHAPTER 1. HEALTH AND SPORTS SCIENCES

FACTORS ASSOCIATED WITH EXACERBATIONS OR CRISIS EVENTS OF CHRONIC NON- COMMUNICABLE DISEASES

FACTORES ASOCIADOS A LAS EXACERBACIONES O EVENTOS DE CRISIS DE ENFERMEDADES CRÓNICAS NO TRANSMISIBLES EN HOSPITALES DE PRIMER NIVEL

*Authors: Giovanni García Castro, Sandra Milena Bedoya
Gaviria¹, Isabela Patiño Pulgarín y Valentina Valencia Flórez²*

Abstract

Chronic non-communicable diseases (CNDs) are pathologies responsible for high rates of mortality and dysfunction worldwide, being also high-cost conditions for the health systems of developing countries. The three main diseases in this category are Systemic Arterial

¹ Professors. Universidad Tecnológica de Pereira, Health Sciences Faculty, GIRUS Research Group.

² Students., Prehospital Care, EMT, Universidad Tecnológica de Pereira

Hypertension (SAH), Diabetes mellitus (DM) and Chronic Obstructive Pulmonary Disease (COPD). This project sought to determine the factors associated with exacerbations or crisis events in the three most frequent non-communicable chronic diseases, in the emergency services of first-level hospitals in the municipalities of Risaralda and Caldas. A prospective, descriptive, observational study was carried out, taking as a population the patients who attended the emergency department of 6 first-level hospitals in Risaralda and Caldas, diagnosed with exacerbated or in crisis COPD, hypertension or DM and who motivated the consultation to the emergency service; We sought to determine the main factors related to the exacerbation of the underlying disease. It was found that in general terms COPD is the most prevalent disease and that in the three cases most of those affected are of low economic resources and of rural origin. For the three diseases, factors related to poor adherence to treatment or misuse of medications are the cause of exacerbation events. For COPD it should be clarified that the most important factor was having previous exacerbations, that is, the more exacerbations, the more clinical deterioration. This study aims to suggest the implementation of educational strategies aimed at increasing awareness of the chronic process of the disease, as well as the importance of following the recommendations of the health system. On the other hand, the need to carry out studies involving the patient, his family and caregivers is raised to try to understand causes of social and cultural order that can influence poor adherence to treatments.

Key words: non-communicable chronic diseases, Pre-hospital care, Exacerbations, Hypertensive crisis, medical emergencies.

Resumen

Las enfermedades crónicas no transmisibles son patologías responsables de altas tasas de mortalidad y disfunción a nivel mundial, siendo además condiciones de alto costo para los sistemas de salud de países en vía de desarrollo. Las tres principales enfermedades de esta categoría son la Hipertensión arterial sistémica (HTA), la Diabetes mellitus (DM) y la Enfermedad pulmonar obstructiva crónica (EPOC). En este proyecto se buscó determinar los factores asociados a las exacerbaciones o eventos de crisis en las tres enfermedades crónicas no transmisibles más frecuentes, en los servicios de urgencias de

hospitales de primer nivel de municipios de Risaralda y Caldas. Se llevó a cabo un estudio descriptivo, observacional prospectivo, tomando como población los pacientes que acudieron al servicio de urgencias de 6 hospitales de primer nivel de Risaralda y Caldas, diagnosticados con EPOC, HTA o DM exacerbados o en crisis y que motivaron la consulta al servicio de urgencias; se buscó determinar los principales factores relacionados con la reagudización de su enfermedad de base. Se encontró que en términos generales la EPOC es la enfermedad más prevalente y que en los tres casos la mayoría de los afectados son de bajos recursos económicos y de origen rural. Para las tres enfermedades los factores relacionados con la mala adherencia al tratamiento o el mal uso de medicamentos son los causantes de eventos de reagudización. Para la EPOC se debe aclarar que el factor más importante fue tener exacerbaciones previas, es decir a más exacerbaciones, más deterioro clínico.

Con este estudio se pretende sugerir la implementación de estrategias de educación dirigidas a una mayor concientización del proceso crónico de la enfermedad, así como a la importancia de seguir las recomendaciones del sistema de salud. Por otro lado, se plantea la necesidad de llevar a cabo estudios en los que se involucre al paciente, su familia y cuidadores para tratar de comprender causas de orden social y cultural que pueden influir en la mala adherencia a los tratamientos.

Palabras claves: Enfermedades crónicas no transmisibles, Atención prehospitalaria, Exacerbaciones, Crisis hipertensiva, Urgencias médicas.

Introduction

According to the WHO Non-communicable diseases (NCDs) cause 40 million deaths each year, which is equivalent to 70% of the deaths that occur in the world.

Every year 15 million people between 30 and 69 years of age die from NCDs; more than 80% of these “premature” deaths occur in low- and middle-income countries (WHO, 2017). Cardiovascular diseases constitute most deaths from NCDs (17.7 million each year), followed by respiratory diseases (3.9 million) and diabetes (1.6 million). Tobacco

use, physical inactivity, harmful use of alcohol, and poor diets increase the risk of dying from one of the NCDs. Screening, care, and treatment, like palliative care, are critical components of the response to NCDs.

According to the WHO, economic conditions, social stratifications and poor eating habits have triggered an increase in the prevalence and complications of this type of disease; For this reason, the deterioration in the quality of life of patients and their families progressively declines, since the emotional, pharmacological and economic burden play a fundamental role in the course of each of these diseases. Tobacco is one of the main causes of exacerbations of the diseases, since its degree of addiction is very high, thus leading to disabling or fatal complications (Rodríguez, Nerín & Calle 2017).

NCDs not only cause premature deaths, but they are also the origin of multiple consequences such as disability and the loss of productive years, as well as increased expenditures in the national budget due to increased demand for services in health systems, which exceed its response capacity due to the fact that the treatments are more expensive, turning these pathologies into a public health problem.

In our country, these diseases have high mortality rates, in addition, according to the Ministry of Health, the Andean region, compared to others, have the highest prevalence rates of CNCD where more than 60% of the population suffers one or more of these conditions.

Chronic non-communicable diseases are those whose evolution is slow and of a long duration, these diseases generally increase due to the current way of life of the population, this refers to poor diet, sedentary lifestyle and other habits that people have. These diseases are characterized by having the same risk factors for their appearance such as smoking, lack of physical activity, inadequate diet, excessive alcohol consumption and obesity.

Noncommunicable diseases are the most important cause of death in the world, together they represent around 70% of the total number of annual deaths. Within the ranking of causes of morbidity and mortality in the general population, diseases of the circulatory system, mainly ischemic heart disease, cerebrovascular disease, arterial hypertension

and its complications, occupy the first place, followed by tumors, chronic lung diseases and degenerative osteoarticular diseases.

In Colombia, Decree 3039 National Public Health Plan states that chronic non-communicable diseases rank first among the main causes of illness and death in the Colombian population, even surpassing those caused by violence and accidents.

Strategies have been put in place around the world to reduce the prevalence of chronic non-communicable diseases and the risk factors related to them, however, it is a difficult task to carry out considering that this effort requires the proper functioning of the health systems, of intersectoral activities of permanent coordination, and in some cases of collaboration between the countries due to the high cost demanded by their prevention, treatment, rehabilitation, control and follow-up.

Taking into account the above, the Colombian government has set as a priority objective to reduce non-communicable diseases and disabilities by increasing the prevalence of physical activity, reducing the degree of exposure, as well as the age of initiation of consumption cigarettes and alcohol, and the promotion of diagnostic and preventive actions; opting for healthier alternatives that promote good health (PAHO, 2016).

Arterial hypertension

Hypertension is a chronic disease that consists of the continuous increase in the levels of blood pressure in the arteries and is classified as essential and secondary.

When evaluating a patient with hypertension, the goals are to identify potentially correctable causes of high blood pressure, to identify other cardiovascular risk factors, to assess for end-organ damage, to evaluate experience with previous treatments, and obstacles to treatment. The clinical history should include aspects such as: duration and known levels of high blood pressure, family history of hypertension and its sequelae, history or symptom of target organ damage, history of use of all kinds of drugs, results and adverse effects of antihypertensive treatments, psychosocial and environmental factors.

A hypertensive crisis is a severe acute hypertensive syndrome that, when it occurs, could cause target organ damage. In general, acute target organ damage occurs with a blood pressure higher than that observed in people without pre-existing hypertension (Cifu & Davis, 2017).

A fundamental factor in determining the treatment is the recognition of the acute deterioration of the vital function of a target organ when there is such deterioration the blood pressure must generally be lowered in a matter of minutes to limit or counteract the damage. When severe hypertension is believed to be acute, but there are no symptoms or signs, blood pressure is lowered over several hours to prevent progression to a hypertensive emergency.

When evaluating a hypertensive emergency or a hypertensive emergency in hospital settings, complementary tests such as electrocardiography, urine dipstick, complete blood count with formula and leukocyte count, blood chemistry including urea, creatinine, glucose sodium, potassium, calcium and total proteins are required. Before starting any treatment, it must be taken into account that severity is not only assessed with blood pressure figures, but no matter also how high these values are, the affection on the target organs must be evaluated (Leung et al, 2017).

Risk factors for hypertensive emergency or urgency include: Obesity (BMI > 30), associated coronary disease, anxiety disorders (somatoform), polypharmacy regarding antihypertensive medications, poor adherence to treatment, previous consumption of substances such as caffeine, nicotine or alcohol, consumption of self-medicated drugs and strenuous physical exercise (Jiménez & Montero, 2015).

Diabetes Mellitus

It is a highly prevalent disease, recognized as a public health problem, due to its high rates of associated morbidity and mortality. Different studies have documented that lack of adherence to treatment constitutes one of the main triggers for acute decompensations in diabetic patients. Within the spectrum of these alterations are acute hyperglycemic crises, which have been classified into two clinical entities: Diabetic ketoacidosis and hyperosmolar hyperglycemic State,

which constitute potentially fatal metabolic complications in the short term and of which can be found overlapping tables. Specific diagnostic criteria have been established seeking to make an accurate differential diagnosis, which allows an ideal treatment; however, morbidity and mortality rates remain considerable. Hypoglycemia also constitutes a medical emergency that, if not treated promptly, can cause permanent neurological damage and even death.

From the above, it is deduced the importance of having clear guidelines for the management of these alterations in all centers and services where emergency medical care is provided. Research continues in search of new diagnostic and therapeutic strategies that allow a more comprehensive management of DM and its complications, in order to improve the quality of life of patients.

The risk factors for emergency consultation for diabetes mellitus are: poor control of diabetes mellitus (inadequate diet), inability to eat or drink normally, heart failure, infections (urinary, respiratory, gastrointestinal), surgeries and non-adherence to treatment (Galeas, García, & Fernández, 2017).

Chronic obstructive pulmonary disease

COPD is a disease characterized by chronic and poorly reversible airflow limitation. This limitation is generally progressive and is associated with an abnormal inflammatory reaction to noxious particles or gases, mainly tobacco smoke.

Its best-known risk factors are: exposure to tobacco smoke, indoor air pollution (biomass combustion), occupational dusts and chemicals (vapors, irritants and fumes), air pollution in open spaces and genetic factors: such as deficiency of alpha 1 antitrypsin.

80% of patients with COPD present periodic exacerbations of their symptoms that tend to progressively increase in frequency and intensity, becoming one of the determining factors of the poor quality of life of these patients and a frequent cause of death.

A COPD exacerbation is an event in the natural development of the disease characterized by a change in the patient's dyspnea, cough and / or expectoration beyond daily variability, sufficient to justify a change in treatment (GOLD, 2017). In this definition, increased dyspnea is explicitly mentioned and introduces the concept that the exacerbation is not an isolated and fortuitous accident, but rather a recurrence that is part of the natural history of COPD, frequently triggered by external factors such as exposure to substances, continued tobacco use, or acute respiratory infections (Tabatabai & Gruber, 2018).

Risk factors for COPD exacerbation are: Acute respiratory infection, poor adherence to treatment, exposure to environmental toxins, worsening of coexisting diseases, three or more COPD exacerbations during the previous year, active smoking, and non-compliance with oxygen therapy (Miravittles, Soler-Cataluña, & Calle, 2014).

The relevance of CNDs is not only justified by their current contribution to global mortality and morbidity, but also because this contribution is expected to grow markedly over time as a consequence of the aging of the population, the fall in the incidence of communicable diseases and perinatal and nutritional conditions, and the negative influence of behavioral changes towards typically urban industrial lifestyles (consumption of tobacco, alcohol, inadequate diet and insufficient physical activity).

Materials and methods

A descriptive, observational, prospective study was carried out, taking as a population the patients who attended the emergency service of six first-level hospitals in Risaralda and Caldas, diagnosed with COPD, hypertension or DM exacerbated or in crisis and that motivated the consultation to the emergency service, between the months of January and June of the year 2018. For data collection, a survey designed to meet the objectives of the study was carried out, verifying descriptive demographic variables such as age, sex, origin (rural / urban), as well as lifestyle habits such as smoking and the presence of diseases such as diabetes mellitus or high blood pressure. Authorization was requested from the participating hospitals to obtain the data, which had protection of the confidentiality of the document. In addition, data typical of

patient care in the emergency department were recorded, such as his hemodynamic condition at admission (state of consciousness, blood pressure, heart rate, respiratory rate, oxygen saturation, glucometer) and finally the factors associated with decompensations, exacerbations or events considered crisis, associated with the three CNDs.

After the data collection of the patients with a diagnosis of CNDs in a period of crisis, comparison tables were made by item that helped to answer the research question.

The data collection was carried out by the students of the last semester of Technology in Prehospital Care, rotating in the aforementioned hospitals, they participated both in the construction of the instrument, as in the collection of data and the completion of the matrix in Excel 2010.

Finally, a univariate and multivariate analysis was carried out using statistical software.

The inclusion criteria were:

- Have a previous diagnosis of COPD, SHT or DM.
- Consult the emergency department for a condition considered crisis, exacerbation or decompensation of one of the three pathologies.
- Be over 18 years of age.
- Sign the informed consent designed for the study.

The exclusion criteria were:

- Diagnosis on admission not related to the three CNDs under study.
- Insufficient information.
- Refusal of the patient to continue in the study

Results and discussion

After data collection, it was found that more men than women consulted and that the origin was mostly urban. 72% of the patients have studies up to primary school and more than half belonged to strata 1 and 2. Finally, the Afro-descendant or indigenous population was a minority (Table 1).

The most prevalent disease of the three was COPD with 45%, then hypertension with 38%, and finally DM with 26%. 33% of the patients had two of the three diseases and only 6% suffered from all three. The description of the study cases corresponds to the events that led the patients to the emergency room in relation to their underlying disease.

Table 1. *Demographic data of patients treated in first-level hospitals in Risaralda and Caldas for non-communicable chronic diseases, first semester of 2018*

| Age | | |
|----------------|----------|----------|
| Average | 64.97 | |
| ED | 17.77 | |
| Max | 91 | |
| Min | 14 | |
| Sex | n | % |
| Female | 118 | 40.27 |
| Male | 175 | 59.73 |

| Procedencia | n | % |
|-----------------------|----------|----------|
| Urban | 153 | 52.22 |
| Rural | 140 | 47.78 |
| Escolaridad | n | % |
| Primary School | 211 | 72.01 |
| Secondary | 45 | 15.36 |
| Technical | 24 | 8.19 |
| University | 13 | 4.44 |
| Social stratum | n | % |
| 1 | 124 | 42.32 |
| 2 | 112 | 38.23 |
| 3 | 51 | 17.41 |
| 4 | 3 | 1.02 |
| 5 | 3 | 1.02 |
| 6 | 0 | 0.00 |

| Ethnicity | n | % |
|------------------|----------|----------|
| Afro | 19 | 6.48 |
| Indigenous | 28 | 9.56 |
| Other | 246 | 83.96 |

With regard to diabetes, patients follow the same pattern of the general population in terms of its characteristics, finding that the factors related to poor glycemic control are inadequate diet and poor adherence to treatment, it is clarified that some patients had more than one associated factor. (Table 2).

Table 2. *Factors associated with poor control of Diabetes Mellitus in first-level hospitals in Risaralda and Caldas, first half of 2018*

| Factor | n | % |
|----------------------------|----------|----------|
| Improper diet | 39 | 52.68 |
| Inability to eat or drink | 10 | 13.39 |
| Heart failure | 6 | 8.04 |
| Infections | 22 | 30.36 |
| Surgeries | 9 | 11.61 |
| Non-adherence to treatment | 34 | 46.43 |

Most of COPD patients were from rural areas with 58.5%, finding that the factors that influence the generation of exacerbations mainly include having other previous exacerbations and associated acute respiratory infections (Table 3).

Table 3. *Factors associated with COPD exacerbations in first-level hospitals in Risaralda and Caldas, first half of 2018*

| Factor | n | % |
|--|----|-------|
| Respiratory infection | 52 | 41,46 |
| Non-adherence to treatment | 38 | 29,27 |
| Exposure to environmental toxins | 44 | 34,15 |
| Worsening of coexisting disease | 23 | 17,07 |
| Three or more exacerbations in the previous year | 67 | 51,22 |
| Active smoking | 16 | 12,20 |
| Non-compliance with oxygen therapy | 47 | 36,59 |

Regarding SAH cases, the majority were women with 55.26%, finding that the factors most related to hypertensive crises are poor control of comorbidities such as obesity, poor adherence to treatment and self-medication (Table 4).

Table 4. *Factors associated with hypertensive crisis in first-level hospitals in Risaralda and Caldas, first semester of 2018*

| Factor | n | % |
|-----------------------------|----------|----------|
| Obesity (BMI) | 40 | 36,84 |
| Associated coronary disease | 23 | 21,05 |
| Anxiety disorders | 23 | 21,05 |
| Multiple medicaments | 29 | 26,32 |
| Non-adherence to treatment | 32 | 28,95 |
| Previous substance use | 23 | 21,05 |
| Self-medication | 29 | 26,32 |
| Physical exercise | 23 | 21,05 |

CNDs continue to be an important cause of consultation in the emergency room, where the predisposing factors for their exacerbation could be preventable and controllable. Health systems must establish strategies through patient and family education that promote informed decision-making about their personal well-being and about the available care services that they can access with opportunity and quality. Said education should include information on healthy lifestyles and methods of prevention and early detection of diseases, thus seeking to reduce the impact that these could cause, including disability and death.

Conclusions

Chronic diseases are characterized by their long duration, their progressiveness and incurability, and may require treatment and control for an extensive and indeterminate number of years. Due to the significant burden, they represent, both in terms of mortality and morbidity, and the close causal relationship that they have with certain avoidable risk factors, education and follow-up plans should be established for patients and caregivers, in order to achieve full compliance with the management plans defined for each case, since poor adherence to treatment represents one of the fundamental causes for the exacerbation of these chronic conditions. On the other hand, there is a need to design more rigorous studies that lead to the understanding of the social phenomena involved in factors such as awareness of the disease or the way in which health entities reach communities.

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ORAL ANTICOAGULATION IN PATIENTS WITH NON-VALVULAR ATRIAL FIBRILLATION IN A UNIVERSITY HOSPITAL IN COLOMBIA

ANTICOAGULACIÓN ORAL EN PACIENTES CON FIBRILACIÓN AURICULAR EN UN HOSPITAL UNIVERSITARIO DE COLOMBIA

Authors: María-Leonor Galindo-Márquez, Adrian Giraldo-Diaconeasa, Juan-Darío Franco-Ramírez y Eduardo Ramírez-Vallejo MD. FACP. FACC

Abstract

Background and objectives: Atrial fibrillation is the most common sustained cardiac arrhythmia in the world, it is related to increased morbidity and mortality rates. Currently there are management guidelines for anticoagulation in atrial fibrillation, but it has been shown that they are underutilized. This study seeks to analyze the trend of oral anticoagulation in non-valvular atrial fibrillation, according to management guidelines. **Methods:** A retrospective observational study was conducted analyzing the medical records of adult patients

diagnosed with non-valvular atrial fibrillation in a university hospital in Colombia, reviewing how many patients required anticoagulation according to current guidelines for 2018, and how many did not receive adequate management. **Results:** We analyzed 99 medical records, 97% of patients had indication for anticoagulation, which was not prescribed in 31% of cases. 79% of anticoagulated patients received new oral anticoagulants (NOACs). **Conclusion:** Almost all patients have an indication of anticoagulation, but many do not receive it at discharge and inappropriate medications are used in hospitalization according to the management guidelines. For achieving adequate therapy and adherence there is a lack of multidisciplinary teams, comprehensive evaluation of patients and dissemination of management guidelines.

Keywords: Atrial fibrillation, anticoagulation, stroke

Resumen

Introducción y objetivo: La fibrilación auricular es la arritmia cardíaca sostenida más frecuente en el mundo, se relaciona con aumento en las tasas de morbilidad. Actualmente existen guías de manejo para la anticoagulación en fibrilación auricular, pero se ha evidenciado que son infrautilizadas. Este estudio busca analizar la tendencia de anticoagulación oral en fibrilación auricular no valvular, según las guías de manejo. **Métodos:** Se llevó a cabo un estudio observacional retrospectivo analizando las historias clínicas de los pacientes adultos con diagnóstico de fibrilación auricular no valvular en un hospital universitario de Colombia, revisando cuántos pacientes requirieron anticoagulación según las guías actuales para el 2018, y cuántos no recibieron el manejo adecuado. **Resultados:** Se analizaron 99 historias clínicas, el 97% de pacientes tenían indicación para anticoagulación, la cual no fue prescrita en el 31% de casos. El 79% de pacientes anticoagulados recibieron nuevos anticoagulantes orales (NOACs). **Conclusión:** Casi la totalidad de los pacientes tienen indicación de anticoagulación, pero muchos no la reciben al egreso y en la hospitalización se utilizan medicamentos inapropiados según las guías de manejo. Faltan equipos multidisciplinarios, evaluación integral de los pacientes y difusión de las guías de manejo para lograr una terapia y adherencia adecuada.

Palabras clave: Fibrilación auricular, anticoagulación, accidente cerebrovascular

Introduction

Atrial fibrillation (AF) is defined as a cardiac arrhythmia characterized by a disorganization in electrical and mechanical atrial activity with loss of effective atrial contraction. At the electrocardiogram, it is characterized by the presence of fibrillatory activity in the atria, f waves of variable amplitude and cycle length, ranging between 100 and 200ms. There are multiple classifications described in the literature, however, the one that allows the most appropriate selection for treatment is the one that divides atrial fibrillation into valvular and non-valvular, which is explained by the presence of a valvular pathology, defined as significant mitral stenosis (moderate to severe) or the presence of mechanical valve prostheses in any position; all other conditions that explain atrial fibrillation are classified as non-valvular (1).

Atrial fibrillation is the most common sustained cardiac arrhythmia affecting more than 46.3 million people worldwide (2, 3). In the United States it affects more than 3 million people with an overall prevalence of 1% to 2%, and in Europe more than 14 million people over the age of 55 are projected to be affected by 2050 (3). The prevalence of atrial fibrillation increases with age, this being itself a risk factor for cerebrovascular disease (even 1/3 may be attributable to AF), heart failure, ischemic heart disease, hospitalizations and death (1-5). In non-developed countries annual mortality from atrial fibrillation has been almost double compared to developed countries, shown that AF mortality in South America is 17% and in Africa 20%, while in North America, Western Europe and Australia it is 10% (6). In Colombia there are no conclusive data on the prevalence in the general population, but studies done in several hospitals in the country report a prevalence that ranges in values close to 4.8% and also reporting an increase in this with age (4.4 times more in people over 70 years), but these data cannot be extrapolated to the general population (2,7).

Currently, the detection of AF, even at an asymptomatic stage is the basis for the stratification of stroke risk and the making of appropriate decisions about the need for anticoagulant therapy (6). In patients

with atrial fibrillation systemic anticoagulation has shown evidence of reducing the incidence of stroke by approximately 60% (8). Although it is known that these patients have a higher risk of mortality associated with thromboembolic events and the use of anticoagulants is associated with a reduction in this risk, the number of anticoagulated patients is currently much lower than it should be, reaching values of only 53% - 62% of patients with an indication of anticoagulation receiving pharmacological therapy and values of 48.7% of patients receiving an inadequate anticoagulation (2,8,9). In Colombia there are data from a study conducted in a reference center in the city of Bogotá, in which it was evidenced that only 54% of patients with an anticoagulation indication received the therapy, being a strong reason for not doing it, the fear of developing bleeding events (5) since this is a common fear in physicians at the time of initiating anticoagulation (4).

Management guidelines recommend that every patient with non-valvular atrial fibrillation should be stratified according to the risk of suffering a stroke. Most guidelines recommend using the CHA₂DS₂-VASc score (10,17,18) which considers the variables heart failure, arterial hypertension, age > 75 years, diabetes, stroke, vascular disease, age between 65-74 years and female sex, being shown to be more sensitive with respect to other scales (19,20). All patients with a CHA₂DS₂-VASc score equal to or greater than 2 should be anticoagulated (19), with a score of 1 the decision to anticoagulate is made by the clinician according to the particular case and there is no standardized recommendation (10) and with 0 there is no indication for anticoagulation. The only drugs used for this purpose are AVK (Vitamin K Antagonists) and NOAC (No antivitamin K Anticoagulants) (21).

Considering the previous and adding the fact that today the new anticoagulant therapies have gained strength (4,8) it was decided to carry out this retrospective observational study to determine the percentage of patients diagnosed with non-valvular AF with criteria for the use of anticoagulation using the CHA₂DS₂VASc score, which are not adequately anticoagulated according to current guidelines, both in hospitalization and at discharge from a third-level institution of the Colombian Coffee Region in a period of one year.

Materials and methods

Study type and study population

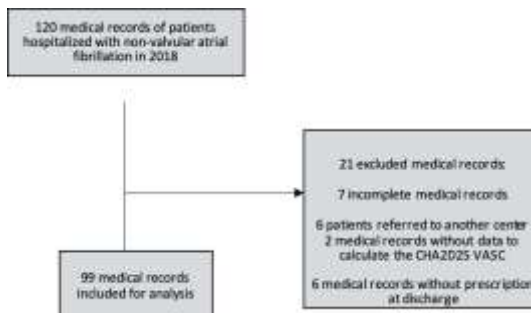
A retrospective observational study was carried out analyzing the medical records of adult patients diagnosed with non-valvular atrial fibrillation who were hospitalized at Hospital Universitario San Jorge of Pereira in 2018. For the collection of the data, we counted with the endorsed of the bioethics committees of the Universidad Tecnológica de Pereira and the Hospital Universitario San Jorge, the research was classified as “risk-free” according to national regulatory frameworks.

Data collection

We searched the medical records for the data needed to fill the parameters of classification of the risk scale for stroke in patients with atrial fibrillation (CHA2DS2 VASC), the anticoagulant management given during hospitalization and that prescribed at discharge.

Data analysis

It was analyzed how many patients required anticoagulation according to international guidelines such as NICE, AHA /ACC /HRS and ESC and the national guide of the Colombian Society of Cardiology and Cardiovascular Surgery used in 2018 for atrial fibrillation, and of these how many patients didn't receive an adequate management. Incomplete medical records were excluded for the analysis, in which data were missing to calculate the variables of CHA2DS2 VASC and information on the anticoagulation used in hospitalization and at discharge.



Results

Characteristics of the population:

We analyzed a total of 99 medical records, we found that the mean age of hospitalized patients diagnosed with non-valvular atrial fibrillation was the eighth decade of life; hypertension was the most prevalent comorbidity as we can see in Table 1, being present in 3 out of 4 patients, with a similar prevalence in both sexes.

The most frequent reason for consultation was acute coronary events (11%) and 40% of patients received antiplatelet, of these 98% took aspirin and 30% received dual anti-aggregation with Clopidogrel.

CHA2DS2VASC scale

We found that 97% of the patients had a CHA2DS2VASC result higher than or equal to 2 points. Separate by sex, the men had lower scores, being 100% below 6 points; in women the 17% had scores greater than 6 (Figure 1).

Anticoagulant management

During hospitalization, 75% of patients who received anticoagulation were anticoagulated with low molecular weight heparins (LMWH), specifically with enoxaparin (Figure 2)

At discharge 68 patients were anticoagulated, of these 79% were anticoagulated with new oral anticoagulants (NOACs), those used for this purpose were Apixaban (56%) and Rivaroxaban (44%) (Figure 3)

Of the 96 patients who had indication of anticoagulation according to CHA2DS2VASC score, 31% were discharged without any type of anticoagulation.

Table 1. Clinical and demographic characteristics of hospitalized patients diagnosed with non- valvular atrial fibrillation, showed as CHA2DS2VASC order.

| | Men, n (%) | Women, n (%) | Total, n (%) |
|---|------------|--------------|--------------|
| Characteristics of patients | | | |
| Congestive Heart Failure o LVEF < 40% | 21 (39,6) | 16 (34,8) | 37 (37,4) |
| Arterial hypertension | 42 (79,2) | 33 (71,7) | 75 (75,8) |
| Age > 75 years | 33 (62,3) | 29 (63,0) | 62 (62,6) |
| Diabetes | 9 (17,0) | 12 (26,1) | 21(21,2) |
| Stroke or TIA | 16 (30,2) | 16 (34,8) | 32 (32,3) |
| Vascular disease (MI, PAD or aortic plaque) | 25 (47,2) | 16 (34,8) | 41 (41,4) |
| Age 65-74 years | 12 (22,6) | 10 (21,7) | 22 (22,2) |
| Sex | 53 (53,5) | 46 (46,5) | 99 (100) |

Figure 1. CHA2DS2-Vasc score in hospitalized patients diagnosed with atrial fibrillation

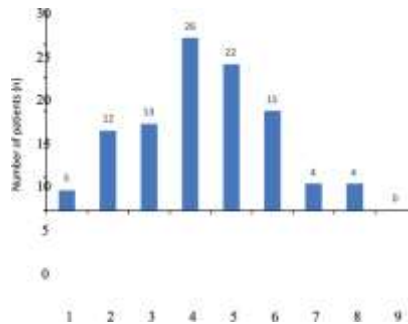
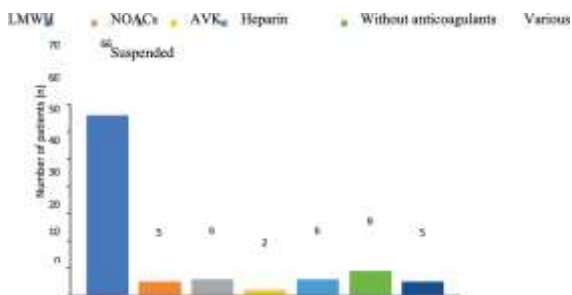


Figure 2. Anticoagulation of patients with non-valvular atrial fibrillation during hospitalization.



Discussion

From the cohort analyzed, we showed that approximately 7 out of 10 patients with anticoagulation indication given by the CHA2DS2VASc scale were discharged with anticoagulant management, of which 79% were with NOACs, which leaves 3 out of 10 patients without treatment, despite the indication according to the Colombian guidelines for the management of atrial fibrillation. We also found a high level of use of low molecular weight heparins (LMWH) during hospitalization for anticoagulant therapy, a drug that is not contemplated considering the evidence collected as anticoagulant therapy in patients with atrial fibrillation (4,8,10,11,14,17,18,21)

We found a high burden of disease in our patients, with an average age of 76 years, in which we calculated the CHADS2VA2SC scale obtaining a score higher than 2 points in 97% of the patients, which translates into high thrombotic risk, however, it is of relevance to highlight that many of the patients who enter the institution have socio-demographic factors that were not evaluated in the present study, which can condition the therapeutic measures of discharge (5).

Multiple causes have been studied regarding the lack of anticoagulant therapy in patients with AF, the bleeding risk plays an important role at the time of not use the anticoagulant therapy by the clinician, however, in the management guidelines anticoagulant

therapy is not contraindicated for this risk, and even the European guidelines excluded the HASBLED score for the risk assessment and recommended the individualized evaluation (11); hospitalization, depending on the cause, modifies the course of anticoagulant therapy, either by suspension when the reason for consultation is bleeding, or the onset when the reason for hospitalization is a cerebrovascular event(12). In our study we detected a change in the pattern of in-hospital prescribing, prevailing therapy with low molecular weight Heparins.

Factors such as the female sex play an important role, since by itself it is a prothrombotic factor, but at the time of prescription there are fewer anticoagulated women, as has been evidenced in various studies and is still the subject of research (13). We found that approximately 4 out of 5 patients who were discharged with anticoagulant therapy were prescribed with NOACS, which is part of the current management trend globally for non-valvular AF, when they are compared with vitamin K antagonists (Warfarin), it has been found that there is a lower risk of bleeding and as an additional advantage does not require routine controls of the INR (4,9,14).

Despite the multiple strategies to define the requirements of anticoagulant therapy in patients with AF, in several studies like ours we saw that there is still a lack of adherence to national and international recommendations and there is a significant proportion of patients who are not anticoagulated despite the indication (5,9,14); expert hospital intervention groups have been proposed to ensure successful intervention (9).

In Colombia it has been evidenced through the published studies on anticoagulation in atrial fibrillation, that approximately 54% of patients did not receive anticoagulant therapy although they had the indication evaluated with the CHADS2VA2SC scale, compared to the 31% that we reported in our study, it should be clarified that at the time of the study with which we compared our results (5), the introduction of NOACS was recent, in fact only Dabigatran was used; we consider its necessary to carry out new studies that quantify the use of new anticoagulants in the country.

Evidence-based clinical practice guidelines aim to help physicians and patients make appropriate decisions about a specific entity, which is why in recent decades the implementation of this has increased, with the subsequent reduction of the rate of varied and inappropriate therapeutic behaviors, improving the quality of medical care and decreasing costs. Even so, recent studies suggest that at least 30-40% of patients do not receive care based on current scientific evidence (15,16). And there are several studies that evaluate the barriers to the implementation of the management guidelines, among which are the lack of knowledge of the existence of the guidelines, the non-agreement with the recommendations by some health workers, by personal decision of the patient, environmental factors such as limited working time, limited human resources, and even limitations of socio-political context (16), for this reason, we consider it is necessary to carry out studies that evaluate the factors described above in Colombia and in the Eje Cafetero, in order to create strategies for the implementation of clinical practice guidelines for the improvement of professional practice and the health outcomes of patients.

It has been suggested the creation of institutional groups of surveillance for the adherence to the guidelines of diverse pathologies as part of protocols directed towards the unification of the criteria and guidelines of management, in multiple studies has been perceived objectively the improvement in the quality of care, the reduction of adverse events and complications derived from the variability in management, as described (9,15,16); however, it is not the only thing that can improve; since there are other elements among which are educational, social and cultural data of doctors and patients that must be understood, to achieve a more comprehensive approach to the problem.

Similarly, due to the limitations of our study, such as the size of the sample, the realization of the study in a single hospital center and that the data studied refer only one year, we suggest carrying out similar studies in other parts of the country that allow to analyze different reference centers to be able to have a broader panorama of oral anticoagulation and adherence to the guidelines of atrial fibrillation in Colombia. It is also relevant to mention that in our objectives we do not include the in-depth study of the reasons why heparins were prescribed as a drug for anticoagulation in the intrahospital environment, we consider that this pattern of prescription deserves a greater number of studies

where the factors that result in the decision to anticoagulate with this pharmacological group are identified.

Conclusions

Almost all patients with non-valvular atrial fibrillation have an indication for oral anticoagulation, however, a significant percentage do not receive it at discharge, in addition, during hospitalization, some anticoagulants drugs are used that are not contemplated in the management guidelines.

A comprehensive assessment of patients is required to ensure adequate therapy and adherence, considering individual biological, social and demographic factors.

The reasons why physicians do not prescribe anticoagulation when indicated should be identified, interdisciplinary groups should be included to manage these patients, and current guidelines and protocols for the management of atrial fibrillation should be disseminated. In the same way, we suggest conducting studies that deepen the lack of adherence of physicians to management guidelines, so that this phenomenon can be better understood.

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PERFORMANCE IN INITIAL TRAUMA ASSESSMENT OF EMERGENCY TEAMS FROM PREHOSPITAL CARE TEAMS

NIVEL DE DESEMPEÑO EN EVALUACIÓN INICIAL DEL TRAUMA DE EQUIPOS DE EMERGENCIA DE EMPRESAS DE ATENCIÓN PREHOSPITALARIA

**Authors: Giovanni García Castro, Yamileth Estrada Berrio¹,
Manuela Aguirre Torres e Isabella Díaz Leal²**

Abstract

During the evolution and development of man, trauma has been present, generating socioeconomic impacts and representing one of the leading causes of death in young people worldwide. Indeed, it is the prehospital field that constitutes a fundamental part in the final recovery of patients suffering from some type of trauma. This study sought to determine the level of performance in the initial care of the polytraumatized patient by the emergency teams of different prehospital care companies in the city of Pereira and Cartago. A descriptive, observational and prospective study was carried out, where it was evaluated by means of a data collection and analysis instrument

¹ Professors. Universidad Tecnológica de Pereira, Health Sciences Faculty, GIRUS Research Group.

² Students., Prehospital Care, EMT, Universidad Tecnológica de Pereira

to three prehospital emergency services companies of the municipality of Pereira and Cartago, where drivers, firefighters, technologists in pre-hospital care and auxiliary nursing technicians faced pre-hospital scenarios through clinical simulation to estimate their performance in the care performed. It was evidenced that the population evaluated is in an age range between 26 and 41 years, mostly men; 67% are firefighters and ambulance drivers, while 8% of the total evaluated are technologists in pre-hospital care. Regarding the academic update, 51% of those evaluated have not taken refresher courses in the last 5 years. Regarding the final score of the trauma assessment test, it was found that 67% of those evaluated obtained a score lower than 20 out of 44 and the remaining 13% obtained a score close to the total score. The research allowed to demonstrate that the technologists in pre-hospital care in comparison with the rest of the personnel evaluated obtained the best performance when providing care to a trauma patient. Indeed, the lack of technologists in prehospital care can be significant in the outcome of the trauma patient. Likewise, it is concluded that the lack of academic updating in the emergency personnel significantly influences the performance of the trauma patient care. Finally, it was shown that high-fidelity clinical simulation works as an evaluation strategy in clinical cases of trauma, as evidenced by the study.

Key words: Clinical simulation, International Trauma Life Support (ITLS), emergency teams, pre-hospital care, multiple trauma.

Resumen

Durante la evolución y el desarrollo del hombre, el trauma ha estado presente, generando impactos socioeconómicos y representando una de las primeras causas de muerte en la población joven a nivel mundial. En efecto, es el campo prehospitalario el que constituye una parte fundamental en la recuperación final de los pacientes que padecen algún tipo de traumatismo. Este estudio buscó determinar el nivel de desempeño en la atención inicial del paciente politraumatizado por parte de equipos de emergencia de diferentes empresas de atención prehospitalaria en la ciudad de Pereira y Cartago. Se llevó a cabo un estudio de tipo descriptivo, observacional y prospectivo, en donde se evaluó por medio de un instrumento de recolección y análisis de datos a tres empresas de servicios de emergencias prehospitalarias

del municipio de Pereira y Cartago, en donde conductores, bomberos, tecnólogos en atención prehospitalaria y técnicos auxiliares de enfermería se enfrentaron a escenarios prehospitalarios por medio de la simulación clínica para estimar su desempeño en la atención ejecutada. Se evidenció que la población evaluada se encuentra en un rango de edad entre 26 y 41 años, en su mayoría hombres; un 67% son bomberos y conductores de ambulancia, mientras que el 8% del total de los evaluados son tecnólogos en atención prehospitalaria. Respecto de la actualización académica el 51% de los evaluados no han realizado cursos de actualización en los últimos 5 años. En cuanto a la calificación final de la prueba de valoración en trauma, se halló que el 67% de los evaluados obtuvieron un puntaje menor a 20 sobre 44 y el 13% restantes obtuvieron una calificación cercana al puntaje total. La investigación permitió demostrar que los tecnólogos en atención prehospitalaria en comparación con el resto de personal evaluado obtuvieron el mejor desempeño al brindar atención a un paciente traumatizado. En efecto, la carencia de tecnólogos en atención prehospitalaria puede ser significativa en el desenlace del paciente en trauma. Asimismo, se concluye que la falta de actualización académica en el personal de emergencias influye significativamente en el desempeño de atención del paciente traumatizado. Finalmente, se demostró que la simulación clínica de alta fidelidad funciona como estrategia de evaluación en los casos clínicos de trauma como lo evidencia el estudio.

Palabras claves: Simulación clínica, International Trauma Life Support (ITLS), equipos de emergencia, atención prehospitalaria, politraumatismo.

Introduction

Trauma is an event that over the years has gained greater importance in society given the advances in technology and means of transport, which appear as predisposing factors for the incidence of multiple injuries. In Colombia, an attempt has been made to create a prehospital care system from which adequate care can be provided to patients; However, these efforts have not been sufficient, since the system has not yet been fully established, leading to a disorder in the pre-hospital care processes that impact on the recovery and life of polytraumatized patients.

Injuries represent more than five million deaths a year in developing countries, figures that exceed diseases such as AIDS, malaria and tuberculosis: highly fatal conditions for humans. According to a study carried out by the Hospital Obispo Polanco Teruel in 2007, more than 50% of trauma patients die in the first three hours, the fatalities are in large numbers those who suffer head and chest injuries, these deaths are classified as premature death. However, there is another noticeably marked threshold of deaths and these are those classified as post-precocious, which amount to 75% in the first 24 hours. It is in this period where an initial attention focused on a simple management of the airway and the control of hemorrhages determines survival in a polytrauma (Espinoza, 2011).

According to figures from the National Planning Department in 2017, in the last decade Risaralda and specifically its capital Pereira, has grown considerably thanks to its economic, infrastructure and road development, which represents a triggering factor in the increase in multiple injuries caused by traffic accidents, and despite the fact that, according to a report from the Ministry of Social Protection (2015) there is a greater number of companies dedicated to the service of traffic accidents, the care is not optimal and in recent years there have been difficulties due to the conflicts that are generated at the time of performing the intervention on a patient.

The life prognosis of a trauma patient can be determined by factors direct to the injuries presented and / or connected to the care provided in the prehospital setting. It is essential to know the level of knowledge of the prehospital care personnel, based on the protocols established for emergency situations in which decisions must be made in a fast, timely and effective manner. Taking into account the importance of the integral training of personnel with a holistic, global and humanized vision. (Sureda, Ramis, & Sesé, 2017) This research allowed evaluating the correct development of the ITLS (International Trauma Life Support) trauma protocol, its effectiveness in stressful situations and the proper management of patients; the development of professional attitudes, human relationships and psychomotor skills will be known; Using clinical simulation as the main tool, which aims to reason, deliberate and issue judgments in order to self-regulate learning by identifying errors and subsequently providing feedback on the case.

Clinical simulation

It is a technique formally used in medical education for more than 40 years. In order to improve the experience of the apprentice and optimization in patient care through the development of skills and abilities with repetitive practice (Dávila-Cervantes, 2014). Simulation was born out of cybernetics, which is the interdisciplinary science that deals with communication and control systems in living organisms, machines, and organizations. It was applied for the first time by the mathematical physicist Norbert Wiener (1894 -1964) during the Second World War, when he was dedicated to the investigation of anti-aircraft defense techniques, developing the theory of feedback or “feed-back” (Matiz-Camacho, 2012).

In Colombia, the first simulation center was the Clinical Simulation Center of the Pontificia Universidad Javeriana, founded in 2007. which was a laboratory of skills and abilities with spaces in which simulators called partial training (part task trainers) were used, which is what is usually found in traditional simulation laboratories. The simulation should have the following steps: Definition of the system, formulation of the model, data collection, implementation of the model in the computer and validation.

Prehospital Care

The advancement of prehospital care in Colombia has been described as one of the priorities in the improvement of the health system for the management of emergencies, emergencies and disasters, making it an essential part of the Emergency Medical Systems (EMS). Pre-hospital care is composed of a variety of rescue, medical care and rescue functions that are provided to a patient quickly and agilely in the same place where the event occurred, during their transfer to a healthcare center or when they are referred. from one of these to another. This care is carried out by suitable and equipped personnel who mainly seek to reduce or eliminate the deterioration of health, compensate for the patient’s conditions and transport them safely to a medical center. Prehospital care in Colombia requires an efficient management method that facilitates the work of various professionals in the health area who attend to critical situations, and thus improve the quality of care for patients before their definitive management in healthcare centers.

The National Government in conjunction with the Ministry of Health and Social Protection recognizes the need to improve pre-hospital care in Colombia, and in turn design and develop a medical emergency system that, as stated in Law 1438 of 2011 in article 67, approve the coordination and articulation of all the professionals involved in the comprehensive care of medical emergencies, and that allows improving the timeliness, quality and impact of the provision of health services. (Prehospital, Basic Guidelines for Medical Care, 2012)

Emergency Equipment

The main purpose of emergency teams is to preserve the lives of patients who are in an emergency situation, achieving this through appropriate medical devices and technical training that does not depend only on the knowledge of the professional, but also on the speed in the answer; In other words, emergency teams are a set of human and material resources that carry out a series of organized processes, from the reception of the call or request for help, analysis of said call, classification of the number of injured, which is known as triage and finally until the resolution of the incident presented.

Trauma assessment

The trauma assessment is responsible for determining the presence of life-threatening injuries immediately, as well as identifying those patients who will require an urgent transfer to a hospital due to their injuries (Campbell, 2016). This is where the professional must use their techniques and maneuvers to stabilize critical situations that put the life of the polytraumatized person at imminent risk. The International Trauma Life Support trauma assessment protocol emphasizes three items that make up the trauma assessment: The first, the assessment of the scene, which seeks to observe and adopt biosecurity measures prior to approaching the victim. The second, the initial evaluation where a rapid assessment of the airway, respiration and circulation is carried out in order to prioritize the patient and identify immediately life-threatening situations. And finally, a rapid trauma assessment ora focused assessment that relies on conducting a brief head-to-toe examination to identify life-threatening injuries (Campbell, 2016).

Materials and methods

A descriptive, prospective observational study was carried out, taking as population the members of the emergency teams of prehospital care companies of the city of Pereira, with which the collection of descriptive sociodemographic data such as: age, sex, occupation and experience in years. Subsequently, the performance level of the application of the initial assessment of the multiple trauma patient was evaluated by clinical simulation and with objective and standardized criteria.

The survey and evaluation model were designed by the researchers bearing in mind some demographic variables and an evaluative part where certain criteria of knowledge in trauma care were observed based on the current protocols of the ITLS (International Trauma Life Support), such as the assessment of the scene that includes certain points such as biosecurity, scene security, among others. On the other hand, an initial assessment that in turn includes the importance of observing the patient in a global way and not only observing the obvious injuries to the eye of the person who provides the care, it is there where the vital thing in the organism of the patient is stabilized. traumatized such as neurological status, airway and circulation. And finally, a fragment in which a quick trauma assessment is made, finding injuries that are not seen with the naked eye but that can worsen the patient's condition.

The survey had 33 items and was designed on a Likert-type scale with a score of 0 to 2, with zero (0) never being carried out and two (2) always being carried out. This instrument was subjected to a pilot test in which it was sought to identify coherence in the questions, from their formulation to the variability of the answers. It was carried out with 48 participants from emergency teams from different ambulance companies, who voluntarily accepted their participation in the study through a duly completed informed consent

Results and discussion

Once the data had been collected, it was evident that the majority of the study participants were men, with a lower percentage of women,

specifically 33% (Figure 1). Likewise, it was observed that the age range varied between 26 and 41 years, with the predominant participants aged between 26 and 30 years and over 40 years (Figure 1).

Figure 1. *Distribution by sex of emergency teams*

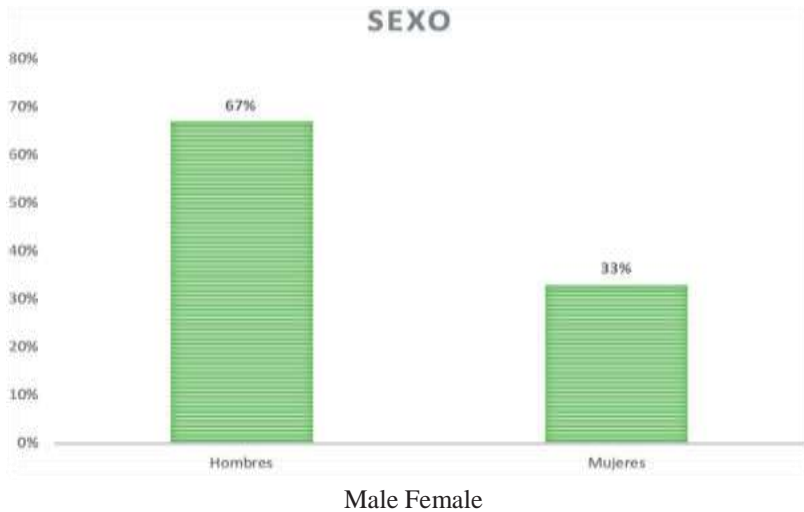
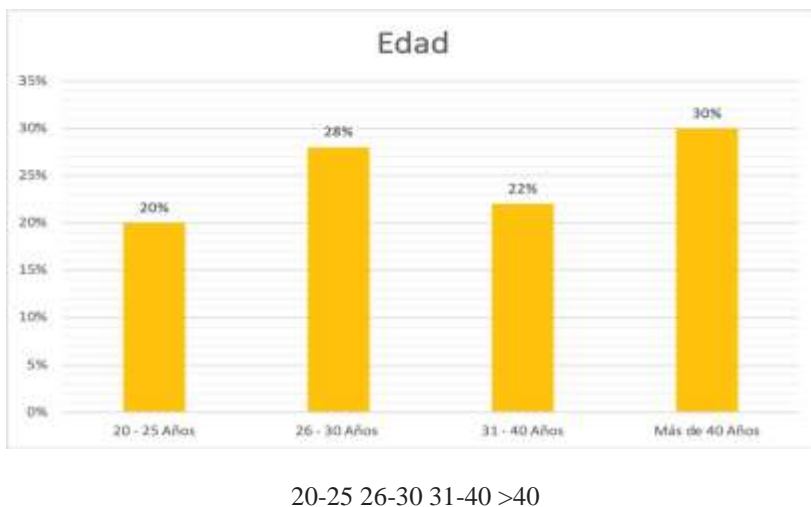
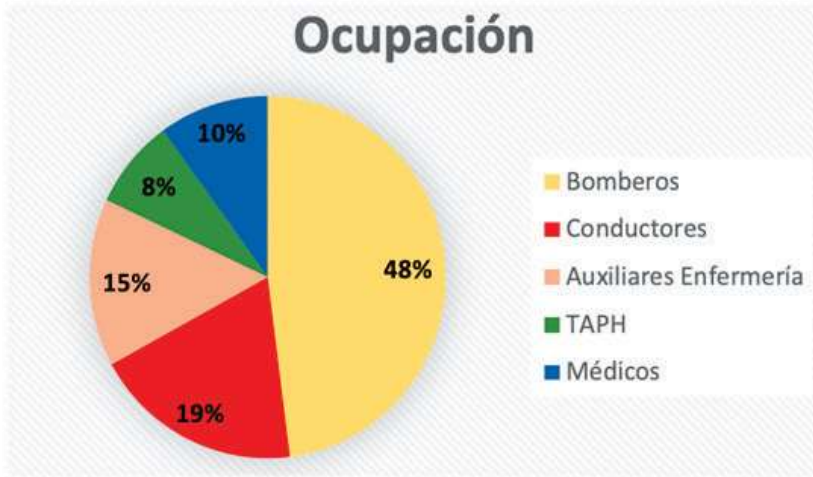


Figure 2. *Age distribution (years) of emergency teams*



Regarding the occupation of those evaluated, it was shown that 48% of them are firefighters, followed by ambulance drivers with 19%, nursing assistants with 15% and doctors with 10%. In the same way, it was observed that only 8% of technologists in pre-hospital care are working in the companies evaluated (Figure 3).

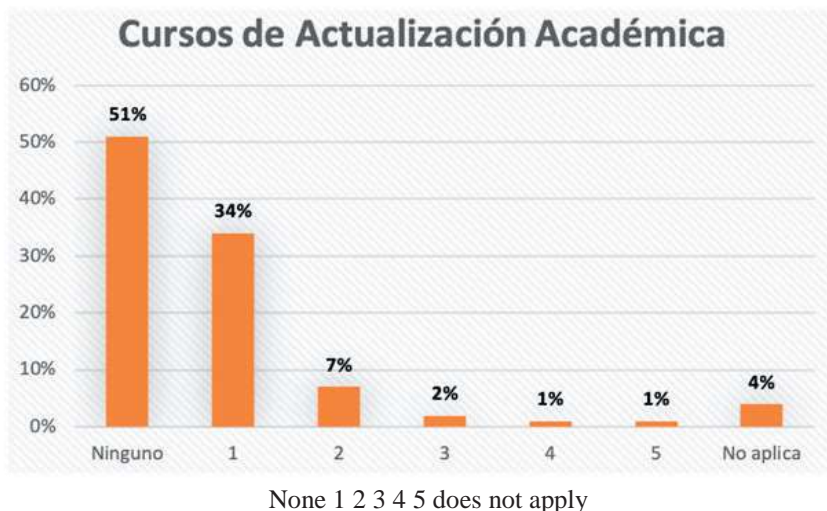
Figure 3. Occupational profile of emergency teams



On the other hand, it was evidenced that more than 50% of the people evaluated had more than 5 years of experience in the prehospital environment. Indeed, it was shown that the companies evaluated prefer to have professionals with more than 4 years of experience in their organizations.

Regarding the academic update, a notable percentage of those evaluated did not take any update course in the last 5 years. Even so, only 34% took a refresher course in a period of 5 years, followed by a percentage of 7% of those evaluated who took at least two courses and another 4% who took between three and five courses in the same period of time. time (Figure 4).

Figure 4. Refresher courses carried out in a period of 5 years by emergency teams



Finally, taking into account the final result of the evaluation, it was possible to deduce that, out of a total of 44 points, only 13% of those evaluated were able to approach the optimal evaluation score, with the total number of technologists in pre-hospital care being the ones with the highest score. Simultaneously, 21% of the participants obtained an average of between 21 and 30 points, followed by 66% of those evaluated who obtained a score less than or equal to 20.

Experience and knowledge are terms closely linked to the prehospital environment, since optimal care for patients who are truly life-threatening due to trauma depends on them. When any of these elements is absent, the recovery or survival of the patient is exposed to multiple possibilities. The emergency teams of some ambulance companies in the city currently have personnel experienced in trauma events, however, the lack of academic updating leads to the loss of skills necessary when caring for an unstable patient due to trauma.

In the same way, prehospital care technologists have led a substantial change in the health system in Colombia, improving the chances of life of patients who suffer some type of trauma and implementing viable health care methods, which is why companies in charge of prehospital

care and home medicine choose to hire these professionals from their organizations.

Conclusions

At present, trauma has made more sense worldwide and there are multiple factors that intervene and facilitate the increase in events. In the same way, this has led to growth in companies dedicated to caring for traffic accidents and that daily face various situations in which the polytraumatized patient needs comprehensive help to reduce the consequences of this type of accident. events may cause. It is evident that the lack of academic updating in the prehospital staff has influences on the final outcome of the patients, since the mere fact of having years of experience in the extra-hospital field proves that it is not enough to provide comprehensive care to the polytraumatized patient.

It should also be mentioned that clinical simulation once again shows its positive effects on the academy and that this type of practice should not only be used as an evaluation method, but also as a reason to encourage the academic updating of all staff of health. It should be added that prehospital care technologists confirm the change they have made to the health system in recent years in Colombia, although it is true that there are still failures in the regulation of calls for trauma events, which is relevant is to be able to observe that the care given by technologists in pre-hospital care has been more successful than the care given by other professionals who even have more time of experience in that field.

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ACADEMIC TRAINING AND WORKING CONDITIONS OF NURSING PROFESSIONALS IN PEREIRA - RISARALDA 2020

FORMACIÓN ACADÉMICA Y CONDICIONES LABORALES DE LOS PROFESIONALES DE ENFERMERÍA DE PEREIRA- RISARALDA 2020

Authors: Miguel Ángel Gómez Puerta¹, Laura Isabel Orozco Santamaría², Alexandra Villa Patiño³ y Gladys Judith Basto Hernández⁴.

Abstract

Nursing professionally takes care of the health and illness of people, families, and communities in general. It is performance, in clinical and community areas, that fulfills functions of education, management,

1 Fundación Universitaria del Área Andina, Research Nurse, mgomez209@estudiantes.areandina.edu.co.

2 Fundación Universitaria del Área Andina, Research Nurse, lorozco39@estudiantes.areandina.edu.co.

3 Fundación Universitaria del Área Andina, Research Nurse, avilla16@estudiantes.areandina.edu.co.

4 Fundación Universitaria del Área Andina, Nursing teacher, gbasto@areandina.edu.co

direct assistance, research and entrepreneurship that allows him to be a leader of the health team in any context of performance. Therefore, this professional goes by hand of care with emotional and physiological needs. Objective: To identify socio-academic characteristics and working conditions of Nursing Professionals who work or have worked in the Pereira-Risaralda municipality in the year 2020. Quantitative study, descriptive and cross-sectional approach, non-random sample of 101 nurses who voluntarily responded to an on-line survey. Surveys completed with more than 75% of the questions were included. The survey was previously tested for validity and reliability. The information was tabulated in Excel and descriptive statistics were applied using SPSS v.23. According to Resolution 8430 of 1993, research without risk. This study has ethical endorsement and contributes to the inter-institutional Andina's Project Area CVI2020 GIER – P08. Results: predominance of the female gender 87,4%; 35,67% of ages between 31 and 40 Years old; 55,5% live in Pereira, 46,3% are owners of these houses, 64,3% are stratum 3 and 4 the 64,3%, the 33,5% have one kid, 63,2% have between 1 and 2 people on charge. 62,3% work in private companies, 48% work in hospitals in administrative functions, 31.2% have an open-ended contract, 70.1% work full time; 41,8% earn between 2 and 3 FLSA and 11% form 1 and 2 FLSA. The 87.1% contributes to health, 72.7% is made by the employee and the company, 80.5% contributes to occupational hazards; 70,3% has a degree of specialization, 54% master's degree, Doctor of Education 5,3%. The 20.8% have experienced discrimination in the workplace. Population between 31 and 40 years old, leaving in evidence the productivity and labor maturity that characterizes them, 35.1% married, which brings benefit to themselves and their workplace by having better ability to adapt to the new reality, 11% receive between 1 and 2 FLSA, which leaves in evidence, that even the nursing professional does not receive adequate remuneration. The area of specialization is administrative, being management with 14.3%, confirming that the clinical area does not show interest by lack of work motivation. Young professionals, low income, work in the hospital in administrative functions, with little involvement in direct care. It is necessary to promote qualification and improvement of working conditions.

Keywords: working conditions, nursing economics, professional education, nursing

Resumen

La enfermería profesional cuida las experiencias de salud y enfermedad de individuos, familias y comunidades. Su desempeño, en áreas de clínicas y comunidades; cumpliendo funciones de educación, gestión, asistencia directa, investigación y emprendimiento que le permite ser líder del equipo de salud en cualquier contexto de desempeño. Asimismo, este profesional es sujeto de cuidado con necesidades emocionales y fisiológicos. Objetivo: Identificar características socio-académicas y condiciones laborales de los Profesionales de Enfermería que laboran o han laborado en el municipio de Pereira- Risaralda en el año 2020. Estudio cuantitativo, enfoque descriptivo y transversal, muestra no aleatoria de 101 enfermeros quienes voluntariamente respondieron encuesta vía on-line. Se incluyeron las encuestas diligenciadas con más del 75% de las preguntas. La encuesta fue previamente sometida a prueba de validez y confiabilidad. La información se tabuló en Excel, se aplicó estadística descriptiva, utilizando SPSS v.23. Según Resolución 8430 de 1993, investigación sin riesgo. Este estudio tiene aval ético y le aporta al proyecto interinstitucional del Área Andina CVI2020 GIER-P08. Predomina el género femenino 87,4%; el 35,67% edades entre 31 a 40 años; 55,5% residen en Pereira, 46,3% tiene casa propia, 64,3% son estrato 3 y 4 el 64,3%, el 33,5% tiene un hijo, 63,2% tiene entre 1 y 2 persona a cargo. El 62,3% laboran en empresas de carácter privado, 48% trabajan en clínica cumpliendo funciones administrativas, 31,2% tiene contrato a término indefinido, 70,1% laboran tiempo completo; 41,8% reciben de 2 a 3 SMMLV y 11% de 1 a 2 SMMLV. El 87,1% realiza aporte a salud, 72,7% lo hace el trabajador y la empresa, 80,5% aporta a riesgos laborales; 70,3% tiene especialización, 54% maestría, doctorado 5,3%. El 20,8% han sentido discriminación laboral. Población entre 31 a 40 años, dejan en evidencia la productividad y madurez laboral que los caracteriza, 35,1% casados, lo que trae beneficio propio y su lugar de trabajo al tener mejor capacidad de adaptación a la nueva realidad, recibe entre 1 y 2 SMMLV el 11%, lo que deja en evidencia, que aún el profesional de enfermería no recibe remuneración adecuada. El área de especialización es administrativa, siendo gerencia con un 14,3%, corroborando que el ámbito clínico no muestra interés por falta de motivación laboral. Profesionales jóvenes, con bajos ingresos, el trabajo en clínica es principalmente administrativo, con escasa participación

en el cuidado directo. Es necesario fomentar la cualificación y el mejoramiento de las condiciones laborales.

Palabras Clave: Condiciones de trabajo, economía de la enfermería, educación profesional, enfermería.

Introduction

Nursing as a discipline and profession has evolved gradually in care and in the labor field, this space of attention has established a series of conditions that allowed the development of the professional and with it a quality care, in front of this there are some sociodemographic, academic and labor characteristics, which should provide recognition, remuneration and welfare.

On the other hand, one of the biggest challenges facing this profession in today's world, and specifically in Colombia, is to remain in the labor market. The phenomenon of globalization that we are experiencing brings with it the economization of health, which generates important inequalities and injustices in work relationships and productive processes, supported by legal- normative referents that have made possible the precariousness of the professions engaged in the delivery of health services.

The situation for Nursing has been, from every point of view, synonymous with the damage of human life and dignity: employment systems, salaries, work schedules and, in general, working conditions have become economic strategies that prioritize the rentability of the capitalist system, the individualization of work and the responsibilities linked to it, putting them above the right to health and the common and supportive welfare, which leads to situations of health problems in nurses, whose main causes are economic, social and emotional instability, for them and their families.

In Fundación Universitaria del Área Andina, this work responds to the strategic direction of the Research according to the institutional policy and is included in two strategic focuses: "Humanization of the professions", The working conditions of the professionals are closely related to the provision of an excellent service and health care to people,

families and communities, and in the aspect of “Social transformation, environmental management and territorial development” the results is expected to be important, necessary and useful as a contribution to a better development and use of nursing human talent at the local level, as given their integral, humanistic and vocational training, it is essential that these professionals are present in all health projects that involve interdisciplinarity and academic connection with the environment and health programs.

Considering the development of nursing, within the framework of the discipline and profession, it should be considered that the field has opened up within the world of employment and has been characterized by historical, social, economic and political contexts. This refers, for example, to the strong change of economic models in countries, some of them in Latin America, which have allowed an increase in the university offer as a business opportunity, causing an increase in training.

The truth and reality about these conditions that are supposed to be provided in the country and that is happening in several countries, is that they are not being complied with. By qualified professionals and in enough number. But because of globalization, there is currently an imbalance between supply and demand, causing a regular existence of: overload, few resources, poor infrastructure, salaries that are unable to meet the basic needs of the professional, such as shift rotation and toxic working environments.

Another problem, given that nursing constitutes the largest category of the health workforce, is the percentage breakdown of professionals according to their training, including bachelor’s degree nurses (the country has no record of technologists, nursing technicians), auxiliary nurses and basic nursing assistants.

All the aspects presented above make clear the impact that these factors have on the way in which good care is provided, as well as the underestimated importance of the profession at a social level, since it has been identified as female work, the lack of control in the exercise of the profession, the following question of interest emerged: what are the socio-academic characteristics and working conditions of nursing professionals in Pereira-Risaralda in the year 2020?

Materials and methods

It was developed at the request of ANEC. A quantitative, descriptive and cross-sectional study was carried out. Total population of 260 professionals; to which were applied as inclusion criteria: their work performance and academic conditions in the city of Pereira, from which a study sample of 101 professionals was taken. These were assigned a digital survey which contained a series of questions guided to the sociodemographic, academic and occupational aspects of each nursing professional, afterwards and complying with the informed consent signed by each participant, this information was collected in an Excel database. A descriptive statistical analysis was completed according to the measures of central tendency, which were obtained from the database. The collection instrument was made in a software which was developed with the support of an expert researcher in the subject, it was supported and approved by teachers and researchers belonging to the National Association of Nurses (ANEC) and there was a preliminary test of about 30 nursing professionals.

Results and discussion

Based on the sociodemographic, academic and occupational questions, a series of conclusive results were obtained in these three aspects:

Socio-Demographic Aspects: The most participants are women 87.4% dominance over men, 35% are married, also the age range with the highest participation was between 31 and 40 years, with 35.6%, followed by professionals between 21 and 30 years, with 20.8%, as we moved up the age range was noted a lower registration, such as what happened with people who are between 51 and 60 years, with 13.9% participation, 57.1% are head of household and have at least one person to take care of 34.1%, 37.9% pay rent and 55.5% live in Pereira and 64.3% live in strata 3 and 4.

Table 1. *Sociodemographic Characterization of Nurses Pereira - Colombia 2020*

| Baseline characteristic | Number of nurses | |
|-------------------------|------------------|------|
| | <i>n</i> | % |
| Gender | | |
| Female | 88 | 87,4 |
| Male | 13 | 50 |
| Age range | | |
| 21-30 | 21 | 20,8 |
| 31-40 | 36 | 35,6 |
| 41-50 | 22 | 21,8 |
| 51-60 | 14 | 13,9 |
| 61* | 8 | 7,9 |
| Marital status | | |
| Single | 33 | 32,7 |
| Married | 35 | 35 |
| Free union | 18 | 17,8 |
| Divorced/separated | 9 | 8,9 |
| Widower | 3 | 3,3 |
| Other | 3 | 3,3 |
| Social statement | | |
| 1-2 | 13 | 12,6 |
| 3-4 | 65 | 64,3 |
| 5-6 | 21 | 20,3 |
| No answer | 3 | 2,7 |

| | | |
|------------------------------|----|------|
| Household head | | |
| Yes | 58 | 57,1 |
| No | 37 | 36,8 |
| No answer | 6 | 6 |
| Children ^b | | |
| 0 | 35 | 34,6 |
| 1 | 34 | 33,5 |
| 2 | 22 | 22 |
| 3 | 6 | 5,5 |
| 4 ^c | 2 | 1,6 |
| No answer | 3 | 2,7 |
| Residence | | |
| Pereira | 56 | 55,5 |
| Dosquebradas | 28 | 28 |
| Santa Rosa de Cabal | 4 | 4 |
| La Virginia | 4 | 4 |
| Rest-municipalities | 8 | 8,2 |
| Number of dependents | | |
| 0 | 19 | 18,7 |
| 1 | 34 | 34,1 |
| 2 | 29 | 29,1 |

| | | |
|------------------------|----|------|
| 3 | 12 | 11,5 |
| 4 | 4 | 4,4 |
| No data | 2 | 2,2 |
| Housing tenancy | | |
| Own | 47 | 46,2 |
| For rent | 38 | 37,9 |
| Familiar | 12 | 12,1 |
| Other | 1 | 0,5 |
| No answer | 3 | 3,3 |

Note. N = total participants = 101 (n = for each condition).

^a Nurses aged 61 years or older

^b Number of children the participant has

^c When the number of children is equal to or greater than 4

Employment Aspects: 41.8% receive 2 to 3 FLSA and 11% receive 1 to 2 FLSA. Of the professionals who answered the survey, 85.2% work, while 14.8% do not work; of those who do work, 35.5% work in one company, 41.3% work in two companies and 23.2% work in three companies. Twenty percent of the workers have contracts in which they are the ones who contribute to health, 67% of the workers have contracts in which both the worker and the company contribute, 83.6% contribute to occupational risks.

A total of 47.8% contribute to public funds and 47.3% to private funds. 62.3% work in private companies and 35.1% in public companies, of which 31.2% have an indefinite contract, and 70.1% of the professionals work full time. 48% work in the healthcare field, 24.7% in the teaching field and 18.2% in the administrative area; there has also been an increase in the 20.8% of professionals who have felt discriminated against in their work environment and 15.6% have suffered harassment at work.

Table 2. *Labor Characterization of Nurses in Pereira – 2020*

| Varieties | Number of nurses | |
|-----------------------------------|------------------|------|
| | <i>n</i> | % |
| Monthly salary range ^a | | |
| 1.000.000 a 1.999.999 | 11 | 11 |
| 2.000.000 a 2.999.999 | 42 | 41,8 |
| 3.000.000 a 3.999.999 | 25 | 24,7 |
| 4.000.000 a 4.999.999 | 17 | 15,9 |
| 5.000.000 and more | 6 | 4,9 |
| Type of company where work | | |
| Private | 63 | 62,3 |
| Public | 38 | 35,1 |
| Performance areas | | |
| Assistance | 48 | 48 |
| Teaching | 25 | 24,7 |
| Administrative (Management) | 18 | 18,2 |
| Other ^b | 10 | 9,1 |

^a Salary established in Colombian currency

^b In reference to: Auditing/consulting, community work (APS) and independent nursing practice.

Table 3. Occupational Risks Coverage

| Enterprise | Contribution to Occupational Risks | | | Responsible for contribution | | |
|------------|------------------------------------|-----|-----------|------------------------------|-------------------------|-----------|
| | Yes | No | No answer | Worker only | Employee and Enterprise | No answer |
| 1 | 77,5 | 4,4 | 18,1 | 18,1 | 57,7 | 24,2 |
| 2 | 20,3 | 5 | 74,7 | 6,6 | 16 | 77,4 |
| 3 | 12,1 | 5 | 82,9 | 3,3 | 9,9 | 86,8 |

Note. This table shows the number of professionals who according to your enterprise, have full coverage for occupational hazards.

Table 4. Social security health coverage

| Company | Social security health contribution | | | Responsible for contribution | | |
|---------|-------------------------------------|------|-----------|------------------------------|----------------------|-----------|
| | Yes | No | No answer | Worker only | Employee and Company | No answer |
| 1 | 85,4 | 2,2 | 12,4 | 19,2 | 66,5 | 14,3 |
| 2 | 35,1 | 10,5 | 54,4 | 9,9 | 20,9 | 69,2 |
| 3 | 19,8 | 8,8 | 71,4 | 5,5 | 14,3 | 80,2 |

Note. This table shows the number of professionals who according to your company, have coverage for their social security in health.

Academic Factors: Of the 101 professionals surveyed, 87.4% were female and 12.6% were male, with a university degree as nurses and came from 19 universities. Regarding their professional training, 53.1% completed their professional career at the Andean Area University, 15.6% have a degree from the University of Caldas and 15, 6% from the Universidad Libre, 2.5% from the Universidad Nacional and 1.3% of nurses graduated from the Universidad de Manizales, Universidad

del Quindío, Universidad del Valle, Universidad de Antioquia, Universidad de Cartagena and Universidad Surcolombiana, and 5.6% from other universities. Only 6 nurses have a second career in the areas of Psychology, Law, Administration and Pedagogy. A total of 70.3% of the nurses studied a specialization, with a preference for management (14.3%), 54% studied a master's degree, especially in Public Health, and finally 5.9% of the nurses have done doctoral studies.

Finally, there was a great deficit in the professionals' preparation and use of other languages, since 89.6% do not know how to speak English, 96.1% do not write it and 55.8% do not read it. The same is the case for other languages.

Socio-Demographic aspects: In the study it was determined that the most of the surveyed are of the female gender, as it happens with other works such as the one by (Díaz Carranza, 2012) where the percentage predominated with 80% for women and 20% for men, or as demonstrated by the author (Franco Coffré, 2019), when explaining that the dominance by the female gender in this profession, is because of the straitjacket that is still established as a result of the history of nursing on professional identity, since society maintains the stigma that the doctor is the man and the nurse has to be a woman.

Regarding the ages that grouped most of the respondents, it was established; as a predominant age category from 31 to 40 years old and from 21 to 30 years old, a relationship according to the information recorded for 2018 by ReTHUS in Pereira, since the age range with the highest percentage was from 25 to 34 years old. The above is evidence of the productivity and labor maturation considered to exist for these ages, while the older population is being left aside due to their loss of action in each of their care activities. In terms of marital status, there is not much difference since 35% corresponds to married professionals against 32.7% of single ones, the reason for this circumstance is established according to what is mentioned (Adanaqué Castillo et al., 2020), companies prioritize single professionals, because they have a greater capacity to adapt to the new reality.

Employment Aspects: In terms of the kind of institution in which they work, (Castillo Ávila et al., 2013) observed in this study that with

respect to the number of graduates who are working in private institutions there is an equivalent of 62.3%, an increase that was also evidenced in the present study on the choice of this type of institutions. This increase is in response to the changes brought about by globalization, which has led to the privatization of public services, including health care. For its part the salary has a tendency of payment between 2 to less than 3 FLSA, for example, for (Zapata Herrera & Zapata Gómez, 2015) 33.5% of nurses had remunerations with monthly salaries of \$2'500,000.

For the Labor Observatory for Education (OLE) of the Ministry of National Education at the cut-off of 2016, it shows that the FLSA of nurses was \$2,474,002, and that nurses earn higher salaries than women. It is also important to reveal that the experience of female professionals is poorly considered. This is a concern in patient care, education and public management, because much of the expertise and quality that produces good results in the areas mentioned above comes from work experience.

A study by the ONG Cuso International, in alliance with the Universidad de los Andes, showed that the Covid 19 pandemic exposes a critical labor outlook and difficulties of nursing personnel, mostly women, and that approximately 6 out of 10 nurses do not contribute to retirement, so many may face a difficult retirement. These are some of the variables for our country to have a deficit of 1.3 nurses per 1,000 inhabitants.

Comparing the labor areas, the ones that are most highlighted and mentioned as common (De Arco Canoles & Suarez Calle, 2018) that were also presented in this study, were: assistance, in this case with 48%, teaching with 24.7% and administrative with 18.2%. In turn, the lack of continuity and sustainability was shown since most of them maintain an indefinite term contract as occurs in the study of (Zapata Herrera & Zapata Gómez, 2015). Of these same there is a high percentage of professionals who work full time making clear a work overload given the poor hiring already mentioned and as mentioned (Castillo Ávila et al., 2013) as there is a dysfunctional work environment, there are other factors of influence, such as those obtained in this study, including workplace violence, discrimination and harassment at work.

Nurses who are suffering from workplace abuse are subjected to constant anxiety, which, together with long shifts and work pressures, affects their capacity and performance, as well as the environment in which they work, as well as collateral damage to their children, partners and other family members, co-workers and patients, who are affected by their difficult condition, psychological problems, poor performance and deterioration of social relationships. All the above results in strained relationships, job insecurity, negative attitudes, emotional instability and even physical deterioration.

Academic Considerations: As it was notorious the dominance of women surveyed, also marked a high percentage of professionals who have their university degree being this higher for women than for men with only 12.6%. According to the city there is always a university that predominates over the others, in this case it was the Areandina University, however, we are a metropolis for other universities. But, for example, in the study conducted by (Arias Torres, 2012), for Huila, it is determined that 70% of the professional resource that works in Huila was formed in the Nursing Program of the USCO.

There is also a relationship with the areas where they work the most with respect to the most chosen specializations, being management with 14.3% the most chosen specialization and to a lesser extent auditing with 5.2% and those related to teaching with 2.6%. The percentages are not enough with the quantity of graduates who should have a continuous education, and this is something that is repeated in most of the studies, as recorded by (Castillo Ávila et al., 2013) where 91% of its professionals reported not having made progress in postgraduate studies, with only 8.6% having completed specializations and a small fraction of 0.5% being master's degree holders.

This dissociation of graduates for postgraduate degrees and for learning other languages are a clear sign of the lack of salary recognition according to their degree recognized by (Gómez Ochoa, 2018) and by other factors mentioned by (Castillo Ávila et al., 2013), such as the high prices established for the courses, the work pressure as a time limitation to continue with the academic training and the few opportunities for job promotion.

Conclusions

Given the objectives, results of the present study and comparisons with previous studies, nursing professionals have a strong decline about their postgraduate training, or in other learning subjects such as languages. As the results revealed, most of the nurses do not consider the idea of pursuing other types of academic preparation due to the lack of motivation, economic support or recognition that can be given through remuneration for their specialization, master's degree or master's, according to the work position assigned to them.

In particular, the academic continuity that the professionals decided to give was not reflected in a salary increase or reward, since similar salary standards were kept in each one of the work areas of this profession. In addition, this study, given that it evidenced these shortcomings in the postgraduate courses due to economic causes, also had expressions of discrimination, violence or abuse in the work environment, which is why it is important to follow up on the work activity of the nurse, since, as is well recognized, poor management, which affects the integrity of the nursing professional, is reflected in the care provided to the user.

The study has shown that professional nurses have acquired media and social visibility in 2020. But, at the same time, it has been revealed that they are not being guaranteed dignified working, academic and social conditions for their professionalism, dedication and commitment to ensure the care of human lives. Specifically, speaking of Workplace Harassment as evidenced in the study conducted by (Molero Jurado et al., 2016), in Colombia there is a law on Harassment, it is evident the need to inform about the law, to minimize the risks of workplace abuse, to create strategies that allow its reduction.

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**EFFECTS OF DYNAMIC TAPE WITH
ANTI-VALGUS APPLICATION ON
VERTICAL JUMP PERFORMANCE
IN PHYSICALLY ACTIVE WOMEN:
A CASE STUDY**

**EFECTOS DEL TAPE DINÁMICO
CON APLICACIÓN ANTI-
VALGUIZANTE EN EL
RENDIMIENTO DEL SALTO
VERTICAL EN MUJERES
FÍSICAMENTE ACTIVAS: UN
ESTUDIO DE CASO**

*Authors: María Camila Arias Castro¹, Alejandro Gómez Rodas²
y Ángela María Cifuentes Ríos³*

1 Estudiante Programa de Fisioterapia Fundación Universitaria del Área Andina VIII semestre, marias58@estudiantes.areandina.edu.co

2 Docente Programa de Fisioterapia Fundación Universitaria del Área Andina, agomez105@areandina.edu.co

3 Estudiante Programa de Fisioterapia Fundación Universitaria del Área Andina VIII semestre, acifuentes12@estudiantes.areandina.edu.co

Abstract

The objective of this case study was to determine the effects of dynamic tape with anti-valgus application on vertical jump performance in physically active women. Two physically active university women participated with the presence of dynamic valgus. Three drop jump (DJ) attempts and a single series of countermovement jumps were made in 15 seconds (CMJ15s) followed by an anti-valgus application of dynamic tape with immediate performance of three drop jump attempts with tape (DJ_A) and a series countermovement jumps in 15 seconds with tape CMJ15s_A. The gestures were repeated on the third day post-application (DJ_{A3}) and (CMJ15s_{A3}). The measurements were made in the Optogate movement analysis system which showed jump height, flight time and potency with subsequent calculation of the fatigue index. Significant improvements in (DJ) jump height was observed in both subjects after tape application both acutely (DJA) and on the third day after application (DJ_{A3}) with similar progression in flight time and jump potency. In the CMJ jumps, subject 1 presented improvement in jump height while subject 2 obtained a decrease in jump height. The fatigue index showed a progressive decrease in subject 1 while subject 2 evidenced the opposite phenomenon. In conclusion, performance improvements in vertical jump variants were identified in two physically active women with the presence of dynamic valgus after the anti-valgus application of dynamic tape, suggesting methodological guidelines for future experimental studies.

Keywords: Vertical jump, athletic tape, kinesiotape, women.

Resumen

El objetivo de este estudio de caso fue determinar los efectos del tape dinámico con aplicación anti-valguizante en el rendimiento del salto vertical en mujeres físicamente activas. Participaron dos mujeres universitarias físicamente activas con presencia de valgo dinámico. Se realizaron tres intentos de drop jump (DJ) y una sola serie de saltos en contramovimiento en 15 segundos (CMJ15s) seguido de aplicación anti-valguizante de tape dinámico con realización inmediata de tres intentos de drop jump con tape (DJ_A) y una serie saltos en contramovimiento en 15 segundos con tape CMJ15s_A. Se repitieron los gestos al tercer día

post-aplicación (DJ_{A3}) y ($CMJ15s_{A3}$). Las mediciones fueron realizadas en sistema de análisis de movimiento Optogate el cual arrojó altura de salto, tiempo de vuelo y potencia con cálculo posterior de índice de fatiga. Se observaron en ambos sujetos mejoras en la altura del salto en DJ después de la aplicación de tape tanto de manera aguda (DJ_A) como al tercer día después de su aplicación (DJ_{A3}) con progresión similar en tiempo de vuelo y potencia de salto. En los saltos de CMJ el sujeto 1 presento mejoras en la altura del salto mientras que el sujeto 2 obtuvo una disminución en la altura de salto. El índice de fatiga mostró una disminución progresiva en el sujeto 1 mientras que el sujeto 2 evidenció el fenómeno contrario. En conclusión, se identificaron mejoras en el rendimiento en variantes de salto vertical en dos mujeres físicamente activas con presencia de valgo dinámico después de la aplicación anti-valguizante de tape dinámico sugiriendo orientaciones metodológicas a futuros estudios experimentales.

Palabras clave: Salto vertical, Cinta atlética, cinta Kinesiológica, Mujer.

Introduction

In recent years, there has been an increase in the participation of adolescent and young adult women in sports activities like soccer, basketball and volleyball, as well as in intense physical exercise like Crossfit and functional training which has led to an increase in lower limb injuries associated with performing vertical jumps, feints and changes of direction. The most frequently reported injuries are the anterior cruciate ligament injury and the patellofemoral pain syndrome, which limits the normal development of training and attendance at competitions (Gómez Rodas, 2007). Divers risk factors have been associated with an increase in injuries in physically active women, including anatomical, hormonal and neuromuscular characteristics, these last are evidenced precisely through kinematic and kinetic analysis, especially when they are developed during the performance of functional gestures such as the vertical jump and its variants of manifestation of explosive and reactive elastic force that include countermovement jumps and drop jump (Jenkins et al., 2017) most sports require single-leg landing from a double or single leg takeoff. Further, knee movement occurs toward both varus and valgus during functional landing. The purpose of this

study was to determine if differences exist between females and males in total frontal plane movement and velocity of the knee during single-leg landing. Design Experimental cohort. Setting Motion analysis laboratory. Participants Forty healthy, physically-active females ($n=20$). The kinematic alteration that has been found to be linked to a greater extent to these injuries is the dynamic knee valgus, mechanism involving an abduction with excessive internal rotation of the hip compensated by internal rotation of the tibia and hyper-pronation of the foot, especially, during motor tasks that involve deceleration against gravity such as vertical jumps (Sannasi et al., 2017).

Recently, the implementation of elastic bands in sports has been increasingly on the rise due to the ease of use and the increase in quality, variety, available brands and therapeutic destination for which they have been designed (Wang et al., 2018). One of the most popular tapes today is the kinesiology tape, which has elastic properties that are presumed to improve muscle behavior by regulating its excitability for both inhibition and facilitation (Bicici et al., 2012). However, a new type of tape with elasticity characteristics much more accentuated than those of the kinesiological tape is currently appearing on the market of therapeutic tools, whose effect seems to improve especially the essential muscular performance characteristics during the eccentric phase of dynamic movements, mechanism that could improve kinematic alterations such as dynamic valgus and decreased muscle performance associated with these movement disorders (McNeill & Pedersen, 2016). Therefore, the development and manifestation of a refined quality of movements is essential both for prevention and for the normal and optimal performance of physical-sports activities. Identification of motion quality can be carried out through kinematic and kinetic motion analysis, the first allow to determine trajectories, angles and forms of movement while the seconds concentrate on determining the performance of force and power variables that determine the final result of the movement performed (Salem et al., 2003) knee, and hip joints during submaximal squatting exercise in rehabilitating patients after ACL reconstruction. Comparisons were performed between involved and noninvolved limbs, and regression models were created to examine the relations between the bilateral kinetic differences and time postsurgery. Setting: A motion analysis laboratory. Participants: Eight adults (27.9 ± 6.8 y).

Finally, the present research work may provide preliminary and exploratory results regarding the effectiveness of the tape called “dynamic tape” and its possible influence on the improvement of performance in the execution of vertical jumps after its application for the correction of dynamic valgus in physically active women, which will possibly result not only in an improvement in the execution of this type of gestures and their performance but also in a better approach to correcting altered patterns of movement, a decrease in the acquisition time of new kinematic parameters resulting from an assisted motor learning mediated by this type of belt, an increase in motor performance in explosive elastic tasks, a decrease in the appearance of injuries in this type of gestures, medical consultations, surgeries and treatments Physiotherapeutic in physically active women. For all these reasons, the present research work intends to exploratory determine the effects of the dynamic tape with an anti-valgus application technique on the performance of the vertical jump in a series of cases of physically active university women.

Materials and Methods

A case study was carried out with a test-post-test methodology in the human movement laboratory of the Fundación Universitaria del Área Andina. Two physically active university women participated according to the short IPAQ classification criteria who caught the attention of the researchers for presenting pronounced dynamic valgus according to the subjective test criteria of dynamic trendelenburg (DiMattia et al., 2005). The two women reported having performed in vigorous physical activity more than five times a week.

The participants in the study showed adequate muscular and cardiovascular health at the time of the tests, reaching a minimum risk for sports practice according to the criteria of the American College of Sports Medicine (Garber et al., 2011) when appropriately evaluated and advised by a health professional. This document supersedes the 1998 American College of Sports Medicine (ACSM, With no surgical history or injuries that prevented the normal development of the tests derived from vertical jump during the last six months, they were informed of the conditions of the study and signed an informed consent prior to the start

of the study, which complied with the regulations of the Declaration of Helsinki .

In case 1, a physically active woman was included, a competitive level athlete in volleyball, belonging to the Risaraldense Volleyball League with an age of 21 years, height corresponding to 1.69 m, a Body Mass Index (BMI) of 21.6 Kg/m² and an assiduous practice of his sport for more than 6 years.

The case 2 involved a physically active woman, a student of the Sports and Recreation Sciences program of the Universidad tecnológica de Pereira with an age of 23 years, height corresponding to 1.50 m, a Body Mass Index (BMI) of 20.9 kg/m², a practitioner she is a regular in various sports due to her status as a student in this area.

Each participant performed a warm-up consisting of a five-minute brisk walk followed by specific stretching of the lower limb muscles and familiarization with countermovement jump and drop jump gestures prior to their execution. Subsequently, each participant was requested to perform three reactive drop jump (DJ) jumps with recovery between jumps of 30 seconds, using the mean of the three attempts as the result variable. This gesture requires the fall from a 40 cm high bench, a landing with minimal contact time with the ground followed by a concentric or positive phase that seeks to achieve the highest possible jump height. Then, after a 3-minute rest, the execution of countermovement jumps was requested for 15 seconds (CMJ15s) consisting of repeated jumps with the use of a muscular elastic component with eccentric or negative moment before a fast concentric or positive moment trying to reach the maximum possible height during the entire duration of the test.

The means corresponding to flight time, jump height and muscle potency were recorded for the (DJ) and (CMJ15s) by adding the fatigue index expressed as a percentage in this last gesture after performing them on a surface delimited by optical bars of the optogait device that allows the direct measurements of temporal variables associated with body movement. Each bar of the optogait contains 96 infrared leds with a resolution of 1.041 cm that communicate continuously with each other, detecting interruptions in their communication and their duration. This system then allows the direct measurement of flight and contact

times during the execution of motor tasks such as vertical jump and its performance variants with an accuracy of 1/1000 of a second.

Once the vertical jump tests were finished, a double application of dynamic anti-valgus tape was applied by an experienced physiotherapist in a spiral direction from the sacral region through the external gluteal face and thigh to the leg with the addition of a double application from the iliac crest, passing through the lateral region of the thigh to the leg, pretending to favor external rotation and hip abduction during the performance of functional jumping tasks. Both the optogait device operators and the study subjects themselves were blinded to the corrective intention to apply the dynamic tape.

The same protocol described for the measurement of performance variables in these same gestures was immediately carried out with anti-valgus application of dynamic tape (DJ_A) and ($CMJ15_{SA}$). The application of the tape was maintained for three more days at the end of which the vertical jump performance tests were performed again under the same conditions described in the initial protocol to determine the remaining effect of the tape on the performance of these motor gestures (DJ_{A3}) and ($CMJ15S_{A3}$).

Results

The table 1 presents the results of the mean of three drop jump attempts in the condition without anti-valgus tape (DJ), with immediate application of anti-valgus tape (DJ_A) and on the third day after application (DJ_{A3}) for the variables jump height, flight time. For countermovement jumps in 15 seconds, the fatigue index was added under these same conditions. An improvement in jump height was observed in both subjects after the application of the anti-valgus tape both acutely and in the third after its corresponding application in subject 1 at 2.1% in (DJ_A) and 5.9 % in (DJ_{A3}). For subject 2 of 12.3% in (DJ_A) and 2% in (DJ_{A3}) with a similar progression in both subjects for flight time and jump power.

Regarding the mean height in countermovement jumps in 15 seconds, subject 1 showed an improvement of 1% in ($CMJ15s_A$) and 6% for the condition ($CMJ15s_{A3}$) while for subject 2 a decrease of 15 %

in condition (CMJ15s_A) and a subsequent improvement corresponding to 6% in condition (CMJ15s_{A3}). Regarding the fatigue index, in subject 1 there was a progressive decrease in fatigue under the conditions (CMJ15s_A) by 11.3% and by 14.4% for the condition (CMJ15s_{A3}), while for subject 2 there was showed an increase in fatigue of 15. 6% and 17.3% for the conditions (CMJ15s_A) and (CMJ15s_{A3}) respectively.

Table 1. Comparison of jump height, flight time, potency and fatigue index between the conditions without tape, acute anti-valgus application and on the third day post-application in each of the study subjects

| Variables | JH cm | FT s | Potency | | FT s | Potency | | FI |
|-----------|-------|-------|------------------------|------|----------------------------|---------|------|----|
| | | | | w/Kg | | | w/kg | |
| Subject 1 | | | DJ | | CMJ15s | | | |
| | 19.3 | 0.398 | 14.67 | 15.8 | 0.359 | 13.7 | 25.8 | |
| | | | DJ_A | | CMJ15s_A | | | |
| | 19.7 | 0.401 | 15.5 | 15.9 | 0.360 | 13.7 | 22.9 | |
| | | | DJ_{A3} | | CMJ15s_{A3} | | | |
| | 20.5 | 0.413 | 15.57 | 16.8 | 0.370 | 14.62 | 22.1 | |
| Subject 2 | | | DJ | | CMJ15s | | | |
| | 16.83 | 0.37 | 13.51 | 12.8 | 0.322 | 10.79 | 25.5 | |
| | | | DJ_A | | CMJ15s_A | | | |
| | 19.16 | 0.39 | 14.87 | 10.8 | 0.296 | 10.35 | 30.2 | |
| | | | DJ_{A3} | | CMJ15s_{A3} | | | |
| | 17.16 | 0.37 | 13.75 | 13.6 | 0.332 | 12.28 | 30.8 | |

JH, jump height; FT, flight time; FI; fatigue index.

Discussion

The exploratory findings of this case study that sought to determine the possible effects of dynamic tape on vertical jump performance after an anti-valgus application technique in physically active women, were

oriented in the first instance towards an improvement in performance in the variant of the vertical jump known as (DJ). In both study subjects, after application the dynamic tape, an increase in jump height, flight time and potency generated in lower limbs were evidenced under the manifestation of reactive explosive elastic force. Although with different elastic bands of the kinesiotape type and with application for the improvement of muscular performance and not for the correction of altered patterns of movement, various reports have shown effects similar to those found in this case study (Liu et al., 2019; Macdowall et al., 2015).

According to what is suggested by McDowall et al. (2015) who evaluated 20 university athletes before and after the application of kinesiotape for the facilitation of gastrocnemius functionality, this type of tape seems to contribute a positive influence on the performance in the unipodal vertical jump, as it could be evidenced in the subjects of this study. Equally, Liu et al. (2019) evaluated the performance of 48 subjects who had anterior cruciate ligament reconstruction surgery through a horizontal unipodal jump test, finding that the use of this type of tape to facilitate the function of the hamstring muscles and the inhibition of the quadriceps, desired effect in patients with reconstruction of the anterior cruciate ligament, produces a statistically significant improvement in the unipodal horizontal jump associated with the use of kinesiotape. These data, which agree with what was found in the present study, suggest a positive effect of the use of this type of elastic tapes for the facilitation of muscle function and vertical jump performance.

However, the data in this case study do not agree with the findings of other investigations that have not shown positive effects associated with the use of this type of tape on vertical jump performance. So Nakajima & Baldrige (2013) as Nunes et al. (2013) do not show effects of kinesiotape on vertical jump performance in healthy subjects, as well as Wilson et al. (2016) in theory, in the improvement of muscle contractibility by supporting weakened muscles. The effect of KT on muscle strength has been investigated by numerous researchers who have theorized that KT facilitates an immediate increase in muscle strength by generating a concentric pull on the fascia. The effect of KT on balance and functional performance has been controversial because of the inconsistencies of tension and direction of pull required during

application of KT and whether its use on healthy individuals provides therapeutic benefits. **HYPOTHESES/PURPOSE** The purpose of the present study was to investigate the immediate and long-term effects of the prescribed application (for facilitation achieved to find some benefit with the superposition of this type of tape for the facilitation of gastrocnemius in various types of horizontal jumps used in the control and monitoring of the athletic condition. For their part, Schiffer et al. (2015) evaluated the effect of kinesiotape for the facilitation of quadriceps function, hamstrings and gastrocnemius in female field athletes in horizontal jumps without finding benefits in performance associated with the use of this tape. These data in healthy subjects do not seem to support the use of this type of bandage for the improvement of muscle performance in explosive and elastic-explosive muscle actions.

In countermovement jumps in 15 seconds, a test that shows the ability to maintain explosive elastic potency over time, subject 1 of the present study presented an improvement in jump height, flight of time and potency for both the acute dynamic tape application condition and the third day measurement, however, for subject 2, improvement only occurred on the third day of application of the dynamic tape. Although no study has been identified so far that includes this type of test in its protocols. Boozer et al. (2018) examined the effect of the application of kinesiotape for the facilitation of gastrocnemius in a fatigued condition after performing five series of plantiflexions until fatigue in 50 healthy non-athletes, concluding that the addition of Kinesiotape does not produce significant improvements in the height of countermovement jump. In addition, Lee & Lim (2020) executed a fatigue protocol consistent of 20 squats and 5 series until fatigue by eccentric contraction of the quadriceps after the application of kinesiotape in healthy students in a randomized clinical trial, identifying that the addition of kinesiotape for the facilitation of gastrocnemius does not produce significant improvements in countermovement jumps.

Until now, no other study has been found with the intention of determining the effects of the application of elastic bands for correction of altered patterns of movement on performance in vertical jumps. Sannasi et al. (2017) identified that the addition of kinesiotape for the correction of dynamic knee valgus significantly decreased the values of the knee frontal projection angle in healthy women in a randomized

clinical trial, while Bitteconurt et al. (2017) in a pre-experimental design reported an improvement in dynamic valgus after the application of dynamic tape for correction of dynamic valgus in female volleyball players.

This exploratory study is the first attempt to determine if correcting an altered movement pattern such as dynamic valgus with elastic bands can improve performance on muscle performance variables such as vertical jump. The findings presented will serve as the basis for the improvement of intervention protocols, definition of variables result from the variants of vertical jump susceptible to change with this type of bandage and methodological direction of future experimental studies that can reach better conclusions regarding the use of these therapeutic tools in the acquisition, correction and improvement of movement patterns that produce better muscular performance.

Conclusion

The present case study allows exploratory identification of improvements in vertical jump performance in two physically active women with the presence of dynamic valgus. These findings serve as the basis for the improvement of intervention protocols, definition of variables susceptible to change in vertical jump variants and in the methodological orientation of future experimental studies that allow obtaining specific and contrasted results with a control group with respect to the effect that this type of therapeutic tools has when correcting altered movement patterns such as dynamic valgus in vertical jump performance in physically active women.

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PROPOSAL OF CARE FOR DIAGNOSTIC PREVALENT NURSES IN AN EMERGENCY DEPARTMENT

PROPUESTA DE CUIDADO PARA DIAGNÓSTICOS ENFERMEROS PREVALENTES EN UN SERVICIO DE URGENCIAS

*Authors: Tatiana Restrepo Pérez¹, Jessica Viviana Ríos Uribe²,
Anyi Daniela Lemos Córdoba³, Anyi Katherine Mapura Benjumea⁴
and Mónica Margarita Barón Castro⁵*

¹Fundación Universitaria del Área Andina. Estudiante Enfermería. trestrepo2@estudiantes.
areandina.edu.co.

² Fundación Universitaria del Área Andina. Estudiante de Enfermería. jrios40@estudiantes.
areandina.edu.co.

³ Fundación Universitaria del Área Andina. Estudiante de Enfermería. alemos5@estudiantes.
areandina.edu.co.

⁴Fundación Universitaria del Área Andina. Estudiante de Enfermería. amapura@estudiantes.
areandina.edu.co.

⁵ Fundación Universitaria del Área Andina. Enf Mg en enfermería énfasis cuidado al adulto.
mbaron@areandina.edu.co

Abstract

Nursing care in emergency services is of special relevance, both due to the characteristics of the patients and the complexity of their situation. The development of nursing care proposals for hospital care services using the NANDA NOC NIC taxonomy is unusual. An emergency service for adults is in high demand. Nursing work involves assessing and identifying care needs to plan, organize, supervise and evaluate the care provided to patients. In this exercise, the phases of the nursing process are applied. Prepare a proposal for nursing care for patients in the emergency department considering the prevalent nursing diagnoses in a second-level institution of complexity and using Virginia Henderson's theory and the Taxonomies of NANDA diagnoses, NOC results and NIC interventions as references. Descriptive case study. The case is the emergency service and it is focused on nursing care. The first ten medical causes of discharge during 2019 were reviewed and the clinical-socio-pathological manifestations were established by literature for each one. Concordance with the defining characteristics of nursing diagnoses was sought. Six prevalent nursing diagnoses were defined and the care proposal is made for each one. Traumatic health events predominated 46%, Chronic Obstructive Pulmonary Disease (COPD) 18.6%, Diarrhea and Gastroenteritis 17%, and to a lesser extent Urinary tract infection 12% and Hypertension 6%.

The prevalent diagnoses were: 00046 Impaired skin integrity, 00004 Risk of infection, 00132 Acute pain, 00092 Activity intolerance, 00030 Impaired gas exchange, and 00013 Diarrhea. For each diagnosis, three expected outcomes [NOC] and three interventions [NIC] were proposed.

The main NOCs were related to: Physiological health, Functional health and Perceived health. The NIC domains involved were: Basic Physiological, Complex Physiological, Safety and Behavioral.

Nursing diagnoses were also referred in other studies to emergency services. It is suggested to continue investigating the prevalent diagnoses by care services to have better scientific evidence.

This study determines priorities for the assessment of the basic human needs of the patient who consults the emergency room. The planning of care for prevalent nursing diagnoses will transcend in terms of health, as well as a decrease in hospital admissions.

Keywords: nursing care, NANDA, NOC and NIC terminology.

Resumen

El cuidado de enfermería en los servicios de urgencias tiene especial relevancia, tanto por las características de los pacientes como por la complejidad de su situación. La elaboración de propuestas de cuidados de enfermería para servicios de atención hospitalaria utilizando taxonomía NANDA NOC NIC es poco frecuente. Un servicio de urgencias para adultos presenta alta demanda. La labor de enfermería implica valorar e identificar necesidades de cuidado para planear-organizar- supervisar y evaluar la atención prestada a los pacientes. En este ejercicio, se aplican las fases del proceso de enfermería. Elaborar una propuesta de cuidado de Enfermería a pacientes del servicio de urgencias considerando los diagnósticos enfermeros prevalentes en una institución de segundo nivel de complejidad y utilizando como referentes la teoría de Virginia Henderson y las Taxonomías de diagnósticos NANDA, de resultados NOC y de intervenciones NIC. Estudio descriptivo de caso. El caso es el servicio de Urgencias y se focaliza la atención de enfermería. Se revisaron las diez primeras causas médicas de egreso durante el 2019 y se establecieron por literatura las manifestaciones clínico- socio-patológicas para cada una. Se buscó la concordancia con las características definitorias de diagnósticos enfermeros. Se definieron seis diagnósticos enfermeros prevalentes y para cada uno se realiza la propuesta de cuidado. Predominaron los eventos de salud de carácter traumático 46%, Enfermedad Pulmonar Obstructiva crónica (EPOC) 18.6%, Diarrea y Gastroenteritis 17% y en menores proporciones Infección de vías urinarias 12% e Hipertensión arterial 6%. Los diagnósticos prevalentes fueron: 00046 Deterioro de la integridad cutánea, 00004 Riesgo de infección, 00132 Dolor agudo, 00092 Intolerancia a la actividad, 00030 Deterioro del intercambio de gases y 00013 Diarrea. Para cada diagnóstico se propusieron tres resultados esperados [NOC] y tres intervenciones [NIC]. Los principales NOC se relacionaron con: Salud fisiológica, Salud funcional y Salud

percibida. Los dominios NIC involucrados fueron: Fisiológico Básico, Fisiológico Complejo, Seguridad y Conductual. Los diagnósticos enfermeros fueron también referidos en otros estudios para servicios de urgencias. Se sugiere continuar investigando con los diagnósticos prevalentes por servicios de atención para contar con mejor evidencia científica. Este estudio determina prioridades para la valoración de las necesidades básicas humanas del paciente que consulta a urgencias. La planificación de los cuidados para diagnósticos enfermeros prevalentes trascenderá en términos de salud, así como en una disminución en los ingresos hospitalarios.

Palabras claves: atención de enfermería, terminología NANDA, NOC, NIC.

Introduction

Urgency is defined as the situation that requires immediate specialized attention. The Emergency Nursing professional responds to the care needs of people with critical or high-risk health problems. (García, 2018). Trauma is a problem worldwide, it is the sixth cause of death and the fifth of disability in the world, taking into account that traffic accidents are the main causes of these in low-income countries since they are the most populated, it should be noted that patients over 65 are one of the main affected and have twice the morbidity than young people due to the physical and health changes they present. (Escalona Cartaya et al., 2017)

It has become a public health problem that has a great socioeconomic impact, the high rate of morbidity and mortality makes these very costly, which forces governments to treat this problem in a multisectoral, seeking to reduce the damage they cause from multiple strategies. Health personnel must be trained in the management of a polytraumatized patient, especially in the first hours of the trauma, which is where the highest mortality rate occurs. (Congress, 2004).

According to the ASIS 2017, in Risaralda the proportion of care in the period 2013-2017 for injuries was 2.27, another cause of consultation was non-communicable diseases with 2.59, for the year 2018 the proportion decreased to 2,31 for Risaralda in terms of injury

care, which means that there was a high incidence of injury care in the municipality of Risaralda during these two years. (Departmental, 2015).

The nursing care provided in the emergency services has special relevance, both due to the characteristics of the patients and the level of complexity of their health situation. However, nursing care proposals for hospital care services using NANDA NOC NIC taxonomy is a poorly studied topic. (Herdman & Kamitsuru, 2019).

The emergency service is the service with the greatest demand from both adult and child patients. The work performed by nursing in these care services is of utmost importance since the care needs required by patients and their families are identified. The basis for planning care in a rational, systematic and individualized manner is the Nursing Care Process (PAE) in each of its stages: assessment, diagnosis, planning, execution, and evaluation. The NANDA nursing diagnosis provides the basis for the identification of NOC expected results and the planning of NIC nursing interventions to obtain the expected results. Hence, the use of the standardized language North American Nursing Diagnosis Association (NANDA) (Herdman & Kamitsuru, 2019), Nursing Outcome Classification (NOC), (Moorhead, Swanson, & Johnson, 2018) Nursing Intervention Classification (NIC) (Butcher HK, 2019) facilitates Nursing professionals to communicate what is done with other health professionals. In addition, it documents the nurse's contribution to the care of patients.

Santa Mónica Hospital lacks standardized care plans for prevalent nursing diagnoses in the emergency department. In this study, the purpose is to develop a proposal for nursing care for patients in the emergency department considering prevalent nursing diagnoses, using Virginia Henderson's theory and the NANDA NOC NIC taxonomies as references.

Materials and methods

Descriptive case study. The case is the emergency service and nursing care was focused. It was carried out in three phases:

The first ten medical causes of discharge during 2019 were reviewed and the clinical-socio-pathological manifestations were established by literature for each one.

Concordance with the defining characteristics of nursing diagnoses was sought. Six prevalent nursing diagnoses were defined.

For each nursing diagnosis, the care proposal was made, which included three expected results - NOC and each one with four evaluation indicators. Likewise, for each nursing diagnosis three NIC interventions were included and each intervention with four activities.

Results and discussion

In relation to the top ten causes of discharge in the adult emergency service of ESE Hospital Santa Mónica in 2019, health events of a traumatic nature predominated with 46%, Chronic Obstructive Pulmonary Disease (COPD) with 18.6%, Diarrhea and Gastroenteritis 17% and in smaller proportions Urinary tract infection 12% and Arterial hypertension 6%.

For situations of a traumatic nature, the nursing diagnoses NANDA [00046] deterioration of skin integrity, and [00004] Risk of infection were associated. Hematomas, acute pain, bleeding, alteration in skin integrity and penetrating foreign body in the skin were recognized as the main clinical-pathological manifestations.

The nursing diagnoses [00030] Impaired gas exchange and [00092] Intolerance to activity were part of the respiratory events. The following defining characteristics were taken into account: abnormal skin color, restlessness, diaphoresis, abnormal respiratory pattern, dyspnea, abnormal blood gas, exertional discomfort, fatigue, abnormal heart rate in response to activity, and exertional dyspnea were part of the defining characteristics of the nursing diagnosis.

For gastrointestinal conditions, the nursing diagnosis [00013] Diarrhea was the most prevalent. The elimination of more than 3 liquid stools in 24 hours, intestinal urgency, abdominal pain and cramps are part of the defining characteristics in the nursing diagnosis.

In urinary tract infections and hypertension, the nursing diagnosis was related [000132] Acute pain. Posture to relieve pain, expressive behavior, facial expression of pain, self-report of intensity with standardized pain scales, among others, are part of its defining characteristics.

From the review carried out, it was possible to establish the relationship between Henderson’s basic human needs and NANDA nursing diagnoses for the most frequent health situations in the adult emergency department as shown in Table 1.

Table 1. *Relationship Basic Human Needs and NANDA Diagnostics*

| Nursing Diagnoses NANDA | HUMAN NEEDS |
|--------------------------------|--|
| 00046 Impaired skin integrity | Need 8: Need to maintain body hygiene and skin integrity. |
| 00004 Risk of infection | Need 9: Need to avoid environmental hazards. |
| 00030 Impaired gas exchange | Need 1: Need to breathe normally. |
| [00092] Activity intolerance | Need 4: Need to move and maintain proper posture. |
| 00013 Diarrhea | Need 3: Need to eliminate by all bodily routes. |
| 000132 Sharp pain | Need 9: Need to avoid environmental hazards. |

Note: Own elaboration based on the analysis of results.

The basic human needs to maintain body hygiene and skin integrity was associated with traumatic events. The need 9 “Avoid environmental hazards” it is linked to events of traumatic origins, urinary tract infections and hypertension.

For each nursing diagnosis, three NOC expected results were

identified with their indicators and four NIC nursing interventions for each established nursing diagnosis.

Table 2. *Standardized care plan for 00046 Decay of skin integrity*

| Nursing diagnosis (NANDA) | Results (NOC) | Indicators (NOC) | Measurement scale | Diana score |
|---|---|---|---|---|
| [00046] Decay of skin integrity | [1101] Tissue integrity, skin and mucous membranes. | [110113] Integrity of the skin. [110101] Skin temperature [110122] Paleness. [110115] [Skin lesions | 1. Serious deviation from the normal range. | Each indicator will have a score corresponding to the initial assessment, |
| Defining characteristics: Bleeding, Bruising, Sharp pain, Penetrating foreign body on the skin. | [1102] Wound healing: first intention | [110201] Approach cutaneous [110204] Bloody discharge from the wound [110215] Surrounding skin contusion [110209] Perilesional edema | 2. Substantial deviation from the normal range 3. Moderate deviation from the normal range 4. Slight deviation from the normal range. | based on the measurement scale that serves to evaluate the expected result. |
| | [0407] Tissue perfusion: peripheral | [40743] Paleness [40744] Muscle weakness [40715] Capillary filling of the fingers of the hands [40746] Skin breakdown | 5. No deviation from the normal range | The goal of the interventions is to maintain the score and ideally increase it. |

| Interventions NIC | Interventions NIC | Interventions NIC |
|---|--|--|
| [3660] wound care | [3620] suture | [4010] bleeding prevention |
| Activities | Activities | Activities |
| -Assess the characteristics of the wound, including drainage, color, size and odor. | -Clean the surrounding skin with soap and water or another mild antiseptic solution. | -Control signs and symptoms of persistent bleeding (eg, hypotension, weak and rapid pulse, cold and clammy skin, rapid breathing, restlessness, decreased urinary output). |
| -Remove embedded material (splinter, tick, glass, gravel, metal) as needed. | -Use a sterile technique for the suture procedure. | -Record hemoglobin and hematocrit levels before and after blood loss, as indicated. |
| -Wash with physiological saline solution or a non-toxic cleaner, as appropriate. | -Administer a topical or injectable anesthetic in the area, as appropriate. | -Create an i.v. access, as appropriate. |
| | -Wait enough time for the anesthetic to take effect in the area. | |

Note: Own elaboration based on the analysis of results.

Table 2 shows the standardized plan for Decay of skin integrity, a prevalent nursing diagnosis in causes of discharge of a traumatic nature.

The expected NOC results that were related to the diagnosis were those related to Domain: 2 Physiological health Class: L Tissue integrity. The nursing interventions that were proposed to achieve the expected results NOC were related to Domain: 2 Physiological: Complex Class: L Control of skin / wounds and Domain: 2 Physiological: Complex Class: N Control of tissue perfusion.

The expected NOC results that were related to the diagnosis were those related to the immune response and to the results that describe the condition and function of a person's body tissues. The nursing interventions that were proposed to achieve the expected NOC results were related to the interventions to maintain or restore the integrity of the tissues, as well as the interventions to provide immediate short-term help in physiological crises as shown in Table 3.

Table 3. *Standardized care plan for 00004 Risk of infection.*

| Nursing diagnosis (NANDA) | Results (NOC) | Indicators(NOC) | Measurement scale | Diana score |
|--|---|--|--|---|
| [00004] Risk of infection. | [0703] Severity of infection | [70303] Fetid suppuration [70307] Fever [70326] Increased leukocytes [70333] Pain [1913] Severity of physical injury. [191303] Laceraciones. [191327] Fractura de extremidades inferiores. [191316] Deterioro de la movilidad. [191312] Hematomas. | 1.Serious deviation from the normal range. 2.Substantial deviation from the normal range 3.Moderate deviation from the normal range 4.Slight deviation from the normal range. | Each indicator will have a score corresponding to the initial assessment, based on the measurement scale that serves to evaluate the expected result. |
| Defining characteristics: Alteration in skin integrity, foreign body penetrating the skin. Suppression of the inflammatory response, malnutrition, Obesity | [1101] Tissue integrity, skin, membranes and mucosa | [110101] Skin temperature. [110102] Sensitivity. [110111] Tissue perfusion. [110115] Skin lesions. | 5. No deviation from the normal range | The goal of the intervention is to maintain the score and ideally increase it. |

| Interventions NIC | Interventions NIC | Interventions NIC |
|---|--|---|
| [6540] infection control | [6610] risk identification | [3660] wound care |
| Activities | Activities | Activities |
| -Teach staff correct hand washing. | -Assess medical history to determine care. | -Record the location, size and appearance of the wound. |
| -Apply universal precautions. | -Keep accurate records | -Educate the patient and family on the signs and symptoms of infection. |
| -Ensure a correct wound care technique. | -Establish compliance with medical and nursing treatments. | -Instruct the patient and family about wound care. |

Table 4. Standardized care plan for 00030 Impaired gas exchange.

| Nursing diagnosis (NANDA) | Results (NOC) | Indicators (NOC) | Measurement scale | Diana score |
|--|---------------------------------|--------------------------------|---|---|
| [00030] Impaired gas exchange. | [0402] | [40204] | 1.Serious deviation from the normal range. | Each indicator will have a score corresponding to the initial assessment, based on the measurement scale that serves to evaluate the expected result. |
| | Respiratory state: gas exchange | [40211] O2 saturation | 2.Substantial deviation from the normal range | |
| | | [40203] Dyspnea at rest | 3.Moderate deviation from the normal range | |
| | | [40206] Cyanosis | 4.Slight deviation from the normal range. | |
| Defining characteristics: dyspnea, abnormal breathing pattern, confusion, abnormal arterial blood gas. | [2103] Symptom severity | (210301) Symptom intensity | | The goal of the interventions is to maintain the range. |
| | | (210304) Associated discomfort | | |
| | | (210313) Inadequate sleep | | |

| | | |
|--|--|---|
| | (210302) | score and ideally |
| | Symptom | 5. No deviation increase it. |
| | frequency | from the normal |
| | [40301] | range |
| [0408] Tissue | Respiratory rate | |
| perfusion: | [40808] | |
| pulmonary | Unexplained | |
| | anxiety | |
| | [40820] Arterial | |
| | pH | |
| | [40824] Altered | |
| | gas exchange | |
| Interventions NIC | Interventions NIC | Interventions NIC |
| [3350] respiratory | [3320] oxygen therapy | [3140] airway management |
| monitoring | | |
| Activities | Activities | Activities |
| -Monitor the rate, rhythm, depth and effort of the breaths. | -Administer supplemental oxygen as ordered. | -Auscultate breath sounds, observing areas of decreased / absent ventilation and presence of adventitious sounds. |
| -Indicate all procedures, including possible sensations to be experienced during the procedure. | -Monitor the effectiveness of oxygen therapy (pulse oximeter, arterial blood gas), as appropriate. | -Observe the frequency, rhythm, depth and effort of the breaths. |
| -Estimate thoracic movement, observing symmetry, use of accessory muscles, and retractions of intercostal and supraclavicular muscles. | -Periodically check the oxygen delivery device to ensure that the prescribed concentration is delivered. | -Monitor the conditions that indicate the suitability of non-invasive ventilatory support. |
| | -Maintain the patency of the airways. | |

Note: Own elaboration based on the analysis of results.

The expected NOC results that were related to the diagnosis were those related to domain 2: Physiological health Class: E Cardiopulmonary and Domain: 5 Perceived health Class: V Symptoms. The nursing interventions that were proposed to achieve the expected results NOC were related to Domain: 2 Physiological: Complex Class: K Respiratory control.

Table 5. *Standardized care plan for 00092 Activity intolerance*

| Nursing diagnosis (NANDA) | Results (NOC) | Indicators (NOC) | Measurement scale | Diana score | | |
|---|---------------------------|---|---|---|---|--|
| [00092] Activity intolerance Defining characteristics: Exertional discomfort, Exertional dyspnea, fatigue. | [0415] Respiratory status | [41501] Respiratory rate | 1.Serious deviation from the normal range. | Each indicator will have a score corresponding to the initial assessment, based on the measurement scale that serves to evaluate the expected result. | | |
| | | [41502] Respiratory rate | | | | |
| | | 41504] Auscultate breath sounds | 2.Substantial deviation from the normal range | | | |
| | | [41515] Dyspnea on small efforts | | | | |
| | | [0005] Activity tolerance | [507] Skin color. | | 3.Moderate deviation from the normal range | |
| | | [508] Respiratory effort in response to activity. | | | | |
| | | [519] Walking tolerance | | | | |
| | | [501] Oxygen saturation in response to activity. | 4.Slight deviation from the normal range. | | The goal of the interventions is to maintain the score and ideally increase it. | |
| | | [0007] Fatigue level | [701] Exhaustion | | | |
| | | [715] Activities of daily living | 5. No deviation from the normal range | | | |

| Interventions NIC | Interventions NIC | Interventions NIC |
|---|--|---|
| [3320] OXYGEN THERAPY | [6680] VITAL SIGNS MONITORING | [1800] HELP WITH SELF-CARE |
| Activities | Activities | Activities |
| -Remove mouth, nasal, and tracheal secretions, as appropriate. | -Monitor blood pressure, pulse, temperature, and respiratory status, as appropriate. | -Check the patient's ability to exercise independent self-care. |
| -Restrict smoking. | -Monitor respiratory rate and rhythm (depth and symmetry). | Provide a therapeutic environment guaranteeing a warm, relaxing, private, and personalized experience. |
| -Monitor the flow of liters of oxygen. | -Regularly check the color, temperature and humidity of the skin. | -Encourage the patient to carry out normal activities of daily living adjusted to the level of ability. |
| -Educate the patient about the importance of leaving the oxygen delivery device on. | -Monitor for central and peripheral cyanosis. | -Encourage independence but intervene if the patient cannot perform the given action. |

Note: Own elaboration based on the analysis of results.

Table 5 shows the expected NOC results that were related to the diagnosis were those related to Domain: 1 Functional health Class: A Maintenance of energy and Domain: 2 Physiological health Class: E Cardiopulmonary. The nursing interventions that were proposed to achieve the expected results NOC were related to Domain: 2 Physiological: Complex Class: K Respiratory control and Domain: 4 Safety Class: V Risk control.

Table 6. Standardized care plan for 00013 Diarrhea

| Nursing diagnosis (NANDA) | Results (NOC) | Indicators (NOC) | Measurement scale | Diana score |
|---|------------------------------|--|---|---|
| [00013] Diarrhea | [0501] Bowel elimination | [50101] Elimination pattern | 1.Serious deviation from the normal range. | Each indicator will have a score correspondin |
| Defining characteristics: | | [50102] Control of bowel movements | | g to the initial |
| Abdominal pain, | | [50103] Stool color | 2.Substantial deviation from the normal range | assessment, |
| Elimination of > 3 liquid stools in 24 hours, | [0602] Hydration | [50108] Blood in stool | | based on the measurement |
| Hyperactive abdominal sounds, | | [60226] Diarrhea | | scale that |
| Intestinal urgency. | | [60215] Fluid intake | | serves to |
| | | [60205] Thirst | | evaluate the |
| | | [60202] Moist mucous membranes | 3.Moderate deviation from the normal range | expected result. |
| | [0703] Severity of infection | [70309] Gastrointestinal symptoms | | |
| | | [70311] General malaise | 4.Slight deviation from the normal range. | The goal of the interventions is to maintain the score and ideally increase it. |
| | | [70307] Fever | | |
| | | [70325] Colonization of stool culture. | 5. No deviation from the normal range | |

| Interventions NIC | Interventions NIC | Interventions NIC |
|---|--|---|
| [430] BOWEL CONTROL | [4120] LIQUID HANDLING | [6540] INFECTION CONTROL |
| Activities | Activities | Activities |
| -Monitor bowel movements, including frequency, consistency, shape, volume, and color, as appropriate. | -Instruct the patient on the absolute diet, as appropriate. | -Apply appropriate designated isolation precautions. |
| -Assess bowel sounds. | -Monitor the hydration status (moist mucous membranes, adequate pulse and orthostatic blood pressure), as the case may be. | -Administer an antibiotic treatment when appropriate. |
| -Perform a fecal occult blood test, as appropriate. | -Record entries and exits of liquids. | -Teach the patient and family to avoid infection. |

Note: Own elaboration based on the analysis of results.

For gastrointestinal disorders such as diarrhea and gastroenteritis, the expected NOC results that were related to the nursing diagnosis NANDA 00013 Diarrhea were those related to Domain: 2 Physiological health Classes: F Elimination, G Fluids-electrolytes and H Immune Response. The nursing interventions that were proposed to achieve the expected NOC results were related to the interventions to establish and maintain a regulation in intestinal elimination and control the resulting complications as shown in Table 6.

Table 7. *Standardized care plan for 00132 Sharp pain*

| Nursing diagnosis (NANDA) | Results (NOC) | Indicators(NOC) | Measurement scale | Diana score |
|--|-------------------------|--------------------------------------|---|---|
| 00132 Sharp pain | [2102] Pain level | [210201] Referred pain | 1.Serious deviation from the normal range. | Each indicator will have a score corresponding to the initial |
| Defining characteristics: | | [210204] Duration of pain episodes. | | assessment, based on the |
| Posture to relieve pain, | | [210206] Facial expressions of pain. | 2.Substantial deviation from the normal range | measurement scale that serves to |
| Expressive behavior, | [2103] Symptom severity | [210208] Restlessness | | evaluate the expected result. |
| Facial expression of pain, Self-report of intensity with | | [210301] Symptom intensity | 3.Moderate deviation from the normal range | |
| standardized pain scales. | | [210302] Frequency of symptom | | The goal of the interventions is to maintain the score and ideally increase it. |
| | | [210304] Associated discomfort | 4.Slight deviation from the normal range. | |
| | | [210303] Persistence of the symptom. | | |
| | | | 5. No deviation from the normal range | |

| Interventions NIC | Interventions NIC | Interventions NIC |
|--|--|--|
| [2314] medication administration: intravenous | [6680] vital signs monitoring | [5820] decreased anxiety |
| Activities | Activities | Activities |
| -Apply the correct five in the administration of medication. | -Monitor blood pressure, pulse, of temperature, and respiratory status as appropriate. | -Help the patient to identify the situations that precipitate anxiety. |
| -Properly prepare the team for the administration of the medication. | -Start up and maintain a continuous temperature monitoring device, as appropriate. | -Explain all the procedures, including the possible sensations to be experienced during the procedure. |
| -Determine the knowledge of the medication and the understanding of the method of administration by the patient. | -Monitor and record for signs and symptoms of hypothermia and hyperthermia. | -Provide objective information regarding diagnosis, treatment and prognosis. |

Note: Own elaboration based on the analysis of results.

For urinary situations such as urinary tract infections, the expected NOC results were associated with the Domain: 5 Perceived health Classes: V Symptoms. The nursing interventions that were proposed to achieve the expected NOC results were related to the interventions to facilitate the desired effects of pharmacological agents as shown in Table 7.

The NANDA nursing diagnoses that were related to traumatic events were [00046] Impaired skin integrity and [00004] Risk of infection. These findings are like those of Benítez who reported that 76.2% of the patients were at risk of infection. When an injury occurs because of an external agent, the skin loses continuity, the entry of microorganisms is enhanced and the proliferation of various bacteria in the tissues produces an infection, infectious processes can delay the healing process since this produce tissue destruction.

The NANDA nursing diagnoses related to injuries and traumatic events in the present study agree with those proposed by Rangel and Rivas, where the risk of infection (100%) and deterioration of skin integrity (100%) in patients with multiple traumas predominated, probably due to the impact of an object which directly or indirectly promoted bacterial proliferation. (Garcia and Rivas, 2010).

The systematic review carried out by (Gamboa et al., 2013) yielded results that coincide with the care proposals put forward for respiratory conditions in this study. The nursing diagnoses impaired gas exchange and intolerance to physical activity were identified for which NOC expected results corresponding to Domain: 2 Physiological: Complex were linked.

Regarding the NIC nursing interventions proposed to achieve the proposed expected results, they belong to the Domain: 1 Physiological: Basic, which is like the present investigation.

Likewise, (Gavilema, 2018) proposes in his study, the nursing diagnosis: Impaired gas exchange, as a priority diagnosis for respiratory disorders. As expected results, he proposed those related to the domains: 2 Physiological health, and Domain: 5 Perceived health, being consistent with those proposed in this study. In relation to the NIC interventions, interventions of domain 2 physiological: complex and Domain: 1 Functional health were proposed.

Other authors are similar in nursing diagnoses, NOC expected results and proposed NIC nursing interventions for respiratory disorders (Ucedo C. Pacheco E., 2016).

According to the national institute of health for the year 2020 a decrease in the morbidity of acute diarrheal disease in adults was observed by 29%. In the group of 80 years and over, women have a high prevalence (54%) of acute diarrheal disease, compared to men with 46% less than women. (National Institute of Health, 2020).

The care proposals for patients with diarrhea presented by Norway and Campos are consistent with those presented in this study since, in their study, the NANDA nursing diagnosis suggested for patients

with a gastrointestinal disorder characterized by liquid stools with poor absorption is Diarrhea, NOC expected results that are related are those corresponding to domain 2 Physiological health, and with respect to the NIC interventions, coherence is presented regarding domain 1 Basic Physiological (Gamboa et al., 2013). Diarrhea refers to the

evacuation of exceptionally loose or liquid stools, usually more than three in 24 hours. However, the decrease in consistency is even more important than the frequency. Diarrhea is not considered to be the frequent evacuation of formed stools. (PAHO, 2008)

Urinary tract infection (UTI) is a common pathology that affects a large part of the population and that generally resolves with antibiotics, it is one of the most frequent causes of consultation in the emergency department. It affects all age groups especially at the extremes of life and pregnancy. Most are not complicated Between 10 to 20% of women have an episode in their life, with an incidence 30 times higher than in men (San Félix, 2015).

The nursing diagnosis of acute pain was linked to urinary tract infection, a finding that agrees with the study by Cerquera and Manrique who reported that 53% of the patients present with clinical symptoms represented by a picture of lumbar or abdominal pain, fever, pyuria and irritative urinary symptoms (Cerquera et al., 2016).

For situations of a urinary nature, studies propose the Level of anxiety as the expected result NOC because within the comprehensive care that must be provided to the patient to improve his/her acute pain, the severity of the tension or concern that the patient is taken into account may feel for your urinary symptoms. As a NIC intervention, a decrease in anxiety was associated to help resolve the proposed expected outcome. (Benitez, 2018).

Conclusions

This study determines priorities for the assessment of the basic human needs of the patient who consults the emergency room, incorporates evaluation indicators to improve skin integrity, risk of

infection, deterioration of gas exchange, intolerance to activity, diarrhea and acute pain. Likewise, the certainty that the polytraumatized patient will present a greater number of nursing diagnoses to attend to. The planning of care for prevalent nursing diagnoses will transcend in terms of health, as well as a decrease in hospital admissions.

It is expected that later studies design care plans oriented to prevalent nursing diagnoses and thus be able to develop standardized care plans.

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**FACTORS AND CONCEPTS
ASSOCIATED WITH THE
INITIATION OF CIGARETTE
CONSUMPTION IN UNIVERSITY
STUDENTS OF PEREIRA,
COLOMBIA**

**FACTORES Y CONCEPTOS
ASOCIADOS AL INICIO DE
CONSUMO DE CIGARRILLO EN
ESTUDIANTES UNIVERSITARIOS
DE PEREIRA, COLOMBIA**

Authors: Giovanni García Castro¹, Claudia Milena Bernal Parra, Natalia Cardona Arroyave, Brahiam Stiven Moreno Bustamante y Daniela Ospina Sierra²

¹ Professor. Universidad Libre Pereira, Health Sciences Faculty giovanni.garciac@unilibre.edu.co
²Nursing students Universidad Libre Pereira

Abstract

Tobacco consumption has been increasing worldwide, observing earlier and earlier ages of onset. University students are a population to take into account, since it is during this period that new consumers appear or those who already brought the habit take hold. This study sought to identify the factors and concepts associated with cigarette consumption in students of the Universidad Libre Pereira. A descriptive, observational, prospective study was carried out, taking as a population the students of the daytime session of the Universidad Libre, Belmonte, who had or did not have the habit of smoking in the second semester of 2019. For data collection, a survey was designed with descriptive demographic variables such as age, sex, origin, education, marital status and education of the others. The data collection instrument also had a section that sought to inquire about opinions about the initiation of cigarette consumption in order to analyze concepts or ideas related to the subject, as well as to determine the factors that favor the initiation of consumption. The instrument was validated with thematic and methodological experts, as well as with a pilot test. Subsequently, univariate and multivariate analysis was performed using statistical software. 460 records of non-smokers were obtained, of which 64 are smokers, the average age was 19.3 years, where 25.26% had ever smoked. A percentage of smokers is evidenced in accordance with world statistics, and there is a tendency for women to exceed the national average. There are factors that are considered determining factors for the initiation of consumption, among which are emotional problems such as depression and anxiety disorders, as well as the use of other psychoactive substances. Factors such as the presence of smokers at home, influence of social networks and advertising were also considered. Smokers reported knowing the deleterious effects of tobacco use, especially in what has to do with associated pathologies, however, the vast majority are unaware of other consequences, such as the polluting effect of the production chain and cigarette butts. Contextualizing the problem of tobacco consumption in the university population is the starting point to implement social action campaigns that seek to reduce its consumption and therefore reduce its impacts on the health of the patient and their family and social environment.

Keywords: Smoking, Risk Factors, College Students, COPD, Lung Cancer.

Resumen

El consumo de tabaco viene en aumento a nivel mundial, observándose edades de inicio cada vez más tempranas. Los estudiantes universitarios son una población para tener en cuenta, ya que es durante este periodo que aparecen nuevos consumidores o se afianzan los que ya traían el hábito. Este estudio buscó identificar los factores y conceptos asociados al consumo de cigarrillo en estudiantes de la Universidad Libre Pereira; Se llevó a cabo un estudio descriptivo, observacional, prospectivo, tomando como población los estudiantes de la jornada diurna de la Universidad Libre sede Belmonte que tuvieran o no el hábito de fumar en el segundo semestre de 2019. Para la recolección de datos, se diseñó una encuesta con variables demográficas descriptivas como edad, sexo, procedencia, escolaridad, estado civil y escolaridad de los entre otros. El instrumento de recolección de datos tuvo además un apartado que buscó indagar opiniones sobre el inicio de consumo de cigarrillo con el propósito de analizar conceptos o ideas relacionadas con el tema, así como determinar los factores que propician el inicio del consumo. El instrumento se validó con expertos temáticos y metodológicos, así como con una prueba piloto. Posteriormente se realizó análisis univariado y multivariado por medio de un software estadístico. Se obtuvieron 460 registros de no fumadores de los cuales 64 son fumadores, la edad promedio fue 19.3 años, donde el 25.26% alguna vez había fumado. Se evidencia un porcentaje de fumadores acorde con las estadísticas mundiales, y se observa una tendencia de las mujeres a superar el promedio nacional. Existen factores que son considerados determinantes para el inicio del consumo dentro de los cuales están los problemas emocionales como la depresión y los trastornos de ansiedad, así como el consumo de otras sustancias psicoactivas. También se tuvieron en cuenta factores como presencia de fumadores en casa, influencia de redes sociales y publicidad. Los fumadores manifestaron conocer los efectos deletéreos del consumo de tabaco, sobre todo en lo que tiene que ver con patologías asociadas, no obstante, la gran mayoría desconoce otras consecuencias, como el efecto contaminante de la cadena de producción y las colillas. Contextualizar el problema de consumo de tabaco en la población universitaria es el punto de partida

para implementar campañas de acción social que busquen disminuir su consumo y por lo tanto reducir sus impactos en la salud del paciente y su entorno familiar y social.

Palabras claves: Tabaquismo, Factores de riesgo, Estudiantes Universitarios, EPOC, Cáncer pulmonar

Introduction

Tobacco use is one of the main risk factors for the development of pulmonary and cardiovascular diseases, in addition to being related to different types of cancer and other pathologies that generate individual, social, environmental and economic consequences. According to a report by the World Health Organization on smoking, cigarettes are one of the greatest threats to public health, and nearly 8 million people die each year, of which more than 6 million are direct consumers and around 1 million are non-smokers exposed to the smoke of those who do carry out this practice; Almost 80% of the more than one billion smokers in the world live in low- and middle-income countries where tobacco-related morbidity and mortality are highest (WHO, 2019).

Despite the obvious negative consequences, consumption is widespread throughout the world. According to a world study, the highest prevalence of tobacco consumption in men are found in Vietnam, Korea, part of Africa and the Dominican Republic, while Denmark and Norway present it in the female population. Due to their high population volume, China, India and Russia are the ones that group most smokers in the world, in addition, Cuba is among the countries of Latin America and the Caribbean with the highest cigarette consumption, together with Argentina, Brazil and Chili. According to the World Health Organization, tobacco is responsible for almost two-thirds of deaths worldwide and in America they are related to 77% of premature declines, that is, deaths in people between 30 and 70 years (WHO, 2019).

According to the Ministry of Health and Social Protection of Colombia in 2016, in our country 82% of people do not smoke, despite this, about 22,000 people die from diseases attributable to tobacco consumption, these diseases consume most of the national budget,

since the annual collection for tobacco consumption taxes is close to 400 billion pesos, which implies that to cover the damage caused by tobacco to Colombians, 8 times the collection resources must be paid (MinSalud. 2019). In addition, according to some studies, the effect of tobacco has a significant impact on the environment, as it is one of the crops that most depletes the soils, to this is added the use of pesticides that not only affect soils but also People who work in tobacco plantations and, along with cutting down trees to obtain the paper for cigarettes, are an important cause of deforestation in many countries, as well as many fires; but the greatest damage is produced to the indoor environment, being the main pollutant in the spaces where people spend most of their time (Bianco, 2015).

Once it has been shown that health systems are facing a problem that affects our society globally, through this research it is intended to know in the students of the Universidad Libre Pereira, what are the factors that lead to the beginning of cigarette consumption and the concepts that they have on the subject, which is essential to be able to assertively establish adequate prevention measures, with the ultimate intention of mitigating the individual, social, environmental and economic effects mentioned.

Context of tobacco use

Smoking continues to be a problem of great proportions worldwide.

About 35% of men in developed countries use tobacco, as do 50% of men living in low- or middle-income countries. On the other hand, there are already 250 million women smokers, the prevalence indicates that 22% of women in developed countries and 9% of developing countries consume tobacco (Avino et al., 2018).

In Colombia, the prevalence of tobacco use in adults in recent years are close to 20%, according to the latest National Health Survey, carried out in 2007 and according to the analysis carried out by the group from the University of Antioquia, the prevalence of smoking in Colombia is 19.7% in the general population over 18 years of age. Regarding sex, it has been variable, however, men are characterized by having the highest prevalence (MinSalud. 2019).

Between 1977 and 2007, tobacco consumption in men has ranged from 52.4% to 19.5% and that of women between 26.2% to 7.4%.

If tobacco consumption among the youngest is evaluated, the situation is alarming, according to the latest National Survey on the Consumption of Psychoactive Substances, the prevalence of tobacco consumption among young people between 12 and 17 years of age is 5.93%, among those from 18 to 24 years of age of 20.85% and those of 25 to 34 years of 19.19% (Mantilla-Toloza, Villamizar & Peltzer, 2015). According to statistics, the average starting age for regular tobacco consumption is 17 years and it is also known that 50% of smokers have tried cigarettes before the age of 16 and 25% have done so before the 14 years.

For its part, tobacco consumption is the leading cause of preventable morbidity and mortality in the Western world, causing a significant number of deaths annually and constitutes a public health problem, this occurs even though different information campaigns are carried out for the prevention of smoking (Kathuria & Neptun, 2020).

Risk factors for tobacco use

A risk factor is a condition that can trigger or result in an adverse event, whether in relation to the economic, social, environmental or biological aspects, and may impact individual or collective health. Risk factors can be divided into groups such as behavioral, physiological, demographic, environmental, and genetic.

In the field of health there are several risk factors linked to the diseases produced and they have been exhaustively studied in recent years. With the investigations of the events that occurred, surveys are carried out with which it is sought to find causes that lead to suffering the diseases, the statistical significance, probabilities of risk are shown and they end with results, when these processes are carried out the results may be risky or protection.

The process that is done to determine the risk factors is extensive, it is necessary to carry out this process well and in detail to reach a conclusion that is approved by the scientific community.

The risk factors for the initiation of cigarette consumption have been described for several decades and are related to the social context in which the patient develops, as well as to genetic factors that lead or not to substance addiction.

Some of the factors associated with cigarette smoking in young people are the level of education of the parents and having one of the parent's smokers (Martinez-Torres, & Pañuela-Epalza, 2017). A smoking mother or father could influence consumption, since adolescence is a stage where young people have not yet established an image of themselves, so it is a period of self-knowledge where they are easily influenced and more if it is a close relative. The low academic level of parents indirectly affects children when it comes to the consumption of harmful substances, since they are not well informed about how to prevent consumption and the effects that they have on health, therefore, they will not have the bases when informing their children about the inconvenience of consuming these substances (González, Espada & Orgilés, 2015).

Other studies show that tobacco use can be highly related to emotional problems such as depression, and that the worse the mood, the greater the cigarette consumption, given that people who tend to smoke but have a balanced emotional, put pauses to their consumption. The mood of the people who took part in an investigation was evaluated using the short version of the Center for Epidemiologic Studies Depression (CES-D) scale, with which the degree of sadness or depression that the person has felt in a period of time was evaluated. Time being one of the factors related to the start or continuation of tobacco use (Leventhal et al., 2009).

Impact on public health

Smoking is the largest preventable public health problem in developed countries and the main cause of premature death and preventable diseases in our country and in neighboring countries. In addition, exposure to second-hand cigarette smoke increases the risk of coronary heart disease, respiratory tract infections, chronic obstructive pulmonary disease, lung cancer, and sudden infant death, among other health effects, which contribute a great burden. of morbidity and

mortality in the community, not to mention the high costs for the health system and the implications on the quality of life of patients. It has been estimated that 54,000 people die each year from diseases caused directly by tobacco use. According to the national health survey, 31% of the population over 15 years of age is a smoker. Quitting smoking brings benefits to all smokers and non-smokers.

The world health organization emphasizes that a reduction in tobacco consumption is the most important public health measure that countries can adopt to benefit their health and their economy. The arrest and treatment of smoking is considered a reference compared to other preventive and care interventions, and even the pharmacological treatment of smoking has come to be considered as the reference pattern of preventive interventions, since it has shown clear evidence of effectiveness and good relationship that justifies its use in the usual clinic (Novoa-Gómez, Barreto & Silva, 2012).

Since smoking is a chronic and addictive disease linked to behavior, a biopsychosocial approach is required; the intrinsic characteristics of primary care (accessibility, continuity, integrated and personalized care) and the fact that 70% of the population can go to primary care consultations once a year and 95% do so every 5 years, with a frequency of 5-6 times a year and without delaying assistance, it makes this healthcare environment the most appropriate for its approach, as well as being the best training and follow-up point than any other. At present there is no homogeneity regarding the treatment of smoking.

Materials and methods

A descriptive, observational, prospective study was carried out, taking as a population the students of the Universidad Libre, Belmonte, whether they had the habit of smoking; Data collection was carried out between the months of August and November of the year 2019. For data collection, a survey was designed to meet the objectives of the study, verifying descriptive demographic variables such as age, sex, origin (rural / urban), schooling, religion, marital status, parental education and parental origin, among others.

The data collection instrument also had a section that sought to inquire about opinions about the initiation of cigarette consumption to analyze concepts or ideas related to the subject, as well as to determine the factors that favor the initiation of consumption in the population referred to. have this habit; This was based on previously defined bibliographic references and based on evidence, such as relationships between the initiation of smoking and social or family influences. This section of the instrument was designed as a Likert-type scale and was validated with thematic and methodological experts, as well as by a pilot test.

The data always had confidentiality protection. In addition, an informed consent previously designed for the study was filled out with the participants. After data collection, comparison tables were made by item that helped answer the research question and meet the objectives set.

The data collection was carried out by the student members of the research hotbed “Lifestyles in university students” of the nursing program of the faculty of health sciences, who participated both in the construction of the instrument and in the Data collection and completion of the data consolidation matrix in Excel 2010. Finally, a univariate and multivariate analysis was carried out using statistical software, to find relationships between the data.

The inclusion criteria included: Being a student enrolled at the Universidad Libre for the 2019-2 period, being part of one of the day programs of the Belmonte campus (Nursing, Microbiology, nutrition and dietetics, Civil Engineering and Economics), being over 18 years old, sign the informed consent designed for the study. The exclusion criteria were: Insufficient information, refusal of the participant to continue in the study.

Results and discussion

460 records were obtained, of which 64 were smokers (13.91%), showing differences between men and women. The average age was 19.97 years (SD 3.73), the majority were from the urban area (83.26%), single (87.17%), finding a great variety in origin in terms of regions of the country. The predominant socioeconomic strata were 3 and 4,

although there is a relationship between smoking and stratum 2. 39.78% had ever smoked and 41.75% of the participants lived with smokers, however, this situation is more related to students who smoke. (Table 1).

Table 1. *Characteristics of students of the Universidad Libre Pereira, in terms of cigarette consumption*

| Sex | total | % | Smokers | % | p |
|---------------------------|--------------|----------|----------------|----------|----------|
| Female | 307 | 66,74 | 25 | 8,14 | 0.12 |
| Male | 153 | 33,26 | 39 | 25,49 | 0.08 |
| Origin | total | % | Smokers | % | p |
| Urban | 383 | 83,26 | 62 | 16,19 | 0.05 |
| Rural | 29 | 6,30 | 2 | 6,90 | 0.23 |
| Social stratum | total | % | Smokers | % | p |
| 1 | 18 | 3,91 | 2 | 11,11 | 0.34 |
| 2 | 73 | 15,87 | 21 | 28,77 | 0.07 |
| 3 | 163 | 35,43 | 17 | 10,43 | 0.28 |
| 4 | 152 | 33,04 | 22 | 14,47 | 0.32 |
| 5 | 38 | 8,26 | 1 | 2,63 | 0.45 |
| 6 | 16 | 3,48 | 1 | 6,25 | 0.52 |
| Live with a smoker | total | % | Smokers | % | p |
| Yes | 81 | 17,61 | 45 | 70,31 | 0.03 |
| Not | 379 | 82,39 | 19 | 29,69 | 0.26 |

The general population thinks that the main factors related to the initiation of cigarette smoking have to do with the presence of smokers at home and with emotional problems, more precisely with depression and anxiety disorders, as well as the consumption of other substances such as alcohol, coffee or psychoactive. Factors such as social influences or the need for approval of specific groups and the influence of the media and social networks are also considered (Table 2).

Table 2. *Factors related to the initiation of cigarette smoking in students of the Universidad Libre Pereira*

| Predisposing factor | Women | | Men | | P |
|------------------------------|--------|-----------|--------|-----------|------|
| | Smoker | Nonsmoker | Smoker | Nonsmoker | |
| Smokers at home | 85 | 75 | 92 | 62 | 0.18 |
| Few information | 18 | 12 | 14 | 21 | 0.48 |
| Hostility in parenting | 15 | 18 | 11 | 25 | 0.53 |
| Bullyng | 8 | 10 | 7 | 15 | 0.65 |
| Advertising and media | 54 | 67 | 48 | 56 | 0.34 |
| Emotional problems | 78 | 84 | 65 | 67 | 0.09 |
| Lack of affection | 23 | 34 | 15 | 28 | 0.54 |
| Social influences | 16 | 25 | 35 | 18 | 0.67 |
| Alcohol or cofee consumption | 82 | 54 | 92 | 61 | 0.13 |
| Drugs consumption | 65 | 47 | 71 | 56 | 0.21 |

Note: The value is expressed in the percentage of importance given to each factor depending on whether they are smokers or non-smokers and by sex.

Regarding the information on the harmful effects related to tobacco, there are no significant differences between smokers and non-smokers, however, the consequences of smoking associated with lung cancer and chronic obstructive disease (COPD) are more in mind, rather than to other types of cancer or to the environmental effects of the chain of production and disposal of cigarette residues.

Table 3. *Information from the students of the Universidad Libre Pereira on the consequences related to cigarette smoking*

| Knowledge about consequences of smoking | Women | | Men | | p |
|---|--------|-----------|--------|-----------|------|
| | Smoker | Nonsmoker | Smoker | Nonsmoker | |
| Lung cancer | 89 | 87 | 91 | 86 | 0.76 |
| Other types of cancer | 67 | 56 | 46 | 51 | 0.65 |
| Lung damage and COPD | 92 | 95 | 87 | 89 | 0.72 |
| Effect on pasive smokers | 46 | 53 | 48 | 57 | 0.8 |
| Cigarette production line | 31 | 28 | 33 | 27 | 0.75 |
| Polluting effect of smoke | 21 | 34 | 18 | 27 | 0.65 |
| Polluting effect of cigarette butts | 17 | 22 | 12 | 19 | 0.61 |

Note: The value is expressed in the percentage of importance given to each aspect according to whether they are smokers or non-smokers and by sex.

The present study shows the state of cigarette consumption among students of the Universidad Libre of Pereira, finding that the percentage of consumption (13.95%) is slightly higher than that reported worldwide (12.98%) and the reference for Colombia (12.8%), however, is lower than the percentage of Risaralda which reaches 17.3%. Regarding the differences between the sexes, it is evident that the highest number of cases occurs among men, maintaining a very similar relationship with global and local statistics, although in this case there is a slight increase among women (8.2%) compared to national data (7.4%).

It is observed that most cases are urban, which is related to the origin of the participants and therefore is a value that cannot be entered into a correlation analysis. For its part, socioeconomic stratum 2 could be related to tobacco use in this population.

Conclusions

It is important to draw attention to the high percentage of people who have ever smoked, although about half do not continue with this habit; It is also striking that those who continue to do so have someone at home who also smokes, this being a highly relevant factor among the aspects to consider when it comes to prevention and to generate cessation strategies.

The concepts related to consumption include, in addition to living with smokers and ever trying cigarettes, emotional problems such as depression and anxiety disorders, especially among consumers who refer to it to “calm down” or to “face the problems”.

It is important to highlight the little knowledge that the students manifest about the aspects that refer to the socioeconomic and environmental impacts of consumption, since the individual consequences related to highly prevalent diseases such as cancer and COPD are considered. However, although the description of this phenomenon and the concepts that students have, is important from the point of view of understanding the phenomenon, the sample represents students, mostly from the health area, which, in view of the form their training, they may have more tools to decide whether to continue or start this habit.

Contextualizing the problem of tobacco consumption and even other addictions in the university population is the starting point to implement social action campaigns aimed at reducing tobacco consumption and therefore its impacts on individual and collective health; it is also the input to design prevention and smoking cessation campaigns.

On the other hand, the population that was defined as “smoker” is still limited and not representative, however, it is the starting point to generate more projects of this type or expand the current work.

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2

CHAPTER 2.

Economic, Administrative and Accounting Sciences

**TECHNICAL-FINANCIAL
EVALUATION OF BEAN (*Phaseolus
vulgaris*) VARIETY CARGAMANTO
IN THE VILLAGE OF THE
MUNICIPALITY OF SIBUNDOY IN
THE DEPARTMENT OF PUTUMAYO**

**EVALUACIÓN TÉCNICO
FINANCIERA DEL CULTIVO
DE FRIJOL (*PHASEOLUS
VULGARIS*) VARIEDAD
CARGAMANTO EN LA
VEREDA PLAYA EL CARMELO
MUNICIPIO DE SIBUNDOY EN EL
DEPARTAMENTO DEL PUTUMAYO**

*Authors: Adriana María Cuervo Rubio¹
Alejandra Arango Baranza²*

1 Adriana María Cuervo Rubio – Docente Asociada UNISARC – Adriana.cuervo@unisarc.edu.co
2 Estudiante Ingeniería Agronómica – Alejandra.arango@unisarc.edu.co

Abstract

A technical-financial evaluation of the cultivation of beans (*Phaseolus vulgaris*) in the municipality of Sibundoy, Putumayo, was carried out with the objective of identifying its technical and financial behavior in a farm located in the Playa del Carmelo village; case study methodology was used, finding that the producer generally follows the technical recommendations set out in the literature and that at 2020 costs, the cost of production per kilo is \$4,333.2 and the cost benefit ratio on gross profit is -\$0.048.

Keywords. Costs, cost benefit

Resumen

Se realizó la evaluación técnico financiera del cultivo de Fríjol (*Phaseolus vulgaris*) en el municipio de Sibundoy, Putumayo, con el objetivo de identificar su comportamiento técnico y financiero en un predio ubicado en la vereda Playa del Carmelo; para lo cual se empleó la metodología estudio de casos, encontrando que el productor sigue de manera general las recomendaciones técnicas planteadas en la literatura y que a costos de 2020, el costo de producción por kilo es de \$4.333,2 y la relación beneficio costo sobre utilidad bruta es de -\$0.048.

Palabras claves. Costos, Relación Beneficio Costo.

Introduction

In the San Miguel farm, Playa del Carmelo village in the municipality of Sibundoy, no technical and economic evaluation of the bean crop (*Phaseolus vulgaris*) has been carried out to date, even though it is frequently produced in areas larger than one hectare and represents a crop of great importance for the economy. Apparently, it yields good financial results, but there is no objective certainty, which leads to formulate the following research question; What is the technical and financial behavior of the bean crop in the San Miguel farm, Playa del Carmelo village in the municipality of Sibundoy - Putumayo?

Based on the above, this research intends to make a local approach to bean crop production and carry out a technical and financial analysis of the crop.

In Colombia there is a production chain for the cultivation of beans, according to which, it has been determined that this legume contains high amounts of protein and can be produced with two types of species such as the low-growing shrub and the fickle, which is of branched growth. The production of beans in the country occurs between 800 to 2,800 m.a.s.l. and temperatures of 13 to 28°C. Loamy, loose and well-drained soils are required due to the fact that the bean does not tolerate waterlogging. (Sioc.Minagricultura.gov.co, 2020)

In Colombia, 3 to 4 kilos per capita per year are consumed and preferences are given to varieties of beans that are more voluble because of their larger size and better cooking conditions., (Sioc.Minagricultura.gov.co, 2020).

Planting in Colombia was “a total of 92,412 hectares of beans in 2019, with a production of 114,408 tons and an average yield of 1.24 tons per hectare.” (Sioc.Minagricultura.gov.co, 2020).

Sioc.Minagricultura.gov.co, (2020), presents in Table 1 the production and market indicators for this product and specifies that the figures for the year 2020 correspond to those provided by Fenalce for the period from January to April of the same year.

Table 1. *Production indicators Ministry of Agriculture and Rural Development Production and Market Indicators*

| Variable | 2.013 | 2.014 | 2.015 | 2.016 | 2.017 | 2018 | 2019 | 2020* |
|-------------------------|---------|---------|---------|---------|---------|---------|---------|--------|
| Área (ha) | 94.259 | 107.266 | 94.341 | 104.175 | 90.833 | 92.476 | 92.412 | 35.200 |
| Producción (ton) | 119.069 | 132.329 | 101.497 | 130.988 | 115.609 | 113.887 | 114.408 | 68.487 |
| Rendimiento (ton/ha) | 1,3 | 1,2 | 1,1 | 1,3 | 1,3 | 1,23 | 1,24 | 1,25 |

Note: Source Sioc.Minagricultura.gov.co, (2020)

As observed, the cultivation of beans in Colombia is of great importance not only in production but also in consumption making it necessary to have knowledge on how it behaves technically and financially throughout the country's regions and in this specific case in the department of Putumayo, one of the most important producers in the country.

There is some information on bean production costs in Colombia which in chronological order is as follows:

- Arias, Rengifo and Jaramillo, (2007), determined the average cost of production for cargamanto beans in 2005 was \$3,948,000 pesos per hectare, with an average yield of 1,500kg/ha, cost per kilo of \$2,632, of which labor represents 43% of production costs.
- Corpoamazonia, (2007), the average production costs per hectare for bean cultivation in the period 2005-2006 were estimated at \$3'087,377, reporting an average yield of 2,521 kg/hectare. Production is especially concentrated in four municipalities in the Sibundoy Valley: Santiago 486 tons, Colón 379 tons, Sibundoy 670 tons, San Francisco 798 tons.
- López López, A. G., & Eugarríos Eugarríos, R. I., (2012), in a descriptive study with four producers, collected data and records of agricultural activities and established as findings that: producers do not have the habit of recording activities to keep track of expenses and defined that the highest percentage costs and the most common activity is planting (acquisition of seed, including labor to establish the crop) with the highest percentage weight of 23.36% in the cost of production, followed by manual fertilization with 12.08%.
- Chamber of Commerce of Bogota, (2015), references production costs for a 6-month cycle of the bean crop at \$4'066,125 for one hectare.
- Pajoy Guachetá, C. Y., (2018), in Production and commercialization of beans (*Phaseolus vulgaris L*) variety

cargamanto white flower, focused on sustainable agriculture in the municipality of Morales Cauca determined that the largest investment of the crop is located in labor, with 47% of the total cost of the project. The profit of the project turns out negative (- \$ 274,000) and corresponds only to the income of one crop cycle. It should be taken into account that the largest investment was in labor during soil preparation and trellising; this investment has not been profitable with other crop cycles.

– Rojas Rojas Sandra Liliana, R. R. M. N. (2019), In the research study: Determination of production costs with the implementation of one hectare of lima bean (*Phaseolus vulgaris*) in the productive unit La Palmera, Santa Bárbara village, Municipality of Timaná-Huila, determined that the costs per hectare (labor, inputs and others) generated in the establishment of the crop corresponds to \$3,188,500.

– Martínez-Reina, A., Grandett-Martínez, Tordecilla-Zumaqué, Rodríguez-Pinto, Cordero-Cordero, & Tofiño-Rivera, (2021), conducted research with small producers and determined that the cost per hectare in bean production was US1,347 with a productivity of 1.7 Tons per Ha.

Additionally, concerning the business of the crop in Colombia Sioc. Minagricultura (2020) established that “the Cargamanto bean presented its highest price on October 1, 2018 with a value of \$6,600,000 per ton and its minimum value on September 1, 2019 with a value of 4.8 Million pesos” (Sioc.Minagricultura, 2020), it also states that “between 2016 and 2019 the area planted in beans has decreased by 13% due to the marketing problems that affected the producers” (Sioc.Minagricultura, 2020).

Materials and methods

The methodology used in this research was a descriptive case study given that the data are focused on describing the situation as it is presented. We evaluated mainly the technical and financial behavior of bean cultivation on the San Miguel farm in the village of Playa del Carmelo in the municipality of Sibundoy, as proposed by Cuervo, Muñoz and Muñoz. (2017).

The San Miguel farm has an altitude of 2050- 2100 masl and an average temperature of 8 to 12 °C. The total area of the farm is 46 hectares, of which 7 hectares are used for bean production (*Phaseolus vulgaris*), 4 hectares for ecological restoration and the rest are silvopastoral pastures.

In order to achieve the research objectives, the following activities were carried out: collection of bibliography and cyber-graphics; typification and identification of the farm; establishment, harvesting and commercialization of the bean crop (*Phaseolus vulgaris*); taking records during the crop cycle and its commercialization, and systematization of the information obtained; evaluation and technical-financial evaluation of the production data; writing of the document.

For the technical-financial evaluation, production yields, labor and inputs were obtained in terms of quantities per hectare, times per time the work is done, the input is applied or harvested and the cost of the work per hectare. With these indicators, the total cost of production per hectare is calculated, considering the three stages of the production process: establishment, harvest and post-harvest, and separately the cost of trellising. The costs were valued at market prices for the year 2020 and the sale price corresponds to the price that the producer received in the same period.

Results and discussion

As results, the technical description of the work performed by the producer and its comparison with the bibliographic references were obtained. Additionally, the technical indicators or yields of labor and inputs for the establishment, harvest and post-harvest were recollected and based on all this information, the cost of production per kilo and the financial indicators that show the business of the crop in this specific area of the country were obtained.

Three phases in the crop were determined: trellising, which refers to the activities that allow the crop stems to be supported by tutors; establishment, which has to do with all the work that is done from the preparation of the land until the first fruit is obtained; and harvest- post-harvest, which includes all the labor that is done from harvesting, threshing, drying of the product and delivery to the buyer.

Technical analysis of the crop

A comparison of the cultivation tasks carried out by the producer and by the theoretical references was made, finding that:

- In soil preparation, the recommendations of Tamayo Molano, P. J., & Londoño Zuluaga, M. E., (2001), towards making high furrows to deposit the seed, and of Arias Restrepo, et al., (2007) in the incorporation of residual material from previous harvests in the soil, are followed.
- Hernández Fonseca, J. C. (2008) recommends associating corn (*Zea mays*) with the fickle bean so that it serves as a tutor, the farmer uses the corn cane from previous harvests to support the plant but additionally complements the tutoring with wood from the region, in addition the producer performs the tasks that Anleu Benavente, A. R., (2017) establishes for tutoring, which consists of tying the stalks with fiber and wire to the tutor.
- Tamayo et al., (2001) recommends the use of certified seed, which is not done by the producer.
- Córdoba Gaona, O., & Casas Moreno, H. (2003) recommends the use of several types of herbicides for weed management and the producer uses the same active ingredients in the chemical management of weeds.
- Arias, et al. (2007) recommends fertilizer application based on soil analysis, which is not done by the producer.
- The management of insect pests begins with cultural control, starting with the selection and cleaning of the land where the insect host plants are eliminated to prevent them from reaching populations capable of damaging the crop (García Mendoza, E., 2009), an activity carried out by the grower.
- Pest and disease management is done on a calendar basis, using in the same product application a mixture of products such as herbicides with insecticides or fungicides or molluscicides,

going against the recommendations made by Escoto, N., (2004) and Tamayo et al, (2001) regarding the need to avoid calendar applications.

– Arias et al. (2007) recommends harvesting when the grain contains 20% moisture and the producer harvests in two stages: a main harvest and then a rere harvest to collect the pods that were not ready when the main harvest was made.

Cost structure

The costs of labor and inputs were established and analyzed for three phases of the production process: establishment, harvest, post-harvest and trellising. The cost per hectare was calculated and a fourth part was applied to this crop, taking into account that this infrastructure allows the establishment of four crops and for this costing it was obtained that the value of the tutoring is \$196,964, which is 4% of the cost of the production process.

Table 2 shows the technical labor indicators for the establishment. It is observed that to produce the crop, 55.43 daily wages/Ha were used in the establishment, the harvest was carried out under contract and was paid per kilo harvested, but the harvest and hauling were done on a daily basis, using 3.7 daily wages per hectare. Similarly, post-harvestwork involved 18-day laborers per hectare. In the establishment, the most representative tasks were fertilization with 33%, followed by Pestand Disease Management, alone or with the application of herbicides or fertilizers with 31.38%.

Table 2 *Technical labor indicators in the establishment*

| Detail | Times period | Days /Ha/ Period | Wages per Time |
|---|---------------------|-------------------------|-----------------------|
| Manual augering | 8 | 8,86 | 1,11 |
| Sowing | 3 | 5,71 | 1,90 |
| Reseeding | 8 | 4,86 | 0,61 |
| Hilling | 6 | 3,57 | 0,60 |
| Fertilization | 18 | 13,71 | 0,76 |
| Application Amendment - Soil conditioner | 2 | - | - |
| Organic fertilization | 10 | 7,43 | 0,74 |
| Chemical fertilization | 6 | 6,29 | 1,05 |
| Weed Management: Herbicide Application | 7 | 6,14 | 0,88 |
| MIPE | 17 | 10,29 | 0,61 |
| Fungicide application | 11 | 7,29 | 0,66 |
| Insecticide application | 2 | 0,71 | 0,36 |
| Molluscicide application | 3 | 1,71 | 0,57 |
| Foliar fertilization - Fungicide application | 1 | 0,57 | 0,57 |
| MIPE - Herbicides: Herbicide - Insecticide Application | 3 | - | - |
| MIPE – Fertilization | 4 | 2,29 | 0,57 |
| Fungicide application | 2 | 1,43 | 0,71 |
| Insecticide application | 1 | 0,43 | 0,43 |
| Foliar fertilization - Fungicide application | 1 | 0,43 | 0,43 |
| Total Workdays | | 55,43 | |

The technical indicators of inputs allow us to identify the use of inputs in each of the activities of the crop. Table 3 shows the total amount of inputs used in the establishment stage, given that when the fruit began to fill the crop it did not receive any more work and waited until it was ready to be harvested.

Table 3. *Technical indicators inputs establishment*

| Detail | Period times | Quantity | Quantity/Ha / Period |
|------------------------------------|--------------|-----------------|----------------------|
| Soil conditioner | 2 | 571,4 | 285,7 |
| Fitoderma g | 2 | 571,4 | 285,7 |
| Adjuvant: Pegal ph cc | 11 | 914,3 | 83,1 |
| Organic amendment: Humita l | 2 | 1,1 | 0,6 |
| Stimulant: Calbit C cc | 8 | 3.428,6 | 428,6 |
| Fertilizer | 8 | 622,1 | 77,8 |
| Ferti inversa cc | 2 | 500,0 | 250,0 |
| Sulfato de Amonio SAMv Kg | 1 | 0,7 | 0,7 |
| Sulfato de magesio Kg | 3 | 7,1 | 2,4 |
| D.A.P Kg | 1 | 57,1 | 57,1 |
| Vicor Kg | 1 | 57,1 | 57,1 |
| Fungicide | 38 | 13.170,1 | 346,6 |
| Agrifos cc | 1 | 785,7 | 785,7 |
| Azufre cc | 1 | 785,7 | 785,7 |
| Belico cc | 14 | 7.628,6 | 544,9 |
| Centaurio cc | 3 | 392,9 | 131,0 |
| Difecol cc | 4 | 514,3 | 128,6 |
| Elosal cc | 8 | 2.571,4 | 321,4 |
| Nativo cc | 4 | 488,6 | 122,1 |
| Oxiclорuro de Cobre Kg | 3 | 3,0 | 1,0 |
| Herbicide | 13 | 1.167,7 | 89,8 |
| Calicut cc | 2 | 200,0 | 100,0 |
| Flex cc | 5 | 557,1 | 111,4 |
| Focus cc | 3 | 407,1 | 135,7 |
| Glifosato L | 3 | 3,4 | 1,1 |
| Insecticide | 6 | 1.425,7 | 237,6 |

| | | | |
|-----------------------------------|-----------|----------------|--------------|
| Insecticide | 6 | 1.425,7 | 237,6 |
| Cipermetrina 20ec cc | 1 | 371,4 | 371,4 |
| Estocada g | 3 | 754,3 | 251,4 |
| Lorsban cc | 2 | 300,0 | 150,0 |
| Molluscicide: Matababosa g | 3 | 1.500,0 | 500,0 |
| Seed: Frijol Cargamanto Kg | 1 | 57,1 | 57,1 |
| Organic fertilizer | 20 | 3.335,7 | 166,8 |
| Gallinaza Kg | 10 | 2.785,7 | 278,6 |
| Ceniza Kg | 10 | 550,0 | 55,0 |
| Adhesive: Melaza Kg | 3 | 7,1 | 2,4 |

Based on the above, the costs of the crop were established, starting with the cost of tutoring.

Table 4. *Total crop costs*

| TOTAL CROP COST | VALUE | % |
|------------------------|----------------|----------|
| Labor cost | \$ 2.071.428,6 | 41% |
| Inputs cost | \$ 1.873.764,3 | 37% |
| Harvest cost | \$ 456.142,9 | 9% |
| Post-harvest cost | \$ 449.857,1 | 9% |
| Tutoring | \$ 196.964,3 | 4% |
| Cost Hectare | \$ 5.048.157,1 | 100% |
| Kilo cost | \$ 4.333,2 | |

The cost of establishment was calculated from the preparation of the land until the first fruit is produced; this stage of the production process represents 78% of the costs. The establishment costs of one hectare of the crop are \$3'945,193 of which 53% or \$2'071,429 corresponds to labor and the remaining 47% (\$1'873,764) corresponds to inputs.

Harvesting costs per hectare are \$456,143, represented by the payment for the harvesting of beans in pods that were harvested under contract, the re-harvesting and hauling of the production to the drying site, which represents 9% of the total direct costs of the production process.

Table 5. *Harvest and post-harvest costs per hectare*

| HARVEST | | |
|----------------------------------|------------|-----|
| Recollection –Contract | \$ 370.500 | 81% |
| Re re | \$ 46.429 | 10% |
| Haul | \$ 39.214 | 9% |
| Harvest Total | \$ 456.143 | |
| POST-HARVEST | | |
| Haul | \$ 91.429 | 20% |
| Adequacy of dryer | \$ 14.286 | 3% |
| Equipment Rental | \$ 36.857 | 8% |
| Watering, drying and ventilation | \$ 33.857 | 8% |
| Selection | \$ 88.571 | 20% |
| Worker's transportation | \$ 28.571 | 6% |
| Trite | \$ 92.000 | 20% |
| Surveillance | \$ 64.286 | 14% |
| Post-Harvest Total | \$ 449.857 | |

The post-harvest cost per hectare is \$449,857 and represents 9% of the total cost of the production process. Post-harvest costs include bean hauling, dryer adaptation, equipment rental, watering-drying and ventilation of the product, selection, transportation of operators to carry out post-harvest work, threshing and product monitoring. Of these tasks, sorting and threshing each represent 20% of the total post-harvest cost and 14% the payment for monitoring the product.

Based on the above, the total costs of the bean production process are 5,048,157 per hectare, of which 78% corresponds to establishment, 9% to harvest, 9% to post-harvest and 4% to tutoring.

According to the Chamber of Commerce of Bogota, (2015), to make an adequate calculation of production costs it is necessary to take into account parameters such as the amount of labor required, the purchase of inputs and the appropriate quantities to avoid cost overruns and a continuous record of production in order to calculate the total production profit, which corroborates the advantages of having research to clearly identify the business of production.

The production cost obtained in this research is higher than the one reported for 2015 by the Chamber of Commerce of Bogotá of \$4'066,125 and the one reported by Rojas (2019) of \$3,188,500. It is important to clarify that the producer with whom this research was conducted is a large producer and his costs differ in addition to those reported by Martínez-Reina et al (2021), who conducted research with small producers and determined that the cost per hectare in bean production was US1,347 (\$3,575.63/US as of March 16, 2021) or \$4'816.374, that is \$231,783.39 pesos less than the result of the research, but also the production reported by Martínez- Reina et al, 2021 was 1.7 Tons per Ha, which means that it had 0.535 tons more per Hectare than what was found in the present study, so the production cost per kilo in Colombian pesos would be \$2,833.16 compared to \$4,333 of the present study. Based on the above, it is important to note that although costs do not differ substantially, productivity does have an impact on unit production costs.

Incomes

The productivity obtained by the producer of 1.165 Tons per Hectare is very close to that of Sioc.Minagricultura.gov.co (2020), which ranges from 1.1 to 1.3, with the estimated productivity for 2020 being 1.25.

It was also established that 1.46 kilos of beans in pods are required to obtain one kilo of dry beans and that 96% of the total produced is of first quality, 4% of second quality. This is a strength found in this crop because the selling price is directly related to the quality of the product.

The average values per kilo per quality were those paid to the producer for which the price for the first quality is \$4,286 per kilo and for the second quality \$317 per kilo. It is important to clarify that in Colombia there are no support prices for the products, except for coffee, which has a base price that fluctuates slightly depending on the buyer.

The purchase prices of agricultural products may change according to the buyer and the presence or not of the intermediary.

The total value corresponding to the sales of the product was \$4'408,905, thus obtaining an average price per kilo of \$4,124 per kilo.

If we compare the selling price per kilo of the producer and the price per kilo at which it is sold to the final consumer, we can see that for example tiendajumbo (2021), reports a value of \$8,312 per kilo charged to the consumer, a difference of \$4,026 per kilo. This shows that the profit margin in marketing is very high and is not paid to the producer.

Financial Analysis

The financial analysis is performed on direct production costs.

Table 6. *Statement of incomes and costs*

| | | |
|--------------------------|-----------------------|-------------|
| Incomes | \$ 4.804.904,8 | |
| Crop Total Cost | | |
| Labor cost | \$ 2.071.428,6 | 41% |
| Inputs cost | \$ 1.873.764,3 | 37% |
| Harvest cost | \$ 456.142,9 | 9% |
| Post-harvest cost | \$ 449.857,1 | 9% |
| Tutoring | \$ 196.964,3 | 4% |
| Hectare Cost | \$ 5.048.157,1 | 100% |
| Kilo Cost | \$ 4.333,2 | |
| Gross Profit per Hectare | \$ (243.252,4) | |
| Profit per kilo | \$ (208,8) | |

Note: Source own elaboration

From the above we obtain:

Direct cost per kilo= $\frac{\text{Total Cost of the Crop}}{\text{Production per Hectare}} = \frac{\$ 5.048.157,1}{1.165} = \$ 4.333,2$ Kilo

Production per Kilo 1.165 Kilos

Direct cost per Hectare: \$ 5.048.157,1 Hectare

Mean sale price: \$4.124 per kilo

Gross Profit per Hectare: \$ (243.252,4)

Gross Profit per kilo= $\frac{\text{Gross Profit per Hectare}}{\text{Production per Hectare}} = \frac{\$ (243.252,4)}{1.165} = \$ (208,8)$ Kilo

Production per Kilo 1.165 Kilos
Utility Margin (MU): profits generated on sales (%)
Utility Margin= $\frac{\text{Gross utility}}{\text{Total Sales}} = \frac{\$ (243.252,4)}{\$ 4.804.904,8} = -5\%$

It is interesting to clarify that from this profit margin the general expenses that were not taken into account in the analysis should be subtracted, since it is considered that the Direct Production Costs are those that the farmer can control at a given moment to improve the profit margin.

Cost-Benefit Ratio (B/C): Profit obtained for each peso invested.
Cost Benefit Ratio= $\frac{\text{Gross utility}}{\text{Direct Costs}} = \frac{\$ (243.252,4)}{\$ 5.048.157,1} = (0,0482)$

Pajoy (2018) showed that the profit of the business was negative in \$274,000. In this particular case it is confirmed that there is a low price per kilo in the case of beans as shown by Sioc.Minagricultura (2020) that the average cost per kilo of cargamanto beans for 2019 was \$4,800 while in 2018 it reached \$6,600 and argues that this has led to the bean production area decreasing in a 13% in the period from 2016 to 2019, due to difficulties in marketing.

CONCLUSIONS

The cultivation of beans (*Phaseolus vulgaris*) in the village of Playa El Carmelo municipality of Sibundoy obtained:

a productivity of 1,165 Tn/Ha, an average very close to that reported for the Colombian bean production chain, which for 2020 was 1.25 Tn/Ha.

obtained a negative profit of \$243,252.4 in a production cycle of 6 months, the benefit-cost ratio is -0.048, this means that for every peso invested, the company obtained a loss of \$0.048.

presents improvement options to reduce direct production costs, which are those that the producer can manage, but has adverse conditions such as the low price received by the producer per kilo

compared to the price at which it is marketed to the producer, which is about 49.6% above the value received by the producer.

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IMPLEMENTATION OF THE NIF IN MICRO-ENTERPRISES OF PEREIRA CITY

IMPLEMENTACIÓN DE LAS NIF EN MICROEMPRESAS DE LA CIUDAD DE PEREIRA

Authors: Laura Cortes Correa¹ y Nataly Andrea Gutiérrez²

Abstract

This document corresponds to the results of the completed research project carried out in the city of Pereira, where the implementation of the Financial Information Standard NIF for group 3 corresponding to micro-enterprises according to Decree 2706 of 2012 was investigated; It is important to note that approximately 96% of the companies in Colombia are in this group and they are organizations that present greater difficulty because their financial muscle is deficient. The research

1 laura.cortesc@campusucc.edu.co – Estudiante de Contaduría Pública VI semestre -Universidad Cooperativa de Colombia sede Pereira – Cartago

2 nataly.gutierrez@campusucc.edu.co – Estudiante de Contaduría Pública VI semestre -Universidad Cooperativa de Colombia sede Pereira – Cartago

had a quantitative, empirical-analyst research approach and was based on collected statistical data that answer specific questions where the implementation of simplified accounting in group 3 microenterprises is analyzed. with respect to the application of the standard, since they do not consider it necessary because in many cases, they do not have qualified personnel and work from the empirical, who have prepared their financial statements with this standard in some cases have been due to pressure exerted by the financial sector which requires them to provide accounting information in accordance with the accounting standards in force in Colombia. In addition, they consider that they have not had sufficient support from the State and organizations such as the Chambers of Commerce to carry out the pedagogical element on the subject.

Keywords: Simplified Accounting, International Standard, Implementation, Financial Reporting Standards.

Resumen

El presente documento corresponde a los resultados del proyecto de investigación terminado realizado en la ciudad de Pereira, donde se indagó sobre la implementación de la Norma de Información Financiera NIF para el grupo 3 correspondiente a las microempresas según el Decreto 2706 del año 2012; es importante destacar que aproximadamente el 96% de las empresas en Colombia se encuentran ubicadas en este grupo y son organizaciones que presentan mayor dificultad debido a que su músculo financiero es deficiente. La investigación tuvo un enfoque investigativo cuantitativo, empírico-analista y se basó en datos estadísticos recopilados que dan respuesta preguntas concretas donde se analiza la implementación de la contabilidad simplificada en las microempresas del grupo 3. Dentro de los hallazgos obtenidos se pudo evidenciar que existe desconocimiento con respecto a la aplicación de la norma, pues no la consideran necesaria debido a que en muchos casos no cuentan con personal calificado y trabajan desde lo empírico, quienes han realizado sus estados financieros con esta norma en algunos casos ha sido por la presión ejercida por el sector financiero el cual les exige suministrar la información contable de acuerdo con las normas de contabilidad vigentes en Colombia. Además, consideran que no han contado con el apoyo suficiente por parte del Estado y

organizaciones como las Cámaras de Comercio para llevar a cabo el elemento pedagógico sobre el tema.

Palabras claves: Contabilidad simplificada, Estándar internacional, Implementación, Normas de Información Financiera.

Introduction

The growth of companies to a large extent depends on the administrative, market, financial and accounting strategies that allow them to face the demands of the market; otherwise, they become part of the mortality statistics for micro-businesses in Colombia, since it is estimated that 70% of companies fail in the first five years and only 30% manage to get ahead. Even though since 2013 the companies of group 3 must apply the regulatory framework Financial Information Standards from now on NIF, there is still a large number of micro-enterprises with deficiencies regarding the application of this regulation in their accounting system; Hence, the purpose of this research was to analyze how the development of this process has been in a particular business group, such as group 3 companies located in the city of Pereira.

The purpose of this research was to contribute to the micro-business sector of the coffee region, specifically the one located in the city of Pereira; by determining the proper application of the NIF, by reviewing the implementation processes. This study is given by the implementation of the international standard in Colombia through Law 1314 of 2009 and Regulatory Decree 2706 of 2012, where the complexity and significance that it meant to evolve to the new form of presentation of the financial statements of Mandatory way makes organizations must incur investments and expenses for which they were not prepared.

The results provide information of interest for future similar investigations regarding the application of simplified accounting or NIF for group three of micro-enterprises. According to Burgos (2007), micro, small and medium-sized enterprises in Colombia are the main source of employment and are an important factor in stimulating the economy and reducing poverty; that is why tools must be created that allow them to be more efficient, productive and competitive not only

nationally but internationally, increasing at the same time, interest in exports”. At the same time, research has benefits, not only technical-academic, but also social and practical, since it favors different users such as micro-enterprises themselves, academia, who through the development of research can continue to expand the subject studied, the entities that support the state such as the Chamber of Commerce, Associations, among others.

As a general objective, it was sought to determine the degree of implementation of the NIF in micro-enterprises in the city of Pereira; For which it was necessary to identify the application of the NIF in group three micro-companies according to accounting policies established by the administration of the group three industries, check the application of the NIF according to the schedule established in the group 3 micro-companies located in the city of Pereira and determine the difficulties to carry out the process of implementation of the NIF in group three micro-enterprises located in the city of Pereira.

Finally, with the socialization of their results, it is expected to create in these microentrepreneurs the awareness to adapt these financial information standards, which are mandatory, with the aim that they have instruments that allow them to be competitive at the local and regional level.

Theoretical reference

The research called positive theory of accounting, explained by Gisbert and Cañibano (2007) where they present the importance of financial information in the setting of contracts in the business organization, is that it allows to know about the contractual structure and that it is decisive in the accounting policies and practices adopted by the entity.

Jensen and Mecklin (1976) were the scholars of agency theory; This refers to a contract in which one or more people entrust another to perform a service on their behalf, which means empowering part of the owner’s decision-making. Two types of relationships are generated within this exercise, which are: the investor and the creditor, within them there are different types of costs associated with the agency.

One of the first are the costs associated with the control mechanisms towards the agent as a measure of protection of the interests of the main economic entity, on the other hand, there are the costs associated with the control mechanisms directed by the agent himself to compensate the agents. owners in the event of abusive behavior, the residual loss associated with the lack of utility maximization is also handled (p. 38).

In the positive theory of accounting, the authors Watts and Zimmerman, (1990) give three basic hypotheses to the agency theory: Remuneration hypothesis, Debt hypothesis, Political costs hypothesis. The first refers to the importance of accounting figures in the formalization of remuneration contracts, pressures managers to comply with the established clauses and obtain the established remuneration, the indebtedness hypothesis refers to debt contracts that include clauses restrictive based on accounting items.

Luna and Muñoz (2011) The WTO, World Trade Organization, has insisted a lot on the global harmonization of accounting practices, to further stimulate markets, facilitating the insertion of countries in international trade. This is of national interest because Colombia is part of the WTO, and as such has become aware of current globalization, which is why the Congress of the Republic when issuing Law 550 of 1999 established in its article 63 called Harmonization of the rules accounting with international rules and practices (p. 31).

The international standard has been a topic that has been talked about since 1970 and has been embraced by more than 120 countries worldwide; becoming an important aspect within countries with respect to their trade ties, allowing them to be transparent and objective in their trade negotiations, which is why it is an important issue for the WTO.

Law 1314 (2009) by which the principles and standards of accounting and financial information and information assurance accepted in Colombia are regulated, the competent authorities are indicated, the procedure for their issuance and the entities responsible for monitoring compliance are determined (p.1).

This Law was the one that regulated the principles of accounting and financial information and information assurance in Colombia,

where knowledge of its application was not only a competence for entrepreneurs but for all actors in the economy, including the professionals from the Public Accounting Office, academia, competent authorities such as DIAN and the entities responsible for monitoring compliance.

Decree 2706 (2012), which regulates Law 1314 of 2009 on the technical regulatory framework of financial information for micro-enterprises. This Decree established a simplified accounting regime under the accrual system for micro-enterprises (p. 1).

Decree 3019 (2013), by which the Regulatory Technical Framework of Financial Information for Micro-enterprises, annexed to Decree number 2706 of 2012, is modified; The first article defines the condition of micro-enterprises and establishes that they are those with a staff of no more than ten (10) workers; possess total assets, excluding housing, for a value of less than five hundred (500) current legal monthly minimum wages (smmlv); and have annual gross income of less than 6,000 MMLV (p. 1).

It should be noted that the business sector in Colombia is divided into micro, small, medium, and large companies, this classification is regulated by Law 590 of 2000, better known as the Mipyme Law, modified by Law 905 of 2004.

Catolico and Gómez (2011) A different point of view from tax on what simplified accounting is that expressed by the Technical Council of Public Accounting (CTCP), an entity that in its Concept No. 13 of June 16, 2009 establishes that simplified accounting is the set of international accounting best practices that are applied to micro, small and medium-sized companies (MiPymes) that are not listed on the stock exchange (they are not public entities from the perspective of capital formation and its link to an active stock market) (p. 88).

Within the classification of the application of IFRS in Colombia, 3 groups were established, where the first group is made up of issuers of securities and public interest entities, who will apply full IFRS; The second group corresponds to large and medium-sized companies that are not issuers of securities, or public interest entities, they will apply

the IFRS for SMEs and group 3 that are small and micro companies, who were authorized to issue statements financial statements and disclosures in an abbreviated manner, therefore they will apply IFRS for micro-enterprises, that is to say that the requirements for this group do not generate exaggerated obligations that create difficulties for them in the development of their corporate purpose.

Materials and methods

The research has a quantitative, empirical-analyst investigative approach and is based on collected statistical data that answer specific questions where the impact of the implementation of financial information for group 3 and the perception of the application of the NIF in this group of companies in the city of Pereira. The deductive and inductive study methods are used, the information is obtained in a clear way to be able to supply the errors that are generated regarding the adoption process. It is a descriptive investigation; a data analysis is carried out where important characteristics and features of the subject are found.

A concrete study of the situation of a group of micro-enterprises in the cities of Pereira is carried out. The information collection instrument is the survey, which had 22 closed questions related to the application of the NIF in companies.

The cut of the investigation is transversal since it allows to compare the application of the NIF in this economic sector in a single time with the purpose of offering an overview of how the regulations issued for companies and other natural and legal persons are being applied, these variables are measured at a given time.

Results and discussion

92% of those surveyed said they did not know why Colombia changed from cost accounting to fair value accounting, which is due to the little importance given to accounting information in this type of company, since it does not, they consider it necessary to comply with this regulation, as they associate it with the obligation to pay more taxes.

There is a latent concern in the matter of ignorance in the regulations in force for this sector, because in Pereira 90% of the market is promoted by micro-enterprises, thus allowing to generate greater dynamics in the economy of the region. 91% of the surveyed entrepreneurs stated that their companies do not have their financial statements updated in accordance with Decree 2706 of 2012, which implies a stagnation in the local economy, as it does not allow them to have clarity regarding their strategic direction and achieving your goals. Only 8% of entrepreneurs know the purpose of simplified accounting, from which we can establish that the lack of awareness training that is provided for these microenterprises is deficient.

More than 90% of companies are unaware that they must have defined accounting policies under the simplified accounting scheme since they become the accounting and financial navigation chart for the recognition of their operations. 75% of the companies affirmed that the current policies are not in accordance with the structure of the company, the foregoing shows that there is no articulation between the administrative management and the financial structure of the entity, which indicates that the information provided to other organizations are initially built to meet some requirement demanded at the time.

71% of companies do not consider it essential that the National Government has included MSMEs within the regulatory accounting frameworks, due to ignorance of the regulations where the benefits that can be generated from having an organized company are not taken into account and formalized.

The multiple demands of the National Government for those who decide to create a company in Colombia, favor their creation in an informal way; Due to the fact that both formal and monetary obligations begin to be generated such as Industry and Commerce, the renewal of the commercial registry, the formalization before the National Tax and Customs Directorate, Sayco and Acimpro, firefighters, health, among others.

The analysis of the implementation of the NIF for micro-enterprises in the city of Pereira was approached with 327 micro-enterprises

registered in the Chamber of Commerce of Pereira, to which the survey on the experience in the implementation of this simplified accounting was applied. At this point, it should be borne in mind that the volume of micro-enterprises is greater since non-formalized enterprises are not being considered.

In the process of gathering information on the implementation of the NIF in micro-companies, the level of knowledge that was had about the subject and the effects for their company was investigated, leaving as a result that approximately 92% of the entrepreneurs are unaware of the concept of the NIF, and they have no interest in applying it, because they link it to greater obligations on the part of the State, therefore, to a greater payment of taxes.

Given the approach from the specific objectives in order to meet the general objective of this research, it is allowed to give greater clarity from the purpose of the IFRS, which were adopted in order that entrepreneurs had the possibility of expanding and additionally handle standards that do not allow room for interpretation and professional judgment, but this has not been possible in microenterprises in Colombia, since their intention is to supply a local or regional business or users.

According to interviews and surveys carried out with a large part of the microentrepreneurs in Pereira, the issue of implementing the NIF for companies belonging to group 3, results in a negative uncertainty in the distant landscape on the issue of adopting it, since it basically does not, they have the financial structure to cover the costs they require, in the same way because the entity would incur in processes that require time and knowledge.

Conclusions

The general analysis of the responses of the instrument showed that the responses of the interviewees are inclined to the fact that although the application of the NIF in organizations is important, it is subject to mechanical compliance with the standard, wasting the benefits offered by the process of the norm and consequently, slowing down the

process of acquiring a general culture, for the generation of pedagogical structures focused on learning processes within organizations.

On the other hand, the agency theory is part of the theoretical foundation because training is essential for this type of organization to internalize the regulations issued by the National Government, complying with current regulations in that interaction between the different actors that make up the agency.

Finally, despite the existence of regulations, its knowledge and application has not been simple, which makes it difficult to comply with Law 1314 of 2009; It is the duty of the National Government and the different entities that support the government such as the Chambers of Commerce and Associations to provide micro-entrepreneurs with a permanent pedagogy that allows them to consciously assume this work through effective training strategies to contribute to increasing the margin of learning that converges in its total application in the companies studied.

Colombia decided to implement the international standard under Law 1314 of 2009, which indicated the authorities, procedures, and surveillance entities that would oversee the process to adapt these standards. For this work, three groups and application schedules were assigned, locating group one and three to start in 2013. For the year 2019, the date on which its implementation was investigated, there was evidence of apathy to implement simplified accounting, because it brings with it a series of expenses that they must incur for the conversion of their financial information.

However, the benefits generated by the financial and administrative knowledge of companies cannot be ignored, because it makes them visible by generating the opportunity to obtain leverage through external parties such as banks, suppliers, investors, among others. For this, the training that can be provided to the micro-entrepreneur is important, since through the investigation it was observed that there is ignorance and myths about the application of current regulations.

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STRATEGIC FRAMEWORK FOR SUSTAINABLE PRODUCTION IN COLOMBIA

MARCO ESTRATÉGICO PARA LA PRODUCCIÓN SOSTENIBLE EN COLOMBIA

**Authors: Paulina Murillo Gómez¹, Manuela Ramírez Osorio²,
Laura Juliana Rodríguez Henao³, Lindy Neth Perea Mosquera⁴,
Isabel Redondo Ramírez⁵**

Abstract

This is a bibliographic review on the behavior that incorporating sustainable measures has been having for Colombian consumers and producers, to determine the efficiency of introducing new environmental policies, where Colombia is welcomed to meet the Sustainable

1 Estudiante de economía, Universidad Libre; paulina-murillo@unilibre.edu.co

2 Estudiante de economía, Universidad Libre; manuela-ramirezo@unilibre.edu.co

3 Estudiante de economía, Universidad Libre; lauraj-rodriguez@unilibre.edu.co

4 Docente investigadora Universidad Libre; lindyn.peream@unilibre.edu.co

5 Directora del centro de investigaciones FCEAC Universidad Libre; isabel.redondo@unilibre.edu.co

Development Goals of the United Nations, emphasizing objective no. 12 where it seeks to “Guarantee sustainable consumption and production patterns: an essential requirement for sustainable development.” This means a reduction in the excessive use of natural resources, and with it, the degradation of the environment. From the theory, it is possible to find original positions against the key aspects developed in the article, such as sustainable development, responsible consumption, sustainable production and tourism. The Sustainable Production and Consumption policy mainly seeks to change consumption habits towards a consumer more responsible and aware of what he buys, increase production efficiency, create environmental responsibility in using raw materials from non-resources. renewables, and the designation of solid waste to improve business and quality of life. In effect, the aspects referring to sustainable development are reviewed and achieve sustainability actions for the efficient management of natural resources, environmental improvement, and the productive transformation of Colombian competitiveness. Qualitative, historical, and analytical methods were used to present the situation of sustainable production in Colombia. The results over time show obstacles that Colombian companies present to get comparative advantages in the application of international plans, programs, and policies. Concluding that Colombia has been presenting in different periods of time an evolution in terms of sustainable development, but it still lacks an interrelation or institutional support for incorporating sustainability processes and to keep up with international markets.

Keywords: Sustainable Consumption, Sustainable Development, Environment, Sustainable Production, Business Sustainability.

Resumen

Esta es una revisión bibliográfica sobre el comportamiento que ha venido teniendo la incorporación de las medidas sostenibles para los consumidores y productores colombianos, de este modo determinar la eficiencia de la introducción de nuevas políticas medioambientales, donde Colombia se acoge a cumplir los Objetivos de Desarrollo Sostenible de las Naciones Unidas, enfatizando en el objetivo no. 12 donde se busca “Garantizar modalidades de consumo y producción sostenible: un requisito esencial para el desarrollo sostenible”. Esto

significa una reducción en el uso excesivo de los recursos naturales, y con ello, la degradación del medio ambiente. A partir de la teoría se logra encontrar diferentes posiciones frente a los aspectos principales desarrollados en el artículo tales como; desarrollo sostenible, consumo responsable, producción y turismo sostenibles. La política de Producción y Consumo sostenible busca principalmente, hacer un cambio en los hábitos de consumo hacia un consumidor más responsable y consciente de lo que adquiere, incrementar la eficiencia en la producción, crear una responsabilidad medioambiental en el uso de materias primas de recursos no renovables, y la designación de los desechos sólidos para mejorar la calidad empresarial y de vida. En efecto, se revisan los aspectos referentes al desarrollo sostenible y con eso lograr acciones de sustentabilidad para el manejo eficiente de los recursos naturales, el mejoramiento medioambiental y la transformación productiva de la competitividad colombiana. Se utilizaron métodos cualitativos, históricos y analíticos con el fin de presentar la situación en la que se encuentran la producción sostenible en Colombia. Los resultados a lo largo del tiempo evidencian obstáculos que presentan las empresas colombianas para lograr obtener ventajas comparativas en la aplicación de los planes, programas y políticas internacionales. Concluyendo que Colombia ha venido presentando en diferentes periodos de tiempo una evolución en materia de desarrollo sostenible, pero aún carece de una interrelación o acompañamiento institucional para la incorporación de los procesos de sostenibilidad y lograr estar a la altura de los mercados internacionales.

Palabras Clave: Consumo Sostenible, Desarrollo Sostenible, Medio Ambiente, Producción Sostenible, Sostenibilidad Empresarial.

Introduction

Currently, consumption and production have generated discomfort in the environment, because man in search of satisfying and satisfying all his needs produces on an unsustainable scale; and in doing so puts the integrity of the environment and the survival of human beings at risk. This problem reflects very shameful scenarios for society since it is not possible to ensure a continuous development of human life; without being able to understand the damage that has been caused to ecosystems, such as: deterioration of water quality, reduction of the

ozone layer, excessive deforestation, extinction of fauna and flora, and increase of non-biodegradable waste. (Nubia, 2016)

The existing action plans provide an alternative to safeguard the environment or remedy what has been caused. The UN in 2015 raised 17 objectives, and within them, a greater focus on the preservation and care of the environment stands out; Each objective has specific goals to be achieved in the next 15 years. (ONU, 2017)

In this way, objective number twelve proposes: “Guarantee sustainable consumption and production patterns” (United Nations, 2015); it seeks the efficient use of natural resources and the ecologically sound management of chemical products and all waste; In addition, the search to reduce food waste proposes the promotion of sustainable tourism, the reduction of subsidies to fossil fuels and, finally, strengthening the scientific and technological capacity of developing countries to encourage sustainable consumption and production.

According to the United Nations, it is important for the producer to have transparency where generalities about the form of production are included and in this way the consumer reflects their purchase choice. (United Nations, 2012)

Member States should plan or stimulate the formulation of general consumer education and information programs, including information on the effects on the environment of consumer decisions and behavior and the consequences, including costs and benefits, that may have the modification of consumption patterns, considering the cultural traditions of the people in question. The objective of such programs should be to empower consumers to be discerning, to make informed choices of goods and services, and to be aware of their rights and obligations. (United Nations, 2012)

Because of this, a bibliographic review of the strategic framework of sustainable production in Colombia should be made since these guarantees the quality and durability of current and future industries. The importance that we must give to the environment is vital because it is to provide us with vital resources to survive, while strategies,

plans and programs must be reviewed and available to help make this transition clean, to achieve sustainable and sustainable development.

The new challenge for countries is to answer to the modalities of sustainable consumption and sustainable production, companies, and families, because of the current consumption model of life requires many resources, thus causing a high environmental impact on the planet, generating great contradictions with sustainable development. To guarantee these forms of sustainable consumption and production, the 2030 agenda wants to ensure that people as consumers adopt lifestyles that are under nature. Therefore, companies adopt sustainable practices, and institutions promote public purchasing sustainable.

Therefore, to achieve economic growth and sustainable development, it is important to encourage bioeconomy models as a comprehensive proposal for environmental, social, and economic development. This new economic model incorporates knowledge, scientific and technological advances, generating new development alternatives for application in industries and consumers. (Jaramillo, 2018).

Likewise, Dr. Mayor Zaragoza points out that “the concern, recently arisen, for the preservation of our planet shows an authentic revolution in mentalities: appearing in just one or two generations. This cultural, scientific and social metamorphosis; it breaks with a long tradition of indifference, not to say hostility”.

Since 1992, at the World Environment Summit, it was mentioned that the principal causes of environmental deterioration were because of the forms of consumption and production that society was adopting. In 2002, at the World Summit on Sustainable Development in Johannesburg, the need for people to change their consumption and production habits was established; later, in 2003, the Marrakech process emerged, seeking to promote changes towards more sustainable consumption and production habits. Finally, at Rio + 20 (2012), the leaders of each nation adopted the Ten-Year Framework of Programs on Sustainable Consumption and Production. (United Nations, 2012).

Sustainable development is a purpose of global solution, because economic, demographic, environmental, industrial, energy, cultural, etc. issues are taken. Similarly, it is said that sustainable development will mean “the third great revolution of humanity.” (Constanza, 1989), therefore, sustainability is the improvement of economic activities, these to reduce the damage and negative effects that have been caused in the environment, in addition, it supposes measures that are sustained over time and that help the durability and durability of the living environment.

According to R.W. (1991), sustainability arises negatively since it is generated thanks to a “planetary emergency” because of the current unstable situation in the environment. On the other hand, Mckeown understands sustainability as a paradigm of thinking about the future through environmental, social, and economic concerns to seek the balance of development and quality of life. (Mckeown, Hopkins, Rizzi, & Chrystallbridge, 2002) The World Commission on Environment and Development (WCED, 1988) introduces the term of sustainability as, “sustainable development is development that meets the needs of the present generation without compromise the ability of future generations to meet their own needs”.

Similarly, the Rio Summit defines the objective of development as: “achieving sustainable development by promoting sustained, inclusive, and fair growth, creating greater opportunities for all, reducing inequalities, improving basic living standards, promoting development. fair social and inclusiveness and promoting the integrated and sustainable management of natural resources and ecosystems, which contributes to economic, social, and human development while facilitating conservation, regeneration, restoration, and restoration. ecosystem resilience in the face of new and emerging problems” (United Nations General Assembly, 2012). Sustainable development is a world-wide concept, which interrelates between nature and society, to fix world problems, among them, climate change, social inequity, poverty, the extinction of species of fauna and flora, overpopulation, the lack of non-renewable resources and education (Disterheft, Caeiro, Azeiteiro, & Filho, 2013).

Responsible Consumption

Responsible consumption refers to the set of good practices that each person applies for the benefit of the environment and society; There are consumers who show a growing sensitivity in relation to their consumption acts and not only consider aspects such as the price, quality, and ease of purchase of the products, but also where and how they have been manufactured, as well as who benefits from their purchase.

From the current perspective, Daly (1995) defines guidelines for responsible consumption; The conditions of sustainability are affirmed that when the rate of use of resources should not exceed the rates of regeneration of the environment. Second, the rate of use of renewable resources should not exceed the rate of non-renewable substitutes. Finally, the emission rates of pollutants should not exceed the assimilation capacity of the environment. Likewise, it is said that sustainability represents an economic theory of the environment, because it provides operational concepts that motivate the dynamics and applicability economical from their own budgets. (Daly, 1995)

Sustainable production

To achieve the goal of promoting sustainable development, it is necessary that the production of goods and services comply with its essential pillars; it must be clean, efficient and, as its name implies, sustainable. From the point of view of supply, it requires that the following factors be considered to achieve sustainable production and consumption; First, it is important that the supply of vital natural resources (water, food, energy, productive land, etc.) for human survival is limited and regulated. Second, in the same way, that there is a control against the main renewable and non-renewable resources (wood, fiber, metals and minerals) to achieve economic development. Finally, have control and achieve the reduction of pollution associated with human and economic activity; reduce as much as possible toxic chemical substances, emission of gases that cause the greenhouse effect, release of excess nutrients and suspended particles that can degrade ecosystems or even human health. (UN, 2018)

The concept of clean production is given thanks to the Office of Industry and Environment of the United Nations Environment Program in 1989, it was defined as the “continuous application of a preventive environmental strategy integrated to processes, products, and services for improve eco-efficiency and reduce risks to humans and the environment” (Sachs, J. 2015).

The well-being of people and the sustainability of the planet cannot be subjected to an accumulation of material goods that breaks the social, economic, and environmental balance. (García, 2020). Therefore, this is how each of the economic agents found in society must change the habits of production and consumption to achieve the long-awaited sustainability.

According to authors Manfred Bergman, Zinette Bergman, and Lena Berger, sustainability in the business sector is defined as “a systematic business approach and strategy, which considers the long-term social and environmental impact of all the economically motivated behaviors of a company, in the interest of consumers, employees and owners or shareholders” (Bergman, Bergman and Berger 2017, p. 10). The authors Yip and Bocken (2018) define it as “generating benefits by significantly reducing the negative effects for the environment and society” (p. 151).

Materials and methods

This document has a documentary review of scientific articles consulting databases, without date restriction, in Spanish and English, by manual search. Research, books, papers, and official sites were reviewed.

The approach is qualitative of a descriptive type based on a non-experimental and historical review because the observations are taken in different periods of time, to conclude what has been the strategic framework of sustainable production in Colombia.

The writing of the article was developed in four phases: the first bibliographic search, second reading and selection of the research, third analysis of the documents, and fourth synthesis and writing of the information.

Results

According to the review of the strategic framework of sustainable production in Colombia, entrepreneurs and consumers must propose objectives and strategies to achieve sustainable production and thus improve the quality of life, the environmental environment and business competitiveness (Alcaldía de Bogotá, 2003), among which there is; Generate corporate awareness regarding sustainable processes in decision-making, activity planning, and economic resource management, make efficient and optimal use of natural resources within productive sectors, produce eco-labels and certificates and Implement environmentally friendly transport, management of solid resources, training in environmental terms and knowledge of international agreements in favor of the environment and finally Boost to the Circular Economy.

In the Colombian subject, there has been gradual progress in spending on environmental protection, this increased by 32% in 2019. (DANE, 2020) The resource management activities with the highest participation are management of water resources and management of aquatic resources. (DANE, 2020)

Colombia is one of the most abundant countries in natural resources, it has 10% of the total world biodiversity, 15% of the National territory are protected areas, of which; 59 are National Natural Parks of Colombia, 57 National Protective Forest Reserves, 4 National Integrated Management Districts, 53 Regional Natural Parks, 93 Regional Integrated Management Districts, 13 Soil Conservation Districts, 10 Recreation Areas, 96 Regional Protective Forest Reserves and 677 natural reserves of civil society. Colombia ranks first in the world with the largest number of birds and orchids, second in numbers of plants, amphibians, butterflies and freshwater fish, and third in number of species of palms and reptiles. (Minambiente, 2021).

According to the Ministry of Environment, Housing and Territorial Development.

Sustainable production and consumption in Colombia have been institutionalized as a relevant strategy to advance environmental

management in the public and private sectors. In 1997, the Colombian Ministry of the Environment adopted its National Policy for Cleaner Production to promote the new environmental institutions in the country. In 2002, the Ministry of Environment, Housing and Territorial Development -MEHTD issued its National Strategic Plan for Green Markets. (Directorate of Sustainable Sector Development, 2011)

Different strategies have been proposed not only in business, but in culture, emphasizing the social responsibility of each company, where the use of raw materials and inputs that generate less pollution and cleaner production is considered. It was found that in the business environment, organizations that do not have or comply with less polluting measures must pay taxes as a compensation mechanism for environmental damage. (Food and Agriculture Organization of the United Nations, 2009)

Achieving the incorporation of companies into sustainable production modalities and processes has been a significant challenge, since they are set more by government compliance, which is mandatory and not by the side of improving the environment and by more competitive business training for foreign markets. (UN, 2017)

There is a growing concern among entrepreneurs about the value they incur when implementing sustainability practices, such as fair trade and organic products, improvement of the quality of life of employees, suppliers and consumers, elimination of single-use plastic bags and containers, generation of decent employment and technological innovation.

According to the bibliographic review, it is found that, an accompaniment by companies, universities, non-governmental organizations (NGOs), community organizations and consulting and research centers, achieve greater consolidation to strengthen the capacities of each company towards a strategic sustainable development and more competitive to generate comparative advantages that differ by sector and company compared to other countries. In this way, companies with greater dynamism and business experience can easily be distinguished and taken as role models. (Valencia-Rodríguez, Olivar Tost, & Redondo, 2019)

Therefore, the National Government is currently developing certain strategies to implement programs and achievements for entrepreneurs and consumers, of which the following stand out:

Achievements got by Colombia at COP 25: (Ministry of Environment and Sustainable Development. 2021).

- Colombia hosts World Environment Day
- Fight against biopirates
- Deforestation is a matter of the State
- Regulated carbon market
- Boosting the circular economy
- Signature of the “Escazú Agreement”
- Sustainable capacity building
- Creation of the Santiago Network
- Leticia Pact Action Plan
- Support against deforestation
- WRI Alliance
- Woman approach

Colombia reiterates its commitment to seek joint solutions to climate change at the multilateral level and, in parallel, advances with implementing the Paris Agreement. In 2020, the country will present the update of its Nationally Determined Contribution (NDC) and its Long-Term Strategy on Climate Change, processes that will have the contributions of government sectors, the economy and with the participation and fundamental contribution of non-state actors. (Ministry of Environment and Sustainable Development., 2021)

However, it is worth mentioning that there is a lack of strategies that allow reinforcing to guarantee sustainable production and consumption for implementing the programs, giving entrepreneurs and consumers incentives and / or education ensuring that they have more awareness of the habits or customs that they carry in their day to day; in this way, achieve sustainable production in Colombia and that it has a comparative advantage over the world.

Conclusions

In the review of the strategic framework of sustainable production in Colombia, it was found that the policies, plans, and programs are aimed at all the inhabitants of Colombia, however, this must be focused on the most important sectors of the Colombian economy, to achieve a greater impact, therefore, strategies must be generated that are in favor of the environment, and in favor of achieving productive sustainability (Diego Masera, PhD, 2005).

Sustainable production is closely linked to the use of natural resources, where its essential purpose is to satisfy the basic needs of the community, the lack of a strategic framework generates an inadequate comprehensive management of natural resources, making sustainable production an object difficult to comply with, but in the same way it is presented as a great opportunity to improve the search for alternatives, strategies and measures to improve and implement ecologically supported models.

The strategies that can be proposed are:

- Encourage the purchase and sale of goods and services that do not impact the environment.
- Training on the environment and how consumers and producers can benefit from sustainable consumption patterns.
- Establish investment plans in infrastructure and technology transfer that facilitate sustainable consumption and production processes.
- Generation of articulation and help, between government agents, companies, organizations, institutions, and families.
- Evaluation and review of activities to determine their respective regional or national impact on or against sustainable production and consumption.
- Support Sustainable Cities initiatives in the region (transportation, energy and waste).

- Generate innovation for the improvement of products and services, to satisfy the needs of all consumers.

Those who must take part and articulate in the application of strategies in favor of sustainable consumption and production are the different economic agents, such as families, public and private companies, government institutions, economic associations, mass media, educational institutions, and financial institutions.

These actors of society are very relevant to achieve those practices or strategies that motivate more sustainable production and consumption patterns, while climate change has been appearing much more premature than previously thought; scarcity of natural resources, air pollution, poor management of solid waste, and losing forest because of deforestation, causing the general population to instigate actions for a sustainable future.

This with the need to support each of the scenarios found in sustainability, so that from them the possibilities of achieving high-affected long-term results increase, this is how networks should be created in which everyone interacts, remembering that the environmental problem is not only in the business sphere but also in the cultural and social sphere.

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SUSTAINABLE INNOVATION IN MANUFACTURING INDUSTRY

INNOVACIÓN SOSTENIBLE EN LA INDUSTRIA MANUFACTURERA

Authors: Mariana Buitrago Zuleta¹, Laura Juliana Rodríguez Henao², Lindy Neth Perea Mosquera³ y Marlen Isabel Redondo Ramírez⁴

Abstract

This research is a bibliographic review designed to analyze some processes given in sustainable innovation in the manufacturing industry, from the international scene; national level (Colombia) in statistical and analytical terms; Its purpose is to describe variables and analyze their incidence over time. The analysis of the information was carried out employing a documentary analysis of the content, which was based on three phases: the first reading/comprehension, the second the analysis, and the third the synthesis. This article allows us to conclude that innovation has always been a fundamental factor in the advances of industries in general, but mostly in manufacturing since they have been the ones that have required an increase in the sustainability of

1 Estudiante de economía, Universidad Libre; Mariana-buitragoz@unilibre.edu.co

2 Estudiante de economía, Universidad Libre; lauraj-rodriquezh@unilibre.edu.co

3 Docente investigadora, Universidad Libre; lindyn.peream@unilibre.edu.co

4 Docente investigadora, Universidad Libre; isabel.redondo@unilibre.edu.co

their processes, to make them more effective. in time and costs, which has implied a great innovative footprint throughout history. Among the results obtained throughout the research, it was also discovered that youth have shown greater interest in innovative and creative issues, which has led organizations to also take these issues into account in other business areas, such as administrative, product, technology, and machinery improvements; It was also found that at present many organizations and especially the national government are looking to generate increases in this field, such as: doubling public and private investment in science and technology by 1.5% of GDP by 2022 and productively supporting almost 4,000 companies, compared to 200 that are currently. providing implementation to sustainable innovation within their organizations at the industrial manufacturing level.

Keywords: Innovation, Industry, Manufacturing, and sustainability

Resumen

Esta investigación es una revisión bibliográfica que busca analizar algunos procesos dados en la innovación sostenible en la industria manufactura, desde el panorama a nivel internacional; nivel nacional (Colombia) en términos estadísticos y analíticos; su propósito es describir variables y analizar su incidencia en el tiempo. El análisis de la información se realizó mediante el análisis documental del contenido, el cual se basó en tres fases: la primera la lectura/comprensión, la segunda el análisis y la tercera la síntesis. Este artículo permite concluir que la innovación siempre ha sido un factor fundamental en los avances de las industrias en general, pero mayormente en las manufactureras, puesto que han sido las que han requerido de un aumento en la sostenibilidad de sus procesos, para hacerlos más eficaces en tiempo y costos, lo que ha implicado una gran huella innovadora a lo largo de la historia. Dentro de los resultados obtenidos a lo largo de la investigación, también se descubrió que la juventud ha mostrado mayor interés en temas innovadores y creativos, lo que ha llevado a que las organizaciones también tengan presente estos temas en otros ámbitos empresariales, como lo pueden ser las mejoras administrativas, de productos, tecnología y maquinaria; también se encontró que en la actualidad muchas organizaciones y en especial el gobierno nacional están en busca de generar incrementos en este campo, como: duplicar la

inversión pública y la privada, en ciencia y tecnología en 1.5% del PIB a 2022 y apoyar a unas 4.000 empresas de manera productiva, frente a 200 que se encuentran actualmente. brindando implementación a la innovación sostenible dentro de sus organizaciones a nivel industrial manufacturero.

Palabras Clave: Innovación, industria, manufactura y sostenibilidad.

Introduction

Sustainable innovation in the manufacturing industry is a topic of global interest that has been approached over time as an object of study by different authors, information that has been used for the analysis of this research, through which, it's possible to detail the factors that affect its sustainability, the different types of innovation, among others.

For the development of this research, we started by using definitions that support an idea as a whole, which is sustainable innovation in manufacturing industries, therefore, Drucker affirms that when we talk about innovation, there are different sources or areas, which can decide the opportunities for such innovation, such as the internal variables of the organization, inconsistencies, process needs and sectoral and market changes, in turn, takes into account additional sources of opportunity that exist in the external environment of the company. organization, such as demographic changes, perceptual shifts, and new knowledge. (Drucker, 2004, p. 4).

Therefore, the unification of these different terms gives a wider perspective about; what is innovation in the manufacturing industry, since they show the relevance of the terminology independently and at a general level, what is intended is to demonstrate the importance of their union and see how the companies that have implemented them have had better results, both internationally and nationally, highlighting the organizations that have sought to contribute in the provision of services for the implementation of said terms in manufacturing industrial organizations.

Sustainable innovation in the manufacturing industry has become a significant factor worldwide since it has had many authors who have used it as a reference object, the information analyzed in this research has allowed us to observe the incidence of sustainability and innovation over time.

The organizational environment is discussed when we talk about innovation, considering that it is a component that reflects the degree of orientation of the organization towards innovation, as well as the support that creativity and innovation absorb; the innovation orientation should take place mostly at the highest hierarchical levels, but it also needs to exist at the lower levels, as it is useful to communicate and interpret that vision (Amabile, 1996, p. 8), this kind of proposal assure that innovation is not focused on something unique, but, on the contrary, it is a set of several elements, as well as creativity, resources, managerial practices, and others.

Starting from the above, it can be concluded that innovation is an important pillar in the sustainable development goals expected for the year 2030, considering that it plays an essential role in introducing and promoting new technologies, facilitating international trade, and allowing efficient use of resources. (United Nations, 2020)

The sustainable development idea turns to be contradictory to many authors, however, this term starts from the hypothesis that there can be development, or qualitative improvement, without generating what we call “growth”, in other words, without generating an increase in the physical scale, without using more energy or materials; Part of this is because, if infinite growth continues to be generated through development in a world with finite goods, services, and materials, in simple words, there will come a point where life cannot continue, this is why it was necessary to generate the implementation of said term and in turn, over time, the sustainable development objectives, to give a guarantee to the young generations that over time they will be able to produce development in an optimal and timely manner without the need to generate that growth, which to define it more colloquially, it is almost impossible to survive it. (Edwards, B., & Hyett, P. 2008). For this reason, it is necessary to highlight the danger that today’s world

faces and at the same time, realize that the responsibility resides on the society itself and the implementation of the word sustainability in real life.

To conclude with the manufacturing industry complete definition, the RAE defines the word manufacturing as a work done by hands or with the help of a machine, then, Guerrero (2008) defined this as a unification of those terms (industry and manufacturing). The manufacturing industry can be defined as a way of transforming raw material into convenient goods for society, in a massive way and with the substitution of human labor, by machinery, assembly lines, automation, and digitization.

The article was made to demonstrate how innovation has become an important factor in the manufacturing industry, not only in the international environment but also in the national background since it is a subject very related to sustainability which currently the world is looking forward to. It seeks to observe the capacities that these types of organizations have had for the implementation of the sustainable development objectives, more specifically in objective 9 (innovation and infrastructure), taking into account that the industries over time have represented a significant part of environmental damage caused in the world, likewise, it should be noted that the novelty in the study lies in the current importance of contributing to efforts not only to achieve better levels of productivity in the company but also to make great contributions to the environment.

In addition, this topic seeks to offer a vision for those micro-entrepreneurs who are looking for ideas to contribute to sustainable development, as this is a radical transformation that the world is seeking, thus including the jolt on climate variation and the innovation that is being developed. It takes place to help companies develop more excellent and cleaner processes, as well as at a social status, since jobs are focused on people's human relations, making them have a better quality of life and, the economic impact represented more at a country stage, since that industries carry out sustainable innovation reflects greater effectiveness in the processes which makes their productions more excellent and as a chain leads in the end to economic growth,

and to an improvement, only that such improvement wouldn't be tied to physical plants, but rather than the optimization of resources and processes.

Innovation

Sustainable innovation in the manufacturing industry is a topic of global interest that has been approached over time as an object of study by different authors, consultation information that authors used for the analysis of this research, through which, it's possible to detail the factors that affect its sustainability and the different levels of innovation, below, the theory that each of them proposes on different concepts associated with the subject that illustrated the study:

According to the OCDE (2005), Innovation is defined as introducing a new or improved product, process, commercialization method or organization method into the internal practices of a company, the workplace organization or the external relationships, however, there are some standards designed by the Oslo manual to help to identify when a product is innovative; and it should be noted that this manual is a guide to analyze data on innovation, so it proposes, for innovation to exist, it is necessary that the product, the process, the marketing method or the organization method are new, or improved. This definition considers products, processes, and methods that companies develop for the first time or those that adopt them. (OECD, 2005, p. 56).

Other authors talk about this topic, as a set of strategies and name it as something very well thought out, as Peter Drucker said it in his book *the Discipline of Innovation* "Innovation is the specific function of the entrepreneurship, whether in an existing company, in a public service institution, or in a new business started by a lonely individual in his home kitchen. It is the means through which the entrepreneur creates new wealth-generating resources or endows existing resources with greater potential to create it". (Drucker, 2004)

Drucker also affirms that, for innovation, there are different sources or areas, which can decide the opportunities for said innovation, such as the internal variables of the organization, inconsistencies, process needs, and sectoral and management changes. Market considers additional

sources of opportunity that exist in the external environment of the organization, such as demographic changes, changes in perception and new knowledge. (Drucker, 2004, p. 4)

Sustainability

This concept appeared for the first time in a report known as “Brundtland”, published in 1987, which talks about the environmental consequences that economic development has brought, thus giving the concept of sustainability in three (3) key parts; the first is that the environment is not an inexhaustible source of resources, the second is that it is necessary to promote social development between communities and to promote economic growth that generates fair wealth. (WCED, 1987).

On the other hand, it is necessary to emphasize that, in the sustainability concept, there are several types that must work together as named by ISO 26000, where it is highlighted that to achieve future sustainability, a balance between social, environmental, and economic sustainability is necessary. This would give an integral performance to the organizations, thus developing their skills and responsibilities in the social sphere. (ISO, 2021)

Currently, the United Nations is calling on all the countries of the world to implement sustainable development goals, which seek to address current problems and thus improve the life quality of the citizens, this agenda includes 17 sustainable development goals, which is expected to be implemented in all nations by 2030, as mentioned above, its aim is to achieve a better and more sustainable world, facing problems such as climate change, women’s equality and clearly, the innovation and sustainability of the nations. (United Nations, 2020)

Manufacturing industry

To develop this term, it is necessary to take a step back in time and study the beginnings of industrialization, this expression was born in a real way and justified by historical events between 1760 and 1840, a period that is known as the revolution industrial and was initially given in England.

Materials and methods

This documentary review article has a qualitative and descriptive approach, which aims to develop a theoretical framework to form a body of ideas about interest, in this case, the concept of “sustainable innovation in the manufacturing industry in Colombia”.

The documentary review presents a non-experimental design of longitudinal cut, considering that observations are made over time. Its purpose is to describe variables and analyze their incidence, in this case, sustainable innovation in the Colombian manufacturing industry throughout history and today.

The method used was a documentary analysis, those documents that were analyzed as papers, monographs, investigations, books, and web pages, collecting, and selecting, analyzing, and presenting coherent results, defined in relation to the objectives set.

The information analysis was made through the documentary study of the content, which was based on three phases: first, reading comprehension, second, the analysis and third, synthesis.

Results

Sustainable innovation in the international manufacturing industry

The United Nations, with its sustainable development goals given for the next 10 years, exactly proposed for their fulfillment in 2030, has shown how many organizations at the international level decided to join and align themselves with some of these goals specifically, implementing some objectives within industrial regime organizations, such innovation, and manufacturing, aligning with the objectives of said point provided by the United Nations, and generating optimal results sent in reports given to platforms such as (Global Compact, 2020) on this page how many organizations that are taking part in the SDG are shown and the good practices that they have developed have been their implementation and result with the application of the objectives.

Among the two hundred and ninety-six (296) organizations are in this forum, applying good practices of sustainable development (Global Compact, 2020), some of them will be enunciated next.

Table 1. Some organizations that contribute to the objective

| Organization | Applications | ODS Objective |
|----------------|---|--|
| AIMPLAS | Develops new biocidal compounds to fight hospital infections. | 3 (Good Health) 9 (Innovation) |
| ACERINOX S.A. | Training of research staff. | 9 (Innovation) 17 (Alliances) |
| FERROVIAL S.A. | Social infrastructure. | 9 (Innovation) 17 (Alliances) |
| AIDF | Reversible substations. | 9 (Innovation) 13 (Climate change) |
| ENAIRE | Contingency plan and resilient infrastructures. | 9 (Innovation) 13 (Sustainable cities) |

Note: Made by the author with data obtained from PACTO MUNDIAL RED ESPAÑOLA

Sustainable innovation in the national manufacturing industry

The DNP (Departamento Nacional de Planeación colombiano) used the ODS agenda as a route, which has been divided into three parts; View the country within the goals for 2030, be consistent with the economic, social, environmental and prosperity dimensions; create permanent dialogues, including all sectors of the national, departmental, and municipal government, but it is also necessary to remember the participation of society. (ODS, 2019).

Now, by focusing on objective 9 industry, innovation and infrastructure, Colombia intends to contribute in a resilient, inclusive, and sustainable way. Its principal objectives are:

- **Technology and science investment:** Set the goal of doubling public and private investment in science and technology by 1.5% of GDP by 2022.
- **Productivity factories:** It was also projected by 2022 to give productive support to almost 4.000 companies, compared to the 200 companies that are receiving that support now.

With the above, you can see the commitment that Colombia has to advance in the ODS, and that it has with sustainable innovation within the manufacturing industries, this can be seen in the investment that is being developed and that is planned to increase throughout the period of the SDG agenda in research and development of industries, which is given by research guided to innovation, to organize and get industrialized companies and integrate into the innovative, sustainable and social aspects.

Table 2. Innovative organizations in Colombia

| Organization | Applications |
|--------------|--|
| NUTRESA | Implement ethics and responsibility policies within corporate governance, generate a culture of innovation, guarantee decent employment, have a sustainable supply, use natural resources rationally and promote a healthy life. |
| SURA GROUP | Strengthened its anti-crime policy, carried out good risk management associated with climate change and the area of safety at work. |

ARGOS GROUP

Grow in a sustainable way, guaranteeing the
conservation of natural resources and
promoting the integral development of the
communities that it makes an impact.

Note: Made by the author with data obtained from CECODES

Many authors have referred to R + D or research and development and its influence on the generation of innovation and the increase in companies productivity, such as Griliches (1979), this author analyzed the relationship between investment in R&D, in order to generate more innovation and increase production within organizations, also Griffith and others (2000) highlight the importance of that investment, as a precise and important element of the productivity growth of certain industries belonging to countries members of the OECD (Organization for Economic Cooperation and Development).

On the other hand, it stands out the fact that investment influences both directly and indirectly, through technology, as this contributes to the growth of productivity levels along with sustainable innovation in manufacturing industries, which has represented significant changes, considering that if the term is broken down, industrial evolution would not be possible without innovation and likewise, manufacturing would not advance in terms of production and costs, because what is sought with this sustainable innovation in industry, is to generate added value to the product made as manufacturing, which at the same time contributes to a social and sustainable development at the company and national level and to become a global contribution, since this objective is essential for the search for circular economies, that improve the sustainability of companies, people, countries and the world.

Many authors have referred to this thematic aspect and various studies have been found such as Langebaek, A., & Vásquez, D, (2007), which according to a survey carried out by DANE-DNP-COLCIENCIAS, found that innovation in companies it can be presented in different ways, named below:

1. Management technologies: ISO rules application, right on time and strategic planning.
2. Investment associated with capital: Machinery and equipment acquisition with technological performance.
3. Technological training: Establish a relationship between technology and the productive processes.
4. Transversal Technologies: Patents, licenses, attendance at fairs, consultancies, software.
5. Research and development (R&D): systems to increase the knowledge and use of new applications and practices.

Also, Maldonado-Pinto, J. E., & Portilla-Barco, L. F, (2020) state that most of the Colombian manufacturing industries assure that if they innovate in their administrative procedures, this makes them improve their products and innovate them, as well as services and markets. Likewise, they stated that in corporate innovation; it is possible to get resources necessary in order to transform and modernize processes, however, there is a point in which they show a weakness, and they are the services, the attention and satisfaction of the clients and the opportunity in the deliveries, and finally, but no less important are the industrial processes, in which they testify that they have improved quality and effectiveness in production.

Finally, authors such as Herrera and Heijs (2007) concluded that in Colombia, there are entrepreneurs and actors who are recognized by Colciencias, for applying for Science, Technology and Innovation (CTeI) projects, however, this has been done with the purpose of having VAT exemptions or tax deductions, which leads to the deduction that this type of instruments that governments want to apply as incentives, generates a centralization in those larger organizations that take part more in the markets, in innovations and development, thus strengthening this system of these already consolidated companies but with the disadvantage that new companies are not born.

Conclusions

To conclude this bibliographic review article, it should be noted that the objectives proposed and developed in its extension, were a sustainable innovation in the international and national manufacturing

industry, highlighting in each of them, companies that have contributed to “objective 9: innovation in infrastructure” from the sustainable development goals set for 2030. As Siemens Gamesa Renewable Energy, SA and IDP Engineer y Arquitectura Iberia SLU have been international, and Nutresa and Grupo Sura at the national level.

Within sustainable innovation at the international level, it was found that within the ODS there are many organizations led by the global compact, in which there are two hundred and ninety-six (296) organizations, applying good practices (Global Compact, 2020), Two of them were highlighted, Siemens Gamesa Renewable Energy, SA and IDP Ingeniería y Arquitectura Iberia SLU.

These organizations are in multinational positions, generating greater autonomous and global benefits, they focus on providing their services to society and its workers, thus giving greater fulfillment to the objectives, and contributing to industrialization through innovation and sustainable technology for the world, its participation in the path towards circular economies with business approaches in R&D is also highlighted; Within sustainable innovation at the national level, Colombia, through the National Planning Department, has sought to implement these objectives, and in this case focused on innovation, industry and infrastructure, through the route, visualization, coherence and dissemination.

In Colombia, there are entrepreneurs and actors who are recognized by Colciencias for applying for Science, Technology, and Innovation (CTeI) projects. However, they have done this with the purpose of having VAT exemptions or tax deductions; It is necessary to highlight the influence that the world contingency had on the latest national statistical reports, in which it is shown that this sector was affected, and that development and innovation did not have as much scope as in other periods.

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CHAPTER 3.

Arts, Humanities and Socials Sciences

**PERSONAL AND FAMILY
CHANGES OF UNDERGRADUATE
PSYCHOLOGY STUDENTS. IS A
PROGRAM IN PSYCHOLOGY A
PATHWAY TO PERSONAL AND
FAMILY CHANGE?**

**CAMBIOS PERSONALES Y
FAMILIARES DE ESTUDIANTES DE
PREGRADO EN PSICOLOGÍA. ¿ES
UN PROGRAMA EN PSICOLOGÍA
UN CAMINO HACIA EL CAMBIO
PERSONAL Y FAMILIAR?**

*Authors: Linda Michelle De La Torre Álvarez¹
Mireya Ospina Botero²*

1 Universidad Católica de Pereira, linda.delatorre@ucp.edu.co

2 Universidad Católica de Pereira, mireya.ospina@ucp.edu.co

Abstract

This article aims to show the personal and family changes perceived by psychology students because of their academic education. The development of this article is based on three categories: family changes, changes in themselves (personal self) and transformation in the role they play in their family. This research was carried out with twenty-three psychology students in their seventh, eighth or ninth semester terms. The research was approached from a mixed approach, with the use of two techniques: the first one, a semi-structured interview containing forty questions that brought about the qualitative results and secondly, the application of a survey containing twenty open and closed questions leading to the quantitative results. The information collected was processed in a systematization matrix that allowed describing the findings in each of the three categories covered, based on the identification of units of meaning according to investigative categories. Positive findings emerge from the study for the perception of changes in the family of origin, in their way of relating to each other and affectivity; regarding personal changes, results arise around self-reflective and psychotherapeutic processes; regarding the role occupied in the family, changes are evident in relation to decision-making and active participation in situations where the student is seen as a mediator. Finally, an answer is given to the research question and an approach is proposed for the academic approach of the Therapist's Personal Self in Psychology programs to approach the future psychologist.

Key words: undergraduate psychology students, personal changes, family changes, Self of the therapist and academic education.

Resumen

Este artículo tiene como objetivo mostrar los cambios personales y familiares percibidos por los estudiantes de psicología como consecuencia de su formación académica. El desarrollo de este artículo se basa en tres categorías: cambios familiares, cambios en sí mismos (yo personal) y transformación en el papel que desempeñan en su familia. Esta investigación se llevó a cabo con veintitrés estudiantes de psicología en sus períodos de séptimo, octavo o noveno semestre. La investigación se abordó desde un enfoque mixto, con el uso de

dos técnicas: la primera, una entrevista semiestructurada que contenía cuarenta preguntas que dieron lugar a los resultados cualitativos, en segundo lugar, la aplicación de una encuesta que contenía veinte preguntas abiertas y cerradas que conducían a los resultados cuantitativos. La información recolectada fue procesada en una matriz de sistematización que permitió describir los hallazgos en cada una de las tres categorías cubiertas, a partir de la identificación de unidades de significado según categorías investigativas. Del estudio se desprenden hallazgos positivos para la percepción de los cambios en la familia de origen, en su forma de relacionarse entre sí y de afectividad; con respecto a los cambios personales, los resultados surgen en torno a procesos autorreflexivos y psicoterapéuticos; en cuanto al papel que ocupa en la familia, los cambios son evidentes en relación con la toma de decisiones y la participación activa en situaciones en las que el estudiante es visto como un mediador. Finalmente, se da una respuesta a la pregunta de investigación y se propone un enfoque para el enfoque académico del Yo Personal del Terapeuta en los programas de Psicología como una forma de acercarse al futuro psicólogo.

Introduction

The article aims to show the changes that students perceive at a personal and family level because of their training process during their psychology studies; family dynamics are involved, particularly considering their family of origin (FO), themselves (personal self) and the role the student occupies in their family. We start from the fact that it is the family that constitutes an important role in the life of the undergraduate psychology student; thus, the family of origin has an investigative character because it is there where the existence or not of changes will be evidenced. This research becomes an opportunity to strengthen the curricula of the universities that offer psychology programs, as it makes contributions on the role that the psychologist plays with his or her consultants from a personal work, through self-reflective or psychotherapeutic practices that involve an introspection and a responsibility about his or her personal Self. In addition, it underlines the implications and responsibilities for the therapist's personal self, in a review of themselves and their family environment during their academic process.

Accordingly, a range of psychological processes that to some extent become necessary for the growth and development of the subject are shown, thus making the therapist's family of origin (TFO) indispensable to this process (Sánchez & De Ávila, 2018). What has been known is that this brings motives related to satisfaction, euphoria and well-being, but that it also adds an additional burden of stress that by nature tends to flow into the emotional realm; it becomes relevant that the student becomes aware of the interactional dynamics, of those roles and of that function that the members of his or her own FO assume or have, focusing all this on avoiding future difficulties that may arise during the development of his or her work, mainstreaming the performance and effectiveness of his or her role as a therapist (Molero, 2010). It is possible to consider the influence of the professional's FO within his or her therapeutic work, as it has been addressed in several research works of a more systemic order.

Inquiries have been made about the influence that FOT has on their professional practice. Taking this into account, narratives are taken that shed light on theoretical explanations for this type of relationships raised here, as reported by Montoya, Oquendo and Tórriz (2019) in their research when they propose that, the notion of self-reference as co-constructed experiences starts from interaction, thus becoming a tool for analysis and intervention in the therapeutic system explaining that what the therapist feels refers not only to his or her personal life story, but also to his or her family and social life story. It is understood that a broader perspective of the personal and family life of the future therapist is gained by focusing on the changes or transformations. It is emphasized that it is their training what can possibly favor them and help them to respond to events that, from a non-introspection, would remain unresolved, influencing their professional work. This first research work gives a broad background to the inclusion and approach of the FOT.

In this order of ideas, the novelty of this paper lies in the fact that research studies known so far on FOT have focused on the weight it has in the therapeutic exercise carried out by the professional with the consultants, but few studies have considered those changes produced in families because of having sons or daughters or another family member studying psychology. An interpretation linked to the theoretical and

practical training provided by the university and, as a result, the fact of making room for introspection to solve personal issues may be allowed. Once again, all this is possibly linked to the learning gained in college; even though, working with the FO may be seen as an unresolved situation depending on the kind of significance given to it since part of their training can be given as a work in favor of their own FO. This may then lead to transforming certain prejudices, taboos, conflicts, among others that may have remained and that now can be called changes or transformation.

The relevance of this article lies in questioning the responsibility of future psychologists, for is it perhaps the academic training that enables students to be an element to transform the other? or does what they have learned during their studies constitute the opportunity for a personal process that will account for a “transformed piece”?, not only because of the knowledge they obtained, but also because of the process of introspection they carried out for themselves allowing them to be a mobilizing element for change in their family environment as well?

Thus, the way to the possibility of human and family development opens by making inroads into a field of knowledge such as psychology and inviting to rethink the contents and pedagogies that universities are undertaking, when considering that the professional self is not only composed of the theoretical dimension, but that it also involves the personal and family experience of the future psychologist still in college.

On the other hand, the Colombian Association of Psychologists (COLPSIC, 2014) states that one of the professional competencies that psychologists must comply with, which is fundamental and transversal to professional practice, is: the assumption of self-reflective practices and permanent self-evaluation. The self-reflective capacity is then understood as a fundamental axis in the training process for the practice of the mental health professional specifically in the clinical field, which invites not only to work on the techniques, but also to engage one’s own look to avoid isomorphisms suggesting a need to recognize the endogenous variables and exogenous factors in the relationship with the consultant and the environment.

When talking about the psychologist's profile, it is considered that the professional not only acts as an agent participating in the transformation of his or her clients, but also as an agent belonging to a reality where systems that interact with each other are involved, such as his or her personal life story, his or her FO and the way he/she positions him/herself before the world. Once this is mentioned, self-reference becomes valid to the extent that such praxis must be permanently assumed and is linked to the professional's personal life story.

To this extent, self-reference as mentioned above, encompasses the encounter with personal characteristics that usually are abilities, skills or emotions that arise and unveil particularities about oneself (Rodríguez-Bustamante, Pérez-Arango, Bedoya-Cardona, & Herrera-Rivera, 2019). The recognition within the therapeutic exercise of all those characteristics of oneself, can serve for a greater understanding of what happens to the person who requires consultation with the mental health professional. It cannot be ignored that both subjects (therapist and consultant) relate to each other and interact in a context attached to their way of perceiving reality and acting; self-reference then, directly concerns the family of origin and plays an important role because it contributes to the discovery of the manner seeing oneself as a professional and the way in which he/she develops his or her therapeutic exercise is related.

Methods and materials

The research process from which this article arises was approached from a mixed cut with a qualitative-descriptive prevalence. This type of methodology represents a set of systematic, empirical, and critical processes that involve the collection and analysis of both quantitative and qualitative data, as well as integration and joint discussion to make inferences that will be the product of all the information obtained (called meta-inferences). Finally, a greater understanding of the phenomenon under study can be achieved (Hernández-Sampieri and Mendoza, 2018). Thus, according to Quecedo and Castaño (2002), descriptive research tends to be oriented to in some detail and exhaustively describe those phenomena in one or more moments in time.

Data collection techniques: For the collection of information, the *Semi-Structured Interview* technique was used, for which a scheme was constructed with questions based on the three research categories: (family changes, changes in oneself (personal self) because of his or her academic training and transformation in the role that the student occupies in his or her family) with forty open and closed questions. Methodologically, the depth of the information obtained showed a process of discovery and identification, beyond the idea of a systematized search, since it incorporated a subjective, longitudinal and retrospective character. However, the magnitude of the data was based on a criterion of significance rather than representativeness (Pujadas, 2000).

The second technique used was the *survey*, where the participant answered twenty closed questions. The information collected through this technique serves in a more standardized way because in the construction of the questionnaire, exact and equal instructions are given to all participants, and the questions already formulated are not modified in any way, as in the case of the interview which, being verbal, allows a greater involvement in the question. (Casas, Repullo and Donado, 2003). The processing and analysis of the information was possible thanks to the construction of categorical matrices according to the objectives of the research; herein, the units of meaning and percentage values for the identification of the emerging categories were specified.

Participants: Twenty-three undergraduate psychology students (eight men and fifteen women), of whom three were seventh-semester students, fourteen were eighth-semester students and six were ninth-semester students. These people participated on a voluntary basis in a general call made to students in their last semesters of Psychology at the Católica de Pereira University. The objectives, scope and research methodology were presented to them, and they also signed the informed consent for the protection and proper use of personal data.

Results and discussion

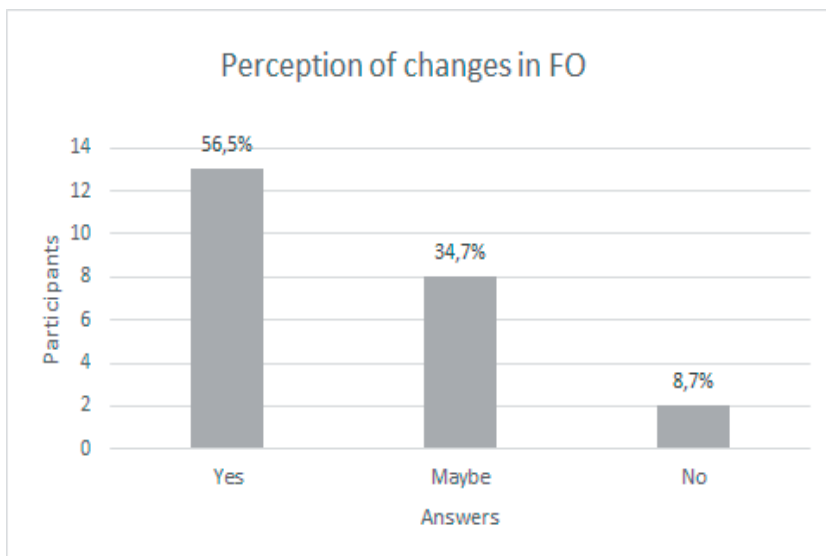
The results presented here show three fields of interest in relation to the research objectives related to personal and family changes because of studying psychology, in relation to: self (personal self), family relationships and finally, transformation in the role the student plays in

his or her family; these range from positive results for the proposal of perception of changes in the FO and the description of these changes.

Findings: in category one, communication among family members, ways of relating to each other and affectivity; in category two, self-reflective and psychotherapeutic processes; and in category three, decision making, greater orientation towards changing the behavior of family members and active participation in situations where the student is seen as a mediator.

The main finding that supports these areas addressed is the students' recognition of the perceived transformation in their lives and family experience (see Figure 1), as shown in the following graph, which shows that 56.5% (13 students) of the participants mentioned that they do perceive changes in their FO as a consequence of their academic training; while 34.8% (8 students) say maybe and 8.7% (2 students) mention that they did not perceive any type of change.

Table 1. Perception of changes in FO

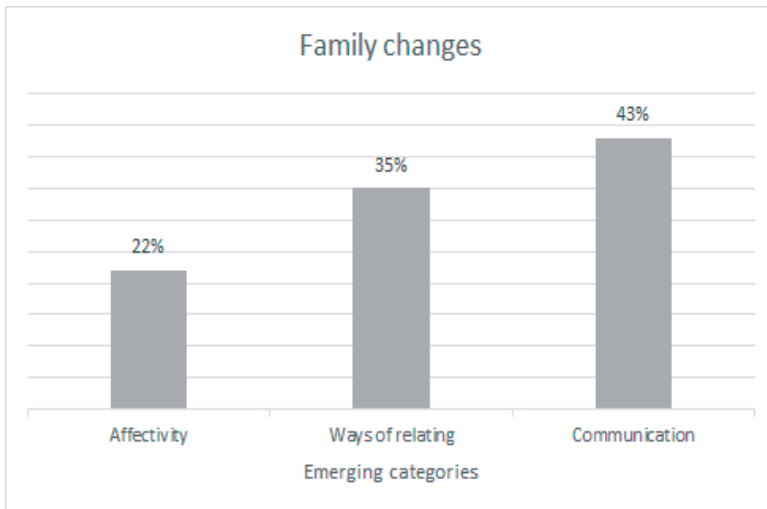


Note: Survey developed in this research.

Family Changes

Family changes are in aspects related to (*see Figure 2*): 22% of the participating population stated that the greatest change in their FO was reflected in Affectivity; 35% evaluated the change in the *Ways of relating to each other* and 43% mentioned that the most noticeable change was in *Communication*. It is important to highlight that these *emerging categories* arise from the grouping or categorization of the narratives of each of the participants; the percentages are linked to the number of people who indicated the same answers.

Table 2. *Family changes*



Note: Survey developed in this research.

Communication: generally, families have different types of communication, a particular language according to their context and dynamics. Communication becomes a significant element for mental health professionals because it has characteristic aspects of psychologists such as active listening, verbal and nonverbal language, coherent, inclusive and specific narratives, among others. Thus, communication is initially approached as an important point of interaction with the other, with others, and with oneself.

This finding particularly showed that psychology students, starting from some previous learning offered by academia, are making it possible to work with their own FO from the bases stressed at the university, developing the practical in their most immediate context, which will begin to configure changes at the family level. This can be evidenced in some narratives such as this one:

when I wanted to voice an opinion, conflict would arise because they have never liked to talk, so in conversations we did not talk, but since I am studying psychology, I am becoming a mediator so that communication gets much better (Participant No. 2, personal communication, November 2020)

From this narrative, it can be understood that communication is a resource that is acquired when rules have been stipulated. Therefore, this analysis focuses on the possibility of learning and practice derived from the academic context in structural issues, where students have used this resource within their FO. It should be borne in mind that *communication* has been characterized as a fundamental process and is seen as a starting point for interactions with others, which involves family interaction. It is here where exchanges of information, meanings, and important valuations arise within their dynamics as a group (Gamboa, 2012). As it has been known, communication allows for the ways of relating to each other; that is to say, these emerging categories can be seen related in such a way that the behavior acquired within the nucleus is understood as significant within the language shared among members of a primary group, such as the family.

Ways of relating to each other: what was found in this finding is that family relationships have been perceived in a negative way and that sometimes psychology students recognize and identify the type of relationship with the members of their FO. Sometimes the ways of relating were kept aside from responsibilities assumed by themselves while their fathers, mothers and/or caregivers were working or remained absent in their parental roles. What can be said is that the way in which each one performs as a member brings out not only individual particularities but also a more group-related interaction. Foreexample, conflict resolution, the change in terms of being more passive and assertive in addressing others versus when they could be violent

and aggressive verbally or physically. What happens with this change is precisely the fact that when sharing a situation that involves them as part of a primary group and puts them in controversy, they begin to rethink or reframe the way in which each one assumes their action (behavior). Narratives that account for the foregoing:

With my experience of being in college, studying psychology, I think, as a family, we have managed to be aware that words, behaviors and thoughts affect what we do every day and the way they also have an impact on others. (Participant No 11, personal communication, November 2020)

It can be understood that these forms of relationship emerge in a reciprocity inherent to communication. This constitutes a readjustment in the message that has been issued, or the one that will be issued soon, because of the information received by the sender, thus referring to the feedback of the process, which clearly can have negative or positive connotations among those who are communicating (Gamboa, 2012). An example may be that those members who communicate and interact in a not so assertive and respectful way, can achieve great changes through the communication strategies and skills provided by the psychology student in the family group.

Affectivity: It was found that emotions and affectivity always demand an interest when describing the family group. The situations experienced in the family are primarily affected by strong emotions; obviously, this depends on the way in which each member lives or perceives the intensity of the same. It is then, at times when the psychology student can mediate and educate against the way in which emotions are traditionally expressed by those family members. Understanding how they live and in turn, the way they interact with each other opens up a new space of understanding and comprehension, hence the relevance of the work of the future psychologist. Narratives that exemplify the above:

I consider that the change I can notice the most is that there is more union, a more open and assertive dialogue about the changes in my life and intimacies, and this has been important in my family. (Participant No. 14, personal communication, November 2020)

Once psychology is studied and basic concepts are learned with which the human being begins to create and develop the principles of language, affectivity is structured. When talking about emotional education, the first reference has been the experiences of each person, how he/she has lived and has been involved with others, the interaction with others and to know about is gained through this interaction, allowing this type of change to be significant. Human beings are constituted by the relationships they have with others, by considering themselves social creatures, they begin to know what they can contribute to the collective.

From all that has been mentioned so far, it can be said that these three emerging categories are framed in actions that make change possible. They point out two important issues, the management of emotions and the ways in which communication develops in the family system.

Psychology training provides tools to the student and future professional so that he/she can play his or her role with expertise and have the basis to intervene in the situations where he/she is involved. Thus, it can be understood that the student will test and put into practice those tools to make possible changes in his or her family, actions that will pave the road to transformations in his or her family dynamics.

What has been found is that there are two actions that are particularly put into practice by this type of participants and as mentioned in the previous paragraph, one is related to the management of emotions. The management of emotions therefore implies that, the better the definition of a feeling or emotion is known (for example: joy or sadness), the better awareness of this feeling or emotion will be, and therefore, the greater the probability of managing what is felt in a healthy way, which would involve an assertive interaction in the relationship with oneself and with other people (Muñoz, 2007).

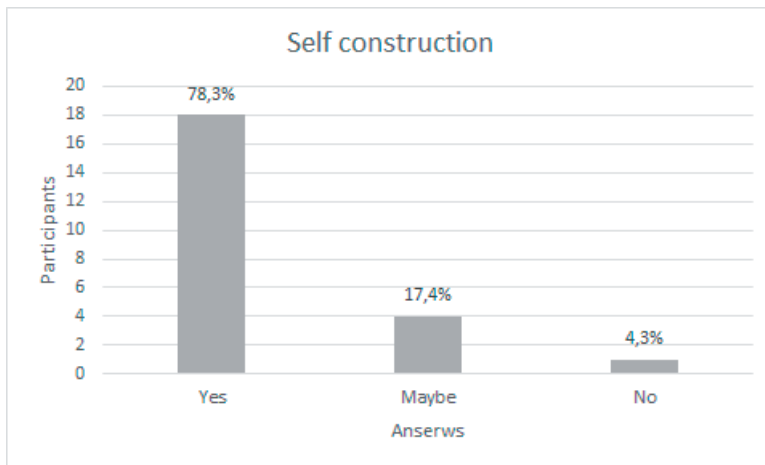
This management of emotions is learned in the first instance, with the FO, but it can be transformed to the extent that there is interaction with other groups. Social dynamics also share aspects that contribute to understanding the different ways of feeling and expressing those

emotions, so it becomes a tool to develop strategies to accompany the family process to manage emotions in the face of what they experience. This theory is reflected in the fact that 18 of the participants identified that the changes occurred mainly in the relationship with the parents.

Changes in oneself (personal self) as a consequence of training

When asked about changes in self as a consequence of their training as psychologists, it is found that 95.7% of the participants have perceived changes in themselves, similarly, in the construction of self, 95.7% (See Figure 3) for positive responses such as “Yes and Maybe”, finally, the influence of their academic training points to 91.3% (See Figure 3).

Table 3. *Self-construction answers*



Note: Survey developed in this research.

Linked to this, it was found that the emerging categories are linked to: self-reflective processes, i.e., a reflection based on what they perceive of themselves and that based on their knowledge, they transform it. The other refers to: a therapeutic process accompanied by a mental health professional; both categories are found in the way they have focused on what helps the construction of both the personal and family self. It is thus evidenced:

Self-reflective and therapeutic processes: it was found that in psychology students, self-reflection is part of their formative process, it is not framed as something of obligatory nature, but it is presented in such a way that it is their personal and own decision to restructure past events in their lives that have become a discomfort for their therapeutic work. This finding can be seen from two perspectives:

The first, as mentioned above, is that the psychology student who develops his or her practice as a therapist can rewrite and change symbolic meanings of certain events that are part of his or her life based on the resignification that the consultants make of their own life. Therapeutic activity has repercussions on the therapist's relationship with the world, and this includes his or her accounts of personal identity, as well as the relationship with the attribution of meanings he or she makes of himself or herself, his or her life and work. It is the important experiences of his or her work that can alter who he or she is and his or her own constitutive elements. They can both sustain and encourage the therapeutic task (White, 2002).

The second perspective is that having a good overall psychological adjustment is associated with the personal development of the student, although this does not mean that the adjustment must be total. In general, if it is thought from a good mental health on the part of the therapist, he or she can attain better results in the treatment under intervention (Bados & García, 2011). What has been said about this is that some therapist training programs have offered their students the possibility of personal therapy mandatory or have made it optional; nevertheless, it has not been demonstrated that having undergone this therapeutic process leads to better results later in the treatment (Beutler, Machado and Neufeldt, 1994). What is evident in the narratives from the above is this:

I tried to go to therapy in college [...], I started to write, analyze my thoughts more and expose myself to what generated a lot of fear. (Participant No. 13, personal communication, November 2020)

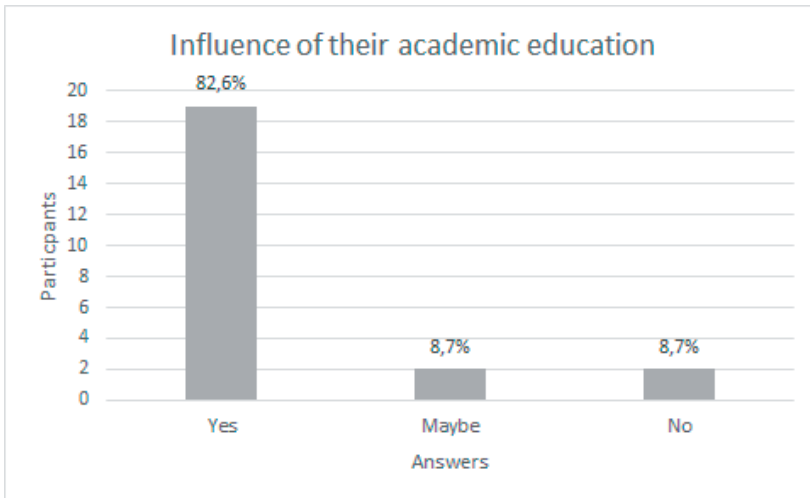
What is significant will be what is identified and that directs the path of the psychology student towards the psychotherapeutic space

where his or her role is transformed towards that which is called “consultant”. He or she will account for what has remained unresolved over time and will put to work his or her personal Self from what he or she considers important for his or her professional Self.

Influence of their academic training

It was found that psychology students affirm the hypothesis in relation to the changes in themselves (personal Self) perceived because of their academic training, as shown in the graph, 82.6% of the participants marked *yes* to this question.

Table 4. *Influence of their academic education*



Note: Survey developed in this research.

To the extent that it is mentioned that part of these changes is reflected in the way they perceive the world, reality, and their relationship with themselves, they are prioritizing themselves as subjects and understand that thinking about themselves is part of the development as a human being. They recognize an intellectual change that is part of starting an academic process, but it is also important to emphasize that the greatest change is in accepting that from the diversity of knowledge that they acquire during their training process, shall allow them to broaden the panorama they have of their lives and put to work what

they have learned to understand from a more personal position. Based on this, the following narratives are considered:

Initiative to open myself more to situations and people with the minimum possible pre-conceptions about them, tolerance to frustration of uncontrollable situations, increased empathy towards people who usually caused me discomfort, understanding that these have also gone through an individual process that I do not know and which is valid. (Participant No 8, personal communication, November 2020)

Cardozo and Virginia (2016), consider that the personal development of psychologists in training is a process of change that occurs continuously. In addition, psychology professionals need to have a trained character as part of their therapeutic style. Otherwise, they will suffer a tendency to fall into the manipulation of personalities much stronger than their own. Or, perhaps, they will be involved in not being able to fully comply with their task of guiding and guiding others. Therefore, identifying those changes in oneself is one more step in the process of building the personal self and, clearly, the influence of academia has an impact on what one intends to be as a future professional, since the individual tends to adopt traits of the professionals they knew during the academic processes, such as professors who serve as a reference for their professional and working life.

These authors have found that the change itself because of their academic training has an influence from various factors. In some, the social relationships that emerge in the university context are more evident, when considered in the process of adaptation and passage through the various stages offered by the program (start, adapt and finish). It is also known that change is mostly driven by the theory that is learned in college. Once this theory is adopted for one's own life, the decision is made to have a process of transformation and personal change. However, there is a prevalence that these processes of self-reflection and personal transformation are influenced by academic training and are adopted when the program has been completed.

Finally, the category "*Changes in oneself (personal Self) as a result of training*" develops key points of this research work since it

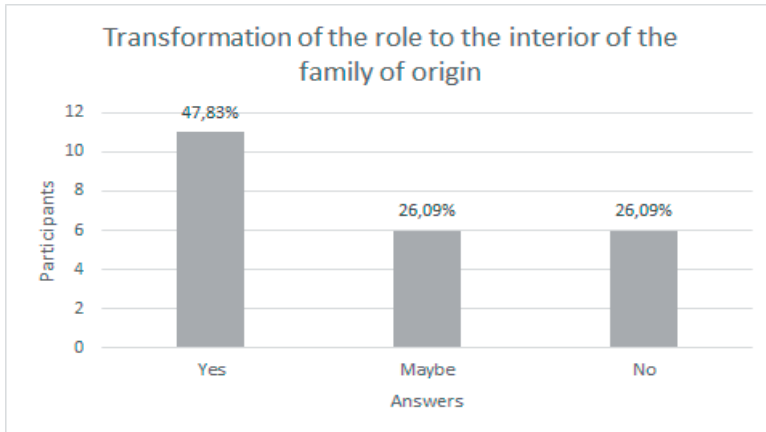
relates what is learned during the training process with the construction of oneself. It was found that the participants could easily realize how they are structuring their personal Self based on the following factors:

- resources that they learn and acquire throughout the training,
- basic principles of communication,
- the possibility of talking about emotional education linked to affectivity,
- the need for self-reflective or psychotherapeutic processes generating clarity regarding their formative process, and
- what also concerns the professional Self.

Transformation of the role in the family of origin

At this point it is important to know that the statistics (*see Figure 4*) mark the first finding of this category, positioning with *Yes* 47.83% as a positive response to the role occupied as a member of the family. As a consequence of studying psychology, 26.09% goes towards *Maybe* and, 26.09% marks *No*.

Table 5. Transformation of the role to the interior of the family of origin



Note: Survey developed in the research

The emerging categories in this finding are directed towards: decision making, greater orientation towards the change of behaviors

of the members of the family nucleus, and their active participation in situations where they are seen as the mediator. Regarding the family scenario with respect to the therapist in training, it is noticeable how those movements, tendencies, and tensions of daily life become visible. Finding the issues linked to changes, transformations and resignifications of the members of the construct the human being is made of and of the configuration of a whole social order, enables a way to access the field of private life, the intimate and domestic, the interactions between relatives who are considered as the closest and what can be bet on in the biographical experiences of people (Palacio, 2009).

Then, once transformation has been thought of as part of the work with oneself, which highlights the most intimate elements of one's FO, the social aspect cannot be left aside. Precisely, the roles of society and sociology cover two concepts of great significance, such as status and hierarchy. Roles, which have also been known throughout history as tasks, are developed in a more individual way and status in a collective way. Thus, in the FO these two concepts will be significant for each of the members depending on the way they are internalized, understood and practiced in the family group, which in turn will have repercussions and effects in the social context (Gelles and Levine, 2000).

Pastor (1988) narrates that within the role theory, it is stated that the FO is a structure that can be understood as homeostatic because it functions based on the facilities that are assigned to the role. This would imply that each of the members would be demanded to behave in a certain way, fulfill duties and be assigned certain privileges. Consequentially, the role would be articulating the psychological and the sociological. Therefore, roles would be social rules for behaving inside and outside the family conformation and that others expect from a particular subject.

This can be translated into the fact that roles support, in a certain way, the family status and, at the same time, are the support for the fulfillment of family functions. These are not in the same line of definition of roles or status, but they are directly related to them (Chavarría, 2010).

Thanks to this, the transformation of the role becomes an issue that is not alien to the members of the FO because it is mainstreamed by the dynamics that are maintained there. These have changed with the passage of time and thanks to sociocultural and historical issues, assuming a role does not only arise from the obligation needs create, but also, it has a link in the position assumed by the subject with respect to its FO.

Decision-making

It is rooted in how the family understands the student's function within the family nucleus itself. That not only a possibility of collaboration is projected to serve as a mediator or neutral advisor in particular situations of the family but also, they endorse the knowledge that each student has acquired during his or her training in the program. It is understood that this is precisely part of calling to think that these psychologists in training have a status and a majority level within their family of origin.

Once they have found themselves in the path of academic training, they begin to replicate strategies learned by their professors or theoretically speaking, what is dictated in books and manuals, taking this to their family nucleus. It is done in such a way that the first bases for decision making are structured in a better way since their role begins to transform within their own nucleus. Those decisions begin to have the weight of argumentation and a validity is cemented before the other members as part of the credibility that leads to a profession. The narrative presented below exemplifies what has been developed here:

Also, they bring up the issue that there is a psychologist in training, which puts them in the situation of asking about things that they usually take for granted. From there, my collaboration can generate divergent opinions, reflective decision-making, or push or stop a decision. (Participant No. 19, personal communication, November 2020)

Generally, the life cycle and the development of human beings within their family nucleus, has allowed humans to realize that most of the time they adapt and are constituted from the examples and

replicability of the behaviors and emotions that their fathers, mothers and/or caregivers tend to have. It is from this that we see in the first “social” group that they begin to form the basis for playing the role at the time of making decisions.

Greater orientation towards changing the behavior of the members of the family nucleus

This finding points out that in the FO of the psychology students, it is he or she as a member who is serving to a certain extent as a subject that proposes, invites and directs the other members towards a reflection about some of the behaviors they perform within the family nucleus. In addition to this, they orient their relatives towards the changes they can make regarding their behaviors. That is, once they have provided the invitation towards reflection, they begin to generate other alternatives to behave in front of certain situations regarding the professional help they can receive based on the needs of each one of them.

Initially, he/she is just another member, then he/she becomes a student of a professional program. However, once this professional program summons something human, he/she begins to have more relevance within their family group. The role is transformed to the extent that he/she is not only a student but also the one who can help and support with the internal situations of the family nucleus, as can be seen in this narrative: “Guidance on what can be done in some behaviors of family members, and how to seek access to professional help” (Participant No. 2, personal communication, November 2020).

One of the main techniques that is learned during the psychology program and that is mediated by the psychological approach is “behavior modification”. This technique tries to change the behavior or behavior of the human being from his thoughts and emotions, taking into account learning and interaction with others. Although the range of psychological approaches shows that this is not the technique with greater emphasis in psychology, it can be taken as an important point to focus the idea that the psychologist has when observing and analyzing the behavior of the other. The FO tends to adopt behaviors that have been part of their lives over time and that sometimes are replicas of how the members of their family of origin acted a chain behavior.

The situations of family life always imply that there is a moment in which someone takes command of decisions. This person assumes a role in which order is imparted and that to a certain extent there is communication among all. The interest of someone assuming certain roles and certain positions in the families is that these are the ones who express the disagreements or can make known what happens within the group and in turn, this person can show the other members what each one can contribute for the collective benefit. Basically, it is a group work where they are empowering and enriching personally to live in society.

Active participation in situations where he is seen as the mediator:

This emerging category shows the finding regarding the attribution of functions that the FO gives to the psychology student as a member of the family, to the extent that they take the professional skills of psychology to make it work in correspondence with this. For example, mediation, validation against the decisions, and tensions that arise within the family are evidenced in the following narrative:

Before I avoided entering into the conflicts that were generated in the family, I lived in isolation. Now, I try to mediate and serve as a support to reach agreements when needed. Giving my opinion and having a more liberal vision within the household. (Participant No. 23, personal communication, November 2020)

What is specified here is that once the transformation of the role has occurred, there is a modification from the role of being a student or a member of the family to one that is able to contribute to family dynamics based on his or her knowledge as a future psychologist. When this transformation has occurred, this positions him or her as an active participant in the situations that emerge within the family nucleus since the FO assumes that he/she has some skills that he/she can put into practice at the moment of being the mediator in a particular situation. This puts them in the position of asking about things that can usually be taken for granted and from there the contribution that is made as therapists in training is that they are in a diversity of opinions, reflections, and are encouraged to make decisions to face what they are discovering and experiencing.

To conclude with this category, it can be inferred that the role transformation is linked to the status that the family member has as a professional. This is linked to those skills assumed by the family group that position the other as a mediator, as one who can contribute to decision-making and even build guidelines for the irregular behavior of someone in the home.

As part of the discussions regarding the results, it is mentioned that this research can serve as a provocative context for those who want to study psychology. This is evidence that the program is not simply providing theoretical knowledge but is also being put into practice from oneself and for the other, because ultimately this program is focused on the provision of a mental health service. In turn, if psychology programs want to do research on their academic processes, this article can be a way to read the transformations in students. With the results of this research, other possibilities open to learn about family changes from the perspective of all its members. They can describe the perception not of changes and how they see the transformation of roles when a member studies psychology, in addition to highlighting the prejudices or preconceptions they have about mental health professionals.

Conclusions

The findings show the concern that psychologists under training have for their self-reflective processes. It is a decision that has been thought from their subjectivity and is rooted in thinking of themselves as a future piece of transformation for others, which leads them to get involved with their internal processes. In other words, academic training provides strategies that make change possible for working with others, but it is up to the students to decide whether to take them for themselves. When this happens, they identify and perceive changes in their family of origin, attributing meaning to the tools learned during the course. It should be noted that the academic spaces have only made it possible for the students to question themselves about their internal processes. As a result of this, they have decided to attend a psychotherapeutic process or to carry out a self-reflective process voluntarily and as a subjective decision.

Secondly, considering the category of family and personal-self modifications, it is concluded that these changes perceived by psychology students in their family of origin are linked to issues of assertive communication and conflict resolution. Here is where a greater transformation of the role assigned and the role assumed within their family nucleus is evidenced. Based on the strategies and techniques that academia provides, these members can put it into practice or simply use it in the psychotherapeutic space with the other. However, the processes they are adopting throughout the program show that for the construction of themselves, they have put to work their unresolved issues mainly with their FO. Thus, they can perceive changes in their family nucleus and that to a large extent, this can be understood because of their academic training.

Based on the third finding and, taking into account the two psychological approaches taught at the university (psychoanalysis and cognitive behavioral therapy), it can be noted that from the different theories and learning in each of these, the construction and work on themselves can also be linked to what they have learned in both approaches. An example would be attending analysis or using techniques such as recording thoughts and working with a professional on a particular topic or problematic situation in their lives. By assuming themselves as future professionals and being in the last three semesters of their program, it becomes evident that there is a constant question about themselves, which involves the situations inside and outside their family of origin. Therefore, it cannot be said that the social and professional individual will only seek to reflect on what is outside their family group.

For the last finding, the relationship is very direct with the previous categories. The transformation of the role is a function of what has been learned during the training in psychology. In turn, this is linked to those changes that involve issues with the self. The processes of self-reflection will be a starting point, also connecting with the most important resource, self-reference. The transformation will be built as changes and questions about themselves are given.

With the results of this research, a new perspective about the therapist's personal self has been generated. It opens a greater panorama

for psychology programs regarding the possibilities of change that are generated indirectly in the transformations of the most immediate spheres of the students, such as their own personal condition and what concerns their families of origin.

On the other hand, the research highlights the responsibility assumed as mental health professionals, in this case as psychologists, to work on issues of themselves that are considered unresolved and that include their personal and family life, as proposed by COLPSIC. It proposes the competencies that psychologists should develop for their own growth: personal and professional self.

Finally, to answer the problematizing question “Is the psychology program a path to personal and family change?” “Being consistent with the objectives of the research, which were focused on identifying changes and establishing relationships between these differences and academic training, it was found that the psychology program enables changes at personal and family level. The work done with human beings is not focused on thinking of the other as someone diverse and complex, but it is precisely this questioning by the human being that ultimately ends up enabling a development and work with himself. This brings about effects in the closest and primary link: their family of origin. Questions that are unresolved or that were thought to be appeased by the passing of time, come to the surface in the psychological processes, in that self-reference of each of the students and it is there where changes in their FO and in themselves are evidenced.

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PREGNANT MOTHERS DEPRIVED OF LIBERTY IN COLOMBIA AND MEXICO. A LOOK FROM COMPARATIVE LAW

MADRES GESTANTES PRIVADAS DE LA LIBERTAD EN COLOMBIA Y MÉXICO UNA MIRADA DESDE EL DERECHO COMPARADO

**Authors: Mary Luz Vélez Cárdenas¹, Katherine Almanza²
Astrid Milena Calderón Cárdenas³**

1 Author: 10th semester student of the Law Program of the Pereira Sectional Fundación Universitaria del Área Andina. Member of the Seedbed of Penitentiary and Prison Law, attached to the GEIS Research Group. Institutional Email: mvelez28@estudiantes.areandina.edu.co
Pereira - Risaralda. Mob: 3117764647

2 Author: 10th semester student of the Law Program of the Pereira Sectional Fundación Universitaria del Área Andina. Member of the Seedbed of Penitentiary and Prison Law, attached to the GEIS Research Group. Institutional Email: kalmanza@estudiantes.areandina.edu.co
Pereira - Risaralda. Mob.: 3233649200

3 Co-author: Teacher - Lawyer Specialist in Administrative Law, Magister in History and PhD candidate in Education; Director of the Seedbed of Penitentiary and Prison Law, attached to the GEIS Research Group of the Law School of the Pereira Sectional Fundación Universitaria del Área Andina. Email: amcalderon@areandina.edu.co. Correspondence Address: Calle 24 No. 8 - 55 Pereira - Risaralda.

Abstract

This is an investigative work that aims, through comparative law methodology, to establish the way in which the Mexican and Colombian high courts have addressed the rights of pregnant mothers in social rehabilitation centers and detention centers respectively. The comparative process has been carried out taking as a theoretical and normative lens the United Nations rules for the treatment of inmates and non-custodial measures for criminal women or Bangkok Rules and selecting Mexico and Colombia for sharing the same legal family, language and sources of law. Study that has been elaborated by means of the bibliographic documentary review, particularly of the jurisprudence and pronouncements available in the gazette and the reports of the high courts. Finding that, although the two countries share protection of the rights of expectant mothers in social rehabilitation centers in their legal systems, regarding the development of the considerations of constitutional judges, it is observed that there is still a need to delve and deepen on this issue, but even more so in the Mexican, being that in the Colombian currently sub-rules of law were identified on the protection of the rights of women and particularly pregnant mothers within the detention centers.

Key words: Comparative law, jurisprudence, pregnant mothers, protection, Bangkok Rules.

Resumen

El presente es un trabajo investigativo que tiene como objetivo, mediante la metodología de derecho comparado, establecer la forma como las altas cortes mexicana y colombiana han abordado los derechos de las madres gestantes en los centros de readaptación social, y centros de reclusión respectivamente. El proceso comparativo se ha realizado teniendo como lente teórico y normativo Las reglas de las Naciones Unidas para el tratamiento de las reclusas y medidas no privativas de la libertad para las mujeres delincuentes o Reglas Bangkok, y seleccionando a México y Colombia por compartir misma familia jurídica, idioma y fuentes del derecho. Estudio que se ha elaborado mediante la revisión documental bibliográfica, particularmente de la jurisprudencia y pronunciamientos disponibles en la gaceta y la

relatoría de las altas cortes. Encontrándose que, si bien los dos países comparten una protección a los derechos de las madres gestantes en centros de readaptación social en sus ordenamientos jurídicos, en cuanto al desarrollo en las consideraciones de los jueces constitucionales se observa que aún falta ahondar y profundizar sobre este tema, pero más aún en la mexicana, siendo que en la colombiana actualmente se identificaron subreglas de derecho sobre la protección de los derechos de las mujeres y particularmente las madres gestantes al interior de los centros de reclusión.

Palabras clave: Derecho comparado, jurisprudencia, madres gestantes, protección, Reglas Bangkok.

Introduction

The United Nations General Assembly UN (2020), establishes the rules for the treatment of female prisoners and non-custodial measures for women offenders (Bangkok Rules), which are extracted from the document approved in the Bangkok Declaration on synergies and responses: strategic alliances in crime prevention and criminal justice, approved by the 11th Congress of the United Nations on Crime Prevention and Criminal Justice on April 25, 2005, in which guidelines are established for the treatment that must be given to pregnant women and women with children within prisons.

In Colombia, Through Law 1709 of 2014, which modified the penitentiary and prison code, in articles 18 and 88 it contemplates norms regarding prisons for women, within which are considered the adequate infrastructure for unionized or convicted pregnant women to have a proper development of pregnancy.

The Prison Group of the Universidad de los Andes Law School (2019); in its “Report on human rights of the prison system in Colombia (2017-2018)”, states that one of the points of greatest exaltation of the civil society monitoring commission, on its study of the situations that exist in the centers penitentiaries.

This report also highlights, in addition, the increase in the number of women deprived of liberty, compared to 25 years ago, being 5.5 times

higher than the current one. For its part in Mexico, the decree came into force on June 17, 2016, by which, however, and similarly to what was mentioned about Colombia, in Mexico the situation of women deprived of liberty, it also faces great challenges, as Raúl Hernández (2013) mentions, regarding the number of centers that are specifically for women, being that there are 16, and the remaining 214 that the country has are mixed.

The Supreme Court of Justice of the Nation, as the highest constitutional court and head of the judicial power of the United Mexican States; and the Constitutional Court as the highest court of the constitutional jurisdiction of the Republic of Colombia; they are recognized as closing courts, and entities that, within their main functions and as a reason for being, have the responsibility to ensure the Constitution of each country, and to be protectors of rights in the different scenarios of life. Considering the context raised above and considering that the reality of the peoples of Colombia and Mexico may mean that the rights of pregnant women are not necessarily guaranteed as detainees or deprived of liberty in prisons and penitentiaries, it is formulated the following problem question:

How have the high courts of Colombia and Mexico incorporated international treaties and the Bangkok rules into pronouncements on the rights of pregnant mothers deprived of liberty?

Adrián Mancera (2008) mentions that comparative law is a research method or technique that allows its use in practically all areas of law, either to identify foreign legislation or to reach a solution to national problems; and from this vision implies that it can be used to analyze different situations, find interpretations, analyzes, studies and compilations of information, which can in turn nurture the state of the art of research topics.

Within the comparison process, criteria are established depending on the scope of the research, and as Mancera (2008) mentions, when the subject under study is being selected, it is necessary to establish the characteristics of the legal systems, structure of the sources of law, judicial system, branches of law, institutions and the historical development of the legal system, it is important that the countries

selected in the process belong to the same legal family, in addition to the fact that “the use of the language marks the comparison because it allows to internalize in its legal fabric and in this there is a first and important limit of the comparatist”. (Ferrante, 2016), reasons why this work has selected Mexico and Colombia, Spanish-speaking countries, which belong to the legal family; civil law-Germanic Roman law.

Analyze the jurisprudence of the Colombian and Mexican high courts, on rights enshrined in international treaties or the Bangkok rules of pregnant women who are deprived of liberty

1. Compare the jurisprudence of the Colombian Constitutional Court and the Supreme Court of the Mexican Nation, against international treaties and the Bangkok rules on the rights of pregnant mothers deprived of liberty.
2. Analyze the similarities and differences of the jurisprudence of the Colombian and Mexican high courts on the rights of pregnant women in prisons.

The information collected through the bibliographic review of the gazette of the Federation of the Supreme Court of Justice of Mexico and in the rapporteur of the Constitutional Court of Colombia on the subject under investigation is related.

In the Mexican case, they have the Agreement of the Full Court of the Supreme Court of Justice of the Nation, corresponding to May 14, 2013, Registration Number: 24657; the court analyzes the regulations established for this purpose, taking into account that, regarding the situation of women and lactating women, it mentions the following.

On the one hand, it is recalled that the reform approved by the Congress of the Union was intended to guarantee that women are serving their sentences in social reintegration centers, referring to the reform of the Law that Establishes the Minimum Standards on Rehabilitation Society of Sentenced Persons, published in the Official Gazette of the Federation on January 19, 2012,

Now, about article 6 of said law, it is particularly mentioned that it establishes:

The place in which the preventive detention is developed will be different from the one that is destined for the extinction of the sentences and will be completely separated.

In the detention centers for women, the necessary medical care and gynecological services will be provided and, where appropriate, specialized care during and after pregnancy”. (Agreement of the Full Court of the Supreme Court of Justice of the Nation, corresponding to May 14, two thousand thirteen., 2013)

Following the argument, article 18 of the Federal Constitution is also mentioned, which establishes as bases on which the prison system will be organized,

On the other hand, in the Amparo in Revision 1219/2016, Speaker: Minister José Ramón Cossío Díaz, which talks about the protection of the right of inmates to receive visits in the federal centers for social rehabilitation,

The United Nations Rules for the Treatment of Women Prisoners and Non-custodial Measures for Women Offenders (Bangkok Rules) states that “The contact of women prisoners with their families shall be encouraged and facilitated by all reasonable means., including their children” and further that “Visits in which children are taken will take place in a conducive environment, (rules 26 and 27). In them, therefore, a model of exercise of the right to the family of women subject to deprivation of liberty is designed. (Amparo judgment in Revision 1219/2016, 2016)

In the Colombian case, through judgment T 267 of 2018, in relation to the rights of women deprived of liberty in prisons, the Court establishes the following:

In the first place, that the fundamental legal risks faced when entering a prison in Colombia, such as physical, psychological or sexual violence, are multiplied in their intensity and impact when it comes to women’s rights.

Mention is made of the Convention of Belén do Pará, especially its article 9, from which it follows that for the state to comply with its obligations in favor of non-violence against women, it must have especially considered the condition of vulnerability to violence that women may suffer, among other reasons for being deprived of liberty.

The United Nations Bangkok rules are also mentioned, where rule 5 establishes specific hygiene needs according to their gender, and particularly on pregnant, lactating and with children cited arts. 48, 50 and 51, which will be discussed later.

The Court establishes constitutionally insurable minimums, and in accordance with the satisfaction of the fundamental social rights of women deprived of liberty in detention centers.

The right to be protected, within the framework of deprivation of liberty, physical, psychological or sexual violence, exploitation and discrimination.

i) To attend to the radical basic needs that, due to their condition as women, they and only they are exposed to suffer.

ii) To have reinforced protection during pregnancy, breastfeeding and the custody of children, in a healthy and appropriate environment.

i) The assurance of adequate sanitary conditions so that they can maintain their hygiene and health.

ii) Enclosures for accommodation with the facilities and items necessary to meet the hygiene needs of their gender.

iii) Appropriate conditions for detainees who are pregnant, or accompanied by their children, to ensure their subsistence in dignified conditions. (Judgment 267/18, 2018)

In other and varied pronouncements of the Court, issues such as the right to dignity of persons in prisons, and the inmate's relationship with the state have been addressed in sentences such as Sentence T-581/17,

Sentence T-232/17, right to visit Judgment T-686/16, the prohibition of cruel and inhuman treatment Judgment T-151/16, among others.

Materials and methods

The present is a qualitative work with a hermeneutical historical approach, since it consists of the review of documentation (documentary) in this case jurisprudence, on a specific topic and that is characterized within the descriptive level, with an analytical method, having as a technique for the collection of information, the direct observation and analysis of the pronouncements made by the Mexican and Colombian high courts, which is obtained from the official websites of said courts, and in the search engines offered by the institution.

The elaboration of the theoretical framework is under comparative law and is part of the development or body of this research work, where a small recount and location will be made in the different constitutions, and later make the analysis of jurisprudence, for which no limit of pronouncements has been defined, as long as the subject under study is observed in them.

The range of comparison of this work is small, therefore, it is of a micro comparison level, since it is based on the jurisprudential development and the pronouncements of the Mexican and Colombian high courts. Within the selection of the countries in the micro comparison range, the following criteria have been considered:

- a) Characteristics of a legal system: structure, sources of law, judicial system and judiciary, legal profession and others.
- b) Branches of national law.
- c) Institutions or concepts.
- d) Historical development of the legal system

For the construction of the analysis, under the two proposed criteria; women as subjects of protection in prisons and pregnant mothers in prisons, first, a comparison matrix will be used, in which the

information extracted will be ordered, and then a comparative analysis with the Bangkok rules will be proposed.

Results and discussion

In the first place, it should be mentioned that within the pronouncements of both courts, both the Supreme Court of Justice of Mexico, and the Constitutional Court of Colombia, there is protection for the rights of women who are deprived of liberty, despite the doctrine can be done and the creation of rules and sub-rules of law, such as those found in ruling T 267 of 2018, of the Constitutional Court in which minimum standards are recognized in terms of protection of the rights of women deprived of liberty.

In what has been stated by the two judicial bodies, there is the right to contact with the family and visits in prisons, in the Mexican case taking as a reference rules 26 and 27 of the Bangkok rules, and in the case of Colombia through judgments such as T 706 of 1996 and Judgment T-686/16.

The United Nations Rules for the treatment of female prisoners and non-custodial measures for women offenders - Bangkok Rules (2020), are a compendium of guidelines that go hand in hand, with other standards of treatment of persons not deprived of liberty.

The Mexican SCJN, in the AMPARO IN REVISION 1219/2016, directly mentions rules 26 and 27 of the Bangkok rules, in this case on family contact and visits that involve the presence of children, for its part in the sentence T 267 of 2018 of the Colombian Constitutional Code, rules number 5 on the hygiene needs of women are mentioned, and in particular on pregnant and lactating women or with children, rules 48, 50 and 51 are mentioned.

In a non-direct way, the jurisprudence and pronouncements of the high courts also refer to other rules that are established in the Bangkok rules. As they are:

Rule number 1, as a basic principle, in which the special needs of women for the application of the rules, and a claim of unconstitutionality

against article 39 of the national law of criminal execution, the SCJN of Mexico, recognizes that the spirit of the legislator with said norms to make visible the situation of women deprived of liberty and give them protection in some particular circumstances, the same for its part is established by the Constitutional Code of Colombia with sentence T 267 of 2018, observes women as a subject of special protection due to their vulnerability in situations related to internment in prisons.

Rule 5, for its part, establishes the basic hygiene needs derived from their own nature as women, in this case as already mentioned by the Constitutional Court of Colombia in ruling T 267 of 2018, it takes it into consideration, and in addition to this, defines it as one of the constitutionally insurable minimums in infrastructure and public services, transcribing said norm.

The rules number 10 and 11 of Bangkok, specifically contemplate health services for women, and in the agreement of May 14, two thousand thirteen of the SCJN of Mexico, it is mentioned that article 6 of the Law that Establishes the Minimum Standards on Social Readaptation, it is established that “In the detention centers for women, the necessary medical care and gynecological services will be provided and, where appropriate, specialized care during and after pregnancy.”, and the CC of Colombia, mentions in the aforementioned sentence as a constitutionally insurable minimum. ii) To attend to the radical basic needs that, due to their condition as women, they and only they are exposed to suffer.

Finally, it should be mentioned that within ruling T 267 of 2018, the Bangkok rules are referred to as international soft law, and this refers to a legal theory, in which there are international norms that are not binding.

Conclusions

The two high courts establish in their considerations, a protection of the rights of women as subjects of protection due to the possible vulnerability that is caused by their own nature at the time of being deprived of liberty, concluding that the objective of the legislator and others States of the legal system of each country, in this matter

it is intended to give visibility and special protection in particular circumstances.

Although the Bangkok rules can be considered as soft law, it is observed that as guidelines they are considered in the analyzes made by the high courts on this subject, however, it could be considered that, in the pronouncements of Mexico, it is something minor, since it was only found directly mentioned in a review protection. Although in the case of Colombia, in the same way, the appearance is to say the least, in the case in question it presented considerable weight, since the Constitutional Court established or outlined, based on these norms and others, a minimum of rights of women deprived of liberty in detention centers.

In accordance with the foregoing, for the Colombian case, it can be concluded that there is currently a key ruling on this issue, and it is ruling T 267 of 2018, which establishes constitutionally insurable minimums, and in accordance with the Satisfaction of the fundamental social rights of women deprived of liberty in prisons, a minimum in terms of infrastructure and public services.

For its part, in relation to pregnant mothers, in the pronouncements of the Supreme Court of Justice of the nation of Mexico, it is established that it existed in the preparation of the reform to the Law that Establishes the Minimum Standards on Social Readaptation of Sentenced Persons, a consideration in the assignment of jobs within the centers, for women in a state of pregnancy, in such a way that they were in accordance with said state. In addition to the mention that article 6, of the same law, establishes for pregnant mothers, medical care, gynecological and specialized services during pregnancy.

Impacts of the results obtained

Although the scope of this research is academic, society in general can benefit from this type of research in that not only pregnant mothers who are deprived of their liberty, but also their families, their relatives, and different entities who fight for rights, and the educational community can nurture the social debate, which, if well directed, achieves real social transformations, hand in hand with the judicial

bodies and entities in charge of the administration of justice and the elaboration and regulation of norms.

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CHAPTER 4. **Naturals Sciences**

**DIFFERENTIAL DIAGNOSIS AND
TREATMENT OF CUTANEOUS
LYMPHOMA VS MASTOCYTOMA
IN A 9 YEARS OLD CANINE: CASE
REPORT**

**DIAGNÓSTICO DIFERENCIAL
Y TRATAMIENTO LINFOMA
CUTÁNEO VSMASTOCITOMA EN
UN CANINO DE 9 AÑOS: REPORTE
DE CASO**

Authors: Diana Patricia Diaz García¹, Stephany Loaiza Pulgarín², Rafael R. SantistebanArenas³ y Juan C. Ramírez Ante⁴

1 Est. Medicina Veterinaria, Unisarc

2 M.V.Z, M.Sc ©

3 M.V.Z, M.Sc ©

4 Docente Unisarc, grupo de investigación IAMVET,juan.ante@unisarc.edu.co

Abstract

Dermal alterations are part of the daily routine in the clinic of small animals, most of all in canines, being a high percentage of these neoplastic processes showing more incidence in geriatric patients. A 9-year-old mix breed female canine was taken to medical consultation at the veterinary medicine clinical didactic unit UNISARC because of the presentation of different masses with multifocal distribution and which was previously diagnosed with cutaneous lymphoma by histopathology of excisional biopsy, taking into account this background, the clinical signs and the multiple tumoral growth presented in the dog new paraclinical tests were performed which establish a new final diagnosis towards another kind of round cell neoplasm this time getting as a result mast cell tumor. The patient was clinically treated, showing slight recovery; however, two weeks later the patient declined her clinical condition due to it was decided to proceed with the euthanasia process.

Keywords: chemotherapy, cutaneous lymphoma, mast cell tumor, neoplasia.

Resumen

Las alteraciones dérmicas hacen parte de la clínica diaria de pequeños animales principalmente en caninos, siendo un alto porcentaje de estos procesos neoplásicos mostrando mayor incidencia en pacientes geriátricos. Una hembra canina mestiza de 9 años fue llevada a consulta a la unidad didáctica clínica de medicina veterinaria UNISARC debido a la presentación de diversas masas con distribución multifocal y la cual fue diagnosticada previamente con linfoma cutáneo por biopsia excisional mediante histopatología, teniendo en cuenta estas antecedentes y los signos clínicos que presentaba se realizaron nuevamente diversas pruebas paraclínicas que replantearon el diagnóstico definitivo hacia otro tipo de neoplasia de células redondas esta vez mastocitoma. La paciente fue sometida a tratamiento quimioterapéutico, mostrando leve mejoría, sin embargo, dos semanas más tarde, la paciente mostro una caída en su condición clínica por lo cual se decide a realizar el procedimiento de eutanasia.

Palabras clave: linfoma cutáneo, mastocitoma, neoplasia, quimioterapia.

Introduction

Skin tumors are frequent and represent an important part of the daily casuistry in the clinic of small animals, being the mast cell one of the most representative in canines (Dobson, Duncan, & Lscelles, 2014). Regarding skin neoplasms, it is estimated that there are breeds predisposed to suffer from this type of tumor and that one in four canines older than two years dies of cancer (Medina, Puicón, & Sandoval, 2017; Rodríguez, Ortiz, Garzón, Gómez, & Vasquez, 2009).

Skin tumors can be generated from the cells that are part of its layers, among them we find tumors of epithelial, mesenchymal, round and melanocytic cells, their etiology varies from viral effects, radiation, endocrine, hereditary, and carcinogenic agents (Medina, Puicón, & Sandoval, 2017; Withrow, David, & Page, 2013). Clinical signs are directly related to tumor behavior, benign neoplasms have a slow growth, and present greater similarity to the tissue of origin compared to malignant neoplasms which present exponential growth and invasion into adjacent structures (North & Banks, 2009). Although appropriate clinical evaluation and some paraclinical examinations allow a differential diagnosis in skin tumors, histopathology is the diagnosis test to confirm skin tumors (Dobson, Duncan, & Lscelles, 2014; Nelson & Couto, 2010); However, it is worth highlighting the importance of cytology as a diagnostic method, which according to some studies has a sensitivity for neoplasms of 89.3% and a specificity of 97.9% (Dobson, Duncan & Lscelles, 2014; Rodríguez, Ortiz, Garzón, Gómez, & Vasquez, 2009)

Different studies have determined the frequency of cutaneous neoplasms, these place lymphoma and mastocytoma in a presentation of 8-9% and 15-20% respectively (Poche, Agudelo, Sánchez & Valencia, 2017; Dobson, Duncan & Lscelles, 2014; Fontaine, Bovens, Bettenay & Mueller, 2009). Lymphoma is a malignant hematopoietic tumor, characterized by the proliferation of cells originating from lymphoid tissue or round cells (Morris & Dobson, 2001). In relation to the prognosis in canines diagnosed with lymphoma, it is relevant to highlight that its

diagnosis will always be reserved, because an effective treatment has not yet been developed, which eliminates the disease completely despite the fact that there are great advances in treatment multimodality with chemotherapeutics and immunosuppressants (Ettinger, 2003).

In order to obtain an accurate prognosis, it is necessary to establish an exact diagnosis, which allows the identification of a type of lymphoma according to the different anatomical classifications, including the cutaneous presentation. In addition, it is important to review the clinical statistics, as this will allow predicting behavior and will be helpful in choosing a specific treatment (Bienzle & Vernau, 2011; Morrison 2004).

On the other hand, mast cell tumor tends to affect mainly elderly animals; However, the literature shows that this neoplasm is indifferent to age, expressing itself in canines from 4 months of age to 18 years, neither a sexual or racial predisposition is evidenced, however, most reports have been presented in breed dogs like: boxer, labrador, Golden retriever, bull terrier, fox terrier, et (Cartagena, 2011; Heredia et al., 2015; Nieto, 2009).

This type of neoplasm shows a great variety in appearance, clinical behavior, metastasis, and response to treatment. The clinical presentation of the tumor is not definitive and clinically 10-15% indistinguishable from common subcutaneous lipomas (Nelson & Couto, 2010), there are multiple variations in thickness, which can result in confusion with other types of skin tumors (Nelson & Couto, 2010; Withrow, Vail, & Page, 2013).

The literature reports that the microscopic diagnosis of mastocytoma is relatively easy both cytologically and histologically using the fine needle aspiration technique and biopsy (Cartagena, 2011; Gómez, 2015; Henry & Higginbotham, 2010; Nieto, 2009; Withrow, Vail & Page, 2013). It presents elevated separated cells, an eccentric and rounded nucleus, abundant cytoplasm and the presence of granules in it, generally accompanied by erythrocytosis (Henry & Higginbotham, 2010; Nelson & Couto, 2010; Rios, 2008; Torres & Eslava, 2006). In the case of this neoplasm, a grading is performed according to the characteristics as shown in Table 1.

Table 1. *Mastocytoma grade classification*
 (Patnaik, Ehler, & MacEwen 1984)

| | GRADE I | GRADE II | GRADE III |
|-----------------------------|----------------|--------------------------|---------------------|
| Differentiation | Good | Intermediate | High |
| Cellularity | Low | Intermediate | High |
| Cells | Uniform | Moderate anisocytosis | Marked anisocytosis |
| Pleomorphism | None | Moderate | Common |
| Cytoplasmic granules | Highly visible | Visible | Not visible |
| Nucleus | Uniform | Anisocariosis | Anisocariosis |

Surgical resection is described as the treatment of choice for mast cell tumor, taking into account the patient's condition, location, the degree to which the tumor is established, and the degree of metastasis (Cartagena, 2011; Medina, 2015). The chemotherapy used for canine mast cell tumors is controversial because there are no studies that clearly demonstrate its benefits. However, there are authors who suggest the use of high-dose corticosteroids, as well as the addition of cytotoxic agents (Rios, 2008; Scase et al., 2006; Tellado, 2016).

Materials and methods

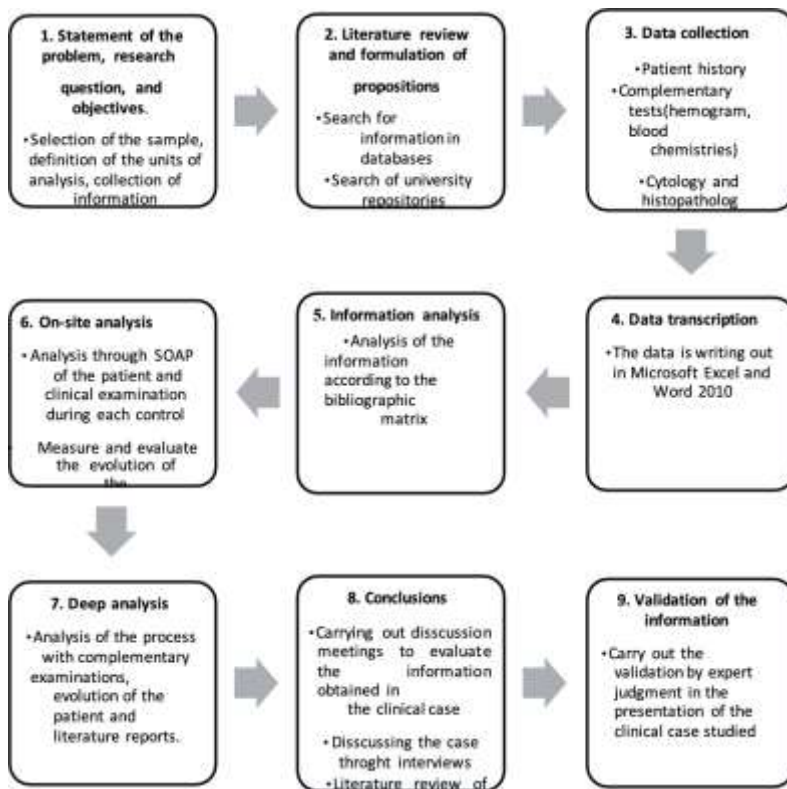
This research is consolidated as a case study; therefore, it focuses on the development or clinical evolution of a specific patient. In order to comply with the general objective, there is a methodology in stages, which in turn is divided into specific activities, which makes it possible to comply with what is proposed.

The general stages are: sample selection, definition of the analysis units, information collection, data collection, data transcription,

information analysis, on-site analysis, deep analysis of the information, conclusion and validation of information.

The general outline for the research methodology is described below.

Figure 1. Methodology



Results and discussion

Case description

The patient admitted to the veterinary medicine didactic unit of Santa Rosa de Cabal UNISARC, the canine was mixed, it had 9 years old and 30.6 kg, it is presenting multiple skin masses with multifocal

distribution of different sizes with an evolution time of 4 months and a previous histopathological diagnosis of lymphoma. In addition to 3 ulcerated mucocutaneous lesions.

Photograph 1 and 2. Multifocal skin masses.



A complete hemoleukogram and ALT and Creatinine measurement was performed, obtaining normal values, the radiological and ultrasound studies ruled out metastases to internal organs. It was also carried out three cytologies and incisional biopsies was performed. We decided to establish a chemotherapeutic protocol for lymphoma taking into account the previous diagnosis, the clinical evaluation, the cytological result and we are waiting for the new histopathological result.

Cytological analysis

Neoplastic cells with round cytomorphological pattern, marked anisocytosis and anisokaryosis, slightly basophilic cytoplasm without granules or vacuoles were observed. Taking into account the previous diagnosis, a presumptive result of cutaneous lymphoma was generated.

Chemotherapy protocol

An oral cyclophosphamide COP protocol (50mg / m²), intravenous vincristine (0.5mg / m²) and oral prednisolone (20mg / m²), weekly for a month.

Histopathological analysis

Mesenchymal cells were observed in the dermis, epidermis and hypodermis, which proliferate forming a solid cell bundle that replaces the stroma of the dermis, nuclei with granular chromatin, moderate anisocytosis and anisokaryosis. Mitosis of 18 in 10 high-power fields, no neoplastic cells were observed in the lumen of the vessels. Final result High-grade cutaneous mastocytoma.

Response to treatment

The patient presented a favorable response in the first two weeks of treatment, evidenced by its clinical recovery and a slight decrease in the size of the different tumor masses.

The mastocytoma is considered highly prevalent in the casuistry of canines, in our country, it is considered the most common skin tumor in this species according to UDEA (University of Antioquia) studies (Ferreira de la Cuesta & Pedraza, 2003); it tends to appear more frequently in elderly animals, however, the literature shows that this neoplasm appears in canines from 4 months to 18 years, neither a sexual or racial predisposition is evidenced, however, the majority of reports have been presented in these breeds: Bóxer, Labrador retriever, Golden retriever, Bullterrier, Fox terrier, etc. (Cartagena 2011; Heredia et al. 2015; Morris & Dobson 2001; Nieto 2009; Perpiñán & Durnell, 2007; Rassnick et al. 1999). In recent studies, it was determined that a high number of dogs had a mutation in the primordial cell receptor (C-Kit) that could be responsible for the proliferation of mast cell tumors (mastocytoma) in canines, however, not all dogs that have mast cell tumors present this mutation. (Cartagena 2011; Nelson & Couto, 2010; Withrow, Vail, & Page 2013).

Mast cells are larger than neutrophils, which have the presence of granules, these are not commonly observed with H and E, to have a better visualization, we need to use Giemsa, Methylene Blue and Blue of Toluidine that have higher affinity and allow the granules to be visible (Riveros, Polanco, & Ochoa, 2011; Torres & Eslava, 2006).

This type of neoplasm is seen with great variety in appearance, clinical behavior, metastasis, and response to treatment.

The clinical presentation of the tumor is not absolute and clinically 10 to 15% indistinguishable from common subcutaneous lipomas (Nelson & Couto, 2010), there are multiple variations in size, which can be confused with other types of skin tumors. This neoplasm can be presented in a multicentric manner or as a solitary, differentiated dermo-epidermal or subcutaneous mass, forming a slow-growing nodule. Ulcerated masses can be found, which, due to the action of histamine are larger, in a red, and swollen appearance. The most aggressive situation can occur in soft tissues and spread through the cutaneous lymphatic veins (Morris & Dobson, 2001; Nelson & Couto, 2010; Nieto 2009; Rassnick et al., 1999; Withrow, Vail & Page, 2013).

The clinical behavior of this type of neoplasm is highly variable, it can be slow-growing, and low-grade, proceeding with benignity, or progressing to rapid and malignant growth and distribution. Histologically, the degree of malignancy is established according to the behavior, morphology, and invasion of adjacent tissue, according to literature, three levels are established (Nelson & Couto, 2010; Withrow, Vail & Page, 2013): well-differentiated tumor (benign behavior), moderately differentiated (with a high degree of metastasis, difficult to predict) and undifferentiated tumor (aggressive behavior, showing early metastasis, poorly differentiated intracytoplasmic granules). (Heredia et al., 2015; Morris & Dobson 2001; Nieto, 2009; Rassnick et al., 1999; Rios, 2008; Tellado, 2016).

The metastatic behavior can occur through the lymphatic or blood route, generally, in cases of metastasis, enlarged local lymph nodes are observed as the main sign (Morris & Dobson, 2001), these are the main organs where mast cells are disseminated: spleen, liver, bone marrow and kidneys, receiving the name of systemic mastocytosis (Cartagena, 2011; Nelson & Couto, 2010; Rios, 2008; Withrow, Vail & Page 2013).

Clinical signs can occur locally or systemically, they vary according to the histamine and vasoactive amines from the tumor, they are mainly associated with erythema, edema, gastrointestinal ulceration associated with vomiting, anorexia, melena, anemia, and hemorrhage

in some cases. In most cases, wound healing is inhibited by proteolytic enzymes (Henry & Higginbotham, 2010; Morris & Dobson, 2001; Nelson & Couto, 2010; Nieto, 2009). These enzymes together with histamine cause changes in size due to the swelling edema produced by their release (Cartagena, 2011).

It is suggested for the confirmatory clinical evaluation to include radiology or ultrasound to determine possible hepatosplenomegaly; also, hematological study, biochemical profile, evaluation of urine parameters, and examination of fecal occult blood (Nelson & Couto, 2010). As the treatment for mastocytoma surgical resection is described, considering the patient's condition, location, the level to which the tumor is established, and the stage of metastasis. It should also be noted that the success of surgical resection depends on established margins (Morris & Dobson, 2001; Nelson & Couto, 2010; Rassnick et al., 1999; Rios, 2008; Thamm, Mauldin, & Vail, 1999). The use of radiotherapy is indicated in post-surgical treatments, however, there is no evidence of its benefits as a therapeutic (Cartagena, 2011; Morris & Dobson 2001; Rios, 2008).

The chemotherapy that is used for canine mast cell tumors is controversial because there are no studies that demonstrate its benefits. However, some authors suggest the use of corticosteroids (prednisolone) at high doses and the addition of more powerful cytotoxic agents such as lomustine, vinblastine, cyclophosphamide, vincristine, etc. (Rios, 2008; Scase et al., 2006; Tellado, 2016; Torres & Eslava, 2006; Usuga, 2019).

Another treatment is intralesional injection with deionized water, before and after surgical resection, however, its benefits have not been described (Cartagena, 2011; Morris & Dobson, 2001; Nelson & Couto, 2010). Regarding prognosis, it is difficult to establish a prediction due to its unpredictable behavior, that is, to its invasive and metastatic capacity. According to the authors, it is described according to the degree of malignancy and clinical stage (Cartagena, 2011; Morris & Dobson, 2001; Nieto, 2009).

Conclusions

The previous histopathological result, the epidemiological data, the cytology, and the clinical signs, allowed them to suspect a round cell neoplasm such as cutaneous lymphoma. However, the histopathology performed during treatment confirmed that it was another neoplasm, in this case, a mastocytoma. It was determined to complete the treatment and subsequently evaluate the clinical status and quality of life of the patient. Two weeks after the protocol, the patient showed decay, prostration, loss of appetite, and the presence of new skin tumors. These signs added to the final diagnosis were sufficient to consider and perform euthanasia.

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5

CHAPTER 5. **Technologies and** **Engineerin**

STUDY OF INVENTORY-ROUTING PROBLEM

ESTUDIO DEL PROBLEMA DE INVENTARIOS Y ENRUTAMIENTO (IRP)

Authors: Frank Alejandro Hincapié Londoño¹, Jhonatan Stiven García Guevara² y Eliana Mirldey Toro Ocampo³.

Abstract

Risaralda is in the center of the so-called “economic triangle of Colombia” delimited by the cities of Medellín, Bogotá and Cali, this region corresponds to only 10% of the total extension of the national territory but concentrates 56% of the total population generates 76% of the national GDP, it also gathers 72% of the construction industry, 75% in commerce and 60% of the economically active population.

1 Universidad Tecnológica de Pereira-grupo de aplicaciones de técnicas de optimización y procesos estocásticos (GAOPE), estudiante de ingeniería industrial, frank.hincapie@utp.edu.co

2 Universidad Tecnológica de Pereira- grupo de aplicaciones de técnicas de optimización y procesos estocásticos (GAOPE), estudiante de ingeniería industrial, jhonatan.garcia1@utp.edu.co

3 Universidad tecnológica de Pereira- grupo de aplicaciones de técnicas de optimización y procesos estocásticos (GAOPE), Docente universitario, elianam@utp.edu.co

With all this manufacturing concentration in our region, it is evident that Risaralda is part of the logistics axis of Colombia, where there is a high flow of transport and storage of goods from sectors such as construction, commerce, among many others that, according to In the national planning department, in Colombia the logistics cost is made up of the cost of storage, which represents a 46.5% share, and the cost of transportation, with 35.2%. Therefore, both items represent 81.7% of the companies' total logistics cost.

With a problem of such high dimensions that affects the logistics of the country, it is necessary to establish a tool that optimizes these processes, allowing logistics to be more effective, fulfilling tasks in the best way and developing more efficiently with fewer resources.

Inventory Routing Problem (IRP) combines the logistics activities of network design and inventory management. The objective of the IRP is at the lowest cost to meet the needs of a set of customers, using a fleet of vehicles, which, starting from a central warehouse, travel distribution routes to supply all customers within a set time horizon.

That is why, from the understanding of the proposed models of the IRP, it is analyzed proposing two inventory supply policies, one of them Maximum level (at the request of the client) and the other the Order up to level policy (fill the maximum capacities storage of clients), there are also three ways to eliminate sub-tours (MTZ, Flows, general), because the routing part is where the greatest computational complexity is found, the results were obtained from the implementation of the exact solution algorithm in the algebraic programming language (AMPL), validating it with the instances raised in the literature.

Finally, it is verified that the responses generated are of very good quality, highlighting the elimination of sub-tours through the flows model since it is the most efficient model in computational times of the three proposed.

Keywords: Inventory management, Inventory-routing, Maximum level (ML), Order up to level (OU), Supply chain.

Resumen

Risaralda se encuentra ubicada en el centro del llamado “triángulo económico de Colombia” delimitado por las ciudades de Medellín, Bogotá y Cali, esta región corresponde a tan solo el 10% de la extensión total del territorio nacional, pero concentra al 56% de la población total, genera el 76% de PIB nacional, además reúne el 72 % de la industria de la construcción, el 75 % en comercio y al 60 % de la población económicamente activa.

Con toda esta concentración manufacturera en nuestra región, es evidente que Risaralda hace parte del eje logístico de Colombia, en donde existe un alto flujo de transporte y almacenamiento de mercancías de sectores como la construcción, el comercio, entre muchos otros que, de acuerdo con el departamento nacional de planeación, en Colombia el costo logístico está compuesto por el costo de almacenamiento, que representa un 46,5% de participación y el costo de transporte, con 35,2%. Por lo tanto, ambos rubros representan el 81,7% del costo logístico total de las empresas.

Con un problema de dimensiones tan altas que afecta a la logística del país, se hace necesario establecer una herramienta que optimice estos procesos permitiendo que la logística sea más efectiva cumpliendo de la mejor manera las tareas y más eficiente desarrollando con menos recursos los resultados esperados por el sector.

El problema de gestión de inventarios y de enrutamiento *Inventory Routing Problem (IRP)*, combina las actividades logísticas de diseño de redes y manejo de inventarios. El objetivo del IRP es al menor costo atender las necesidades de un conjunto de clientes, utilizando una flota de vehículos, que, a partir de un almacén central, recorren rutas de distribución para abastecer a todos los clientes en un horizonte de tiempo establecido.

Es por ello, que a partir de la comprensión de los modelos planteados del IRP se analiza planteando dos políticas de abastecimiento de inventario, una de ellas Maximum level (a solicitud del cliente) y otra la política Order up to level (llenar las máximas capacidades de almacenamiento de los clientes), también se plantean tres maneras de

eliminar sub-tours (MTZ, Flujos, general), debido a que en la parte de enrutamientos donde se encuentran la mayor complejidad computacional, los resultados se obtuvieron a partir de la implementación del algoritmo de solución exacta en el lenguaje de programación algebraico (AMPL), validándolo con las instancias planteadas en la literatura.

Finalmente, se comprueba que las respuestas generadas son de muy buena calidad, destacando la eliminación de sub-tours por medio del modelo de flujos ya que es el modelo más eficiente en tiempos computacionales de los tres planteados.

Palabras claves: Cadena de suministro, Gestión de inventarios, Inventory-routing, Maximum level (ML), Order up to level (OU).

Introduction

Today logistics activities are developing in a more competitive environment, where companies are experiencing high transportation costs, increased inventory investment and longer and unpredictable cycle times.

Therefore, the correct management of the supply chain has taken on greater relevance, being a consequence in addition to the increasingly important impacts on environmental sustainability, urban congestion, logistics efficiency and the costs associated with both transport and merchandise inventory. Therefore, solutions need to be explored to reduce costs that have increased in recent years, especially due to the growth in the online sales sector, which in 2020 grew up to 300%, therefore, companies were forced to adapt and improve its logistics operations to offer a better service. (Rubio, 2020)

Where, the most representative logistics costs are transportation, storage, and inventory management. (Torres, 2012) Consequently, it is increasingly difficult for companies to face logistical challenges, looking for alternatives so that their processes are faster, more flexible, and less expensive.

Therefore, the question arises, which mathematical programming model is the most efficient to solve the inventory routing problem?

The integration of the different processes that make up the supply chain is essential to obtain a better level of coordination. The control of inventories and their distribution are the key processes in the loss of both efficiency and effectiveness in the field of logistics, in addition, according to the national planning department of Colombia within the logistics cost is the cost of storage, which represents a 46.5% share, followed by transportation costs with 35.2%. Therefore, both items represent 81.7% of the total logistics cost of the companies that participated in the 2018 national logistics survey (Departamento Nacional de Planeación, 2018)

Therefore, the IRP intends to minimize the logistics costs that are generated in the company considering routing decisions to clients, taking as a starting point the supply chain and inventories policies. In the same sense, the mathematical model provides tools and knowledge for decision-making that allow studying and having a better management of the supply chain.

Similarly, the IRP model helps indirectly from three main fronts (economic, environmental, social). The economic front, reducing inventory storage and routing costs. Second, environmental, ensuring that used vehicles are used only in necessary situations and in the minimum possible. Finally, social front from service equity, workload balance and collaborative planning

Some of the studies that were analyzed are the paper made by Archetti et al. (2007) propose a distribution problem in which a product has to be sent from a supplier to several retailers, which is known as Vendor managed Inventory (VMI), in which they also consider a fixed time horizon and an inventory policy in where each retailer defines a maximum level of inventory, but each supplier is in charge of controlling the inventory of the retailers, thus determining their replacement policy to guarantee that there is no shortage.

Likewise, the studies carried out by Coelho & Laporte (2013) entitled "The exact solution of various kinds of routing and inventory problems". In which a Branch-and-Cut algorithm is exposed to solve variants of the IRP model, such as considering the variant with multiple vehicles (multi vehicle IRP), testing the operation of the models with proposed instances.

On the other hand, in the work carried out by Batero (2017) which develops the research “multi-objective mathematical model of routing and inventories for the supply chain of perishables: case of the fruit sector” where problems such as inadequate management of Inventories, distribution and routing bring with them high logistics costs associated with the stock, transportation and distribution of products

In the same way, it makes a contrast with the mathematical models that have been proposed, and a model is exposed that allows evaluating the impact on the objectives formulated in terms of costs and level of losses for the fruit chain. Among the strategies formulated is a proposal for routing, distribution, and inventory management of the selected fruits. (Batero, 2017)

The study proposed by Florindo (2019) shows the high adaptability of the problem according to the criteria established by supplier and retailers, for example they present variants in terms of supply policies such as ML policies where it is guaranteed that whenever the customer is visited customer, the quantity of inventory to be delivered cannot exceed the maximum limit of the warehouse. On the other hand, the OU policy guarantees that whenever the customer is visited, the amount of inventory to be delivered is such that the maximum storage level of the retailer is reached.

The purpose of the article is to analyze and compare models IRP evaluated in different instances of the literature, to identify the most efficient. Two ways of inventory management were handled and three ways to eliminate sub-tours, general, flow modeling and Miller-Tucker-Zemlin (MTZ). Similarly, the mathematical models are described, the objective function, execution time and GAP obtained are presented.

Mathematical models

Below are the sets, parameters, and decision variables for the mathematical models.

| Sets | Description |
|---------------------------|---|
| O | Set of distribution centers |
| VI | Set of customers |
| V | Set of nodes $V = O \cup VI$ |
| T | Time set from period 1. |
| Parameters | Description |
| $Cost_{ij}$ | Cost of traversing arc ij in period t . |
| $Coordenadas_j$ | Location of distribution center and customers. |
| H_i | Unit storage cost of the distribution center and customers. |
| r_{it} | Quantity of merchandise available from the distribution center in time t . |
| d_{it} | Quantity demanded by customer i in the period t . |
| C_j | Customer warehouse capacity j . |
| Decision variables | Description |
| X_{ijt} | 1, if the arc ij is used in period t . 0, otherwise. |
| I_{it} | Inventory level of the distribution center and customers at the end of period t . |
| q_{it} | Quantity of product sent to customer i in period t . |
| Y_{it} | 1, if client i is visited in period t . 0, otherwise. |
| U_{ijt} | Cumulative product quantity shipped between nodes in period t . |

Maximum Level (ML)

The ML inventory replacement policy does not allow there to be a break between the supplier's inventory and the inventory of the respective customers, the inventory to be carried by each customer in period t cannot exceed their maximum inventory level and finally, the capacity of the vehicle in each period t , do not exceed your maximum load limit.

$$\text{Min } Z = \sum_{i \in V} \sum_{t \in T} h_i I_{it} + \sum_{i \in V} \sum_{j \in V} \sum_{t \in T} \text{Cost}_{ij} X_{ijt} \quad (1)$$

s.a.

$$I_{0t} = I_{0t-1} + r_{0t} - \sum_{i \in V} \sum_{k \in K} q_{it} \quad \forall t \in T \quad (2)$$

$$I_{it} = I_{it-1} + r_{it} + \sum_{k \in K} q_{it} - d_{it} \quad \forall i \in V, t \in T \quad (3)$$

$$I_{it} \leq C_i \quad \forall i \in V, t \in T \quad (4)$$

$$q_{it} \leq C_i - I_{it-1} \quad \forall i \in V, t \in T \quad (5)$$

$$q_{it} \leq C_i Y_{it} \quad \forall i \in V, t \in T \quad (6)$$

$$\sum_{i \in V} q_{it} \leq Q Y_{0t} \quad \forall t \in T \quad (7)$$

$$\sum_{j \in V} X_{jit} = Y_{it} \quad \forall i \in V, t \in T \quad (8)$$

$$\sum_{i \in V} X_{ijt} = Y_{jt} \quad \forall j \in V, t \in T \quad (9)$$

$$\sum_{j \in V} X_{ijt} - \sum_{j \in V} X_{jit} = 0 \quad \forall i \in V, t \in T \quad (10)$$

$$\sum_{j \in V} X_{0jt} = Y_{0t} \quad \forall t \in T \quad (11)$$

$$U_{jt} \geq U_{it} + q_{jt} + Q X_{ijt} - Q \forall i \in V1, j \in V1, t \in T \quad (12)$$

$$X_{ijt}, I_{it}, Y_{it} \in [0,1] \quad (13)$$

$$q_{it}, U_{jt} \geq 0 \text{ y entero.} \quad (14)$$

Equation (1) seeks to minimize the logistics cost associated with the storage of inventory for both the supplier and the customers, expressed in the first double sum expression, in the second part of the objective function it seeks to minimize the cost associated with the routes in a certain planning horizon.

Equation (2) calculates the supplier's inventory in each time. Equation (3) allows calculating the inventory of each customer in each period of the planning horizon. Equation (4) ensures that the inventory in each period must be less than or equal to the maximum storage capacity of each client. Equation (5) ensures that what is sent to customers must be less than or equal to the maximum they can receive considering how much their inventory already occupies. Equation (6) ensures that what is shipped must be less than or equal to the maximum capacity associated with whether product is shipped.

Equations (5) and (6) identify the ML inventory management policy where the quantity of product delivered in each visit to customers is optimized, ensuring that the respective capacity of each warehouse is respected.

Equation (7) identifies that the quantity to be sent to customers must be less than or equal to the maximum capacity of the vehicles, which in this case are of homogeneous capacity since they only have one vehicle. Equation (8) establishes that, if customer i is sent product in period t , then only 1 of all possible arcs that can enter i can be activated. Equation (9) establishes that, if customer j is sent product in period t , then only 1 of all possible arcs that can come out of i can be activated. Equation (10) restricts that, if node j is entered through an arc, then node j must also be exited through an arc. Equation (11) states that it must always start from the provider node (0).

Equation (12) is the general formulation by the MTZ method for the IRP, to eliminate the sub-tours that may occur in the network

problem. Finally, equations (12) and (13) present the domain of the variables.

Order up to level (OU)

The OU replenishment policy must meet all the conditions of the ML policy, that is, there can be no break in the supplier's inventory and the inventory of the customers, the inventory to take from each customer in period t cannot exceed its maximum inventory level and finally, the vehicles capacity in each period t does not exceed its maximum load limit. When visiting the customer, their inventory level must be filled in period t unlike in the ML policy, where it is supplied according to demand.

$$q_{it} \geq C_i Y_{it} - I_{i,t-1} \quad \forall i \in V1, t \in T \quad (15)$$

Equation (15) ensures the management of OU policy, where, each time a customer is visited, it receives an amount of inventory that completely fills its storage capacity.

Elimination of sub-tours

The component that represents the greatest difficulty in the resolution of mathematical models is the routing part, therefore, in addition to considering the resolution of sub-tours by the general model, the elimination of sub-tours by means of a flow model is studied. and MTZ. These model variants are considered to determine a more efficient exact model.

Flows

Another alternative for the elimination of sub-tours is the one proposed by Florindo (2019) through the flows model, where a decision variable must be considered f_{ij} that represents the amount of flow that passes through the arc ij on the route of period t , that is, it represents the number of clients that will still be visited after client j .

To obtain the model of elimination of sub-tours by flows, the restriction (12) must be eliminated from the general model and the following restrictions must be added:

$$\sum_{j \in V} f_{0jt} = \sum_{j \in V} f_{0jt} - Y_{jt} \quad \forall t \in T \quad (16)$$

$$\sum_{j \in V_1} f_{ijt} = \sum_{j \in V_1} f_{ijt} - Y_{jt} \quad \forall i \in V, t \in T \quad (17)$$

$$f_{ijt} \leq n X_{ijt} \quad \forall i \in V, t \in T \quad (18)$$

$$f_{ijt} \geq 0 \quad \forall i \in V, t \in T \quad (19)$$

The new restrictions are associated with the flow of each route, thus ensuring that there is only one connected circuit. The first set of constraints (16) ensures that the initial flow of each route is equal to the total number of clients to visit (excluding the provider node). The second set of restrictions (17) guarantees the decrease of one flow unit each time it passes through the client to visit on the respective route (excluding the return arc for the provider). The set of constraints (18) guarantees the flow of an arc if it belongs to the solution path. Finally, the set of constraints (19) defines the domain of the variables.

Miller-Tucker-Zemlin (MTZ)

Another alternative to solve sub-tours is through a variant of the MTZ model.

The decision variables W_{it} indicate the order in which customers are visited on the route for each period, thus defining for each vertex j in period t , the total number of customers already visited by the route since period t after to visit that client. To implement it, restrictions (12) must be eliminated and restrictions (20) (21) and (22) must be added. The constraints (20) guarantee for each instant t that the flow starts at the provider's vertex. The set of restrictions (21) refers to the increase of one flow unit each time they pass through the vertex of the client to visit, that is, if vertex j occurs immediately after vertex i , one unit is increased in the variable W_{it} to count the clients visited on that route and avoids the appearance of sub-tours, in addition, it cancels the clients that do not belong to the route. On the other hand, the variables only take positive values (22).

Materials and methods

The proposed research is quantitative in nature since it describes and infers problems, in the same way a sequential and probative process is followed. It is descriptive in nature, since it seeks to specify properties, characteristics, and important features of mathematical models, seeking to collect information from them. (Hernández et al., 2014)

The information will be collected by secondary research, where it is presented to collect Inventory routing problem (IRP) models, after understanding what the bases of the mathematical model of the IRP are and knowing the different ways of approaching the problem, the models are replicated in A Mathematical Programming Language (AMPL), after replicating the models, proceed to validate their operation through the instances proposed by Archetti et al. (2007). (Fourer et al., 2003)

As the IRP models are working, the various models are compared to identify the model that works in the shortest time, offering a good quality response. The results obtained for the models proposed through the implementation in the AMPL software are presented, using a computer with an Intel Core i5-5200U CPU @ 2.2 GHz with 4 GB of ram memory with a maximum execution time of one hour. (Fourer et al., 2003)

To test the proposed models, the instances proposed by Archetti et al. (2007), Instances highcost H3 and Instances lowcost H6. Which were generated for the integrated route and inventory management problem for a product, where the following data was considered as a basis: time horizon $H = 3$ and 6 ; number of retailers of $n = 5, 10, 15, 20, 25, 30, 35, 40, 45$ and 50 ; the amount of inventory r_{st} used by customer s in period t randomly generated as an integer in an interval between $[10,100]$; the storage cost h_i is randomly generated in an interval $[0.1,0.5]$ for the highcost instances and in an interval $[0.01, 0.05]$ for the lowcost instances; the cost of transportation $Cost_{ij}$ is calculated using the following expression $\sqrt{(X_i - X_j)^2 + (Y_i - Y_j)^2}$ where (X_i, X_j) y (Y_i, Y_j) correspond to the coordinates of the retailers, which were randomly generated in an interval of values between $[0, 500]$. Therefore, the matrix obtained is symmetric, that is, $Cost_{ij} = Cost_{ji}$

Results and discussion

The results of objective function, execution time and GAP implemented in AMPL are presented for the inventory management policies ML and OU, elimination of general sub-tours, MTZ and flows.

IRP policy maximum level (ML)

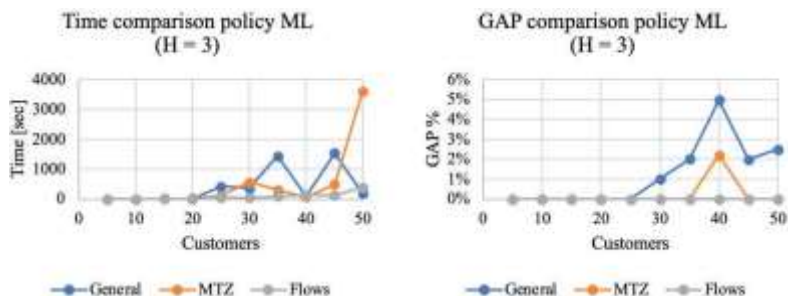
Table 1 shows the results of the execution times, objective function and GAP of the ML model considering $H=3$, where there is a directly proportional behavior in relation to customers, that is, as the number of customers increases, so do the times of execution. Similarly, the figure 1 shows the behavior obtained from the models by means of the different subtour elimination formulations, comparing the execution time and GAP.

Table 1. Results objective function, execution time and GAP of the IRP policy ML ($H=3$)

| Policy ML ($H=3$) | | | | | | | | | |
|---------------------|---------|----------|---------|---------|----------|---------|---------|----------|---------|
| General | | | MTZ | | | Flows | | | |
| n | F.O. | Time (s) | GAP (%) | F.O. | Time (s) | GAP (%) | F.O. | Time (s) | GAP (%) |
| 5 | 2108.34 | 0 | 0.00% | 2108.34 | 0 | 0.00% | 2108.34 | 0 | 0.00% |
| 10 | 4510.61 | 0 | 0.00% | 4510.61 | 1 | 0.00% | 4510.61 | 0 | 0.00% |
| 15 | 5589.7 | 12 | 0.00% | 5589.7 | 5 | 0.00% | 5589.7 | 10 | 0.00% |
| 20 | 6859.02 | 3 | 0.00% | 6859.02 | 2 | 0.00% | 6859.02 | 1 | 0.00% |
| 25 | 8227.86 | 420 | 0.00% | 8227.86 | 113 | 0.00% | 8227.86 | 43 | 0.00% |
| 30 | 12088.9 | 358 | 1.00% | 12066.9 | 556 | 0.00% | 12066.9 | 30 | 0.00% |
| 35 | 11790.5 | 1432 | 2.01% | 11659.9 | 308 | 0.00% | 11659.9 | 95 | 0.00% |
| 40 | 13991.9 | 89 | 4.98% | 13574.9 | 63 | 2.19% | 13364.9 | 142 | 0.00% |
| 45 | 14264.5 | 1532 | 1.98% | 14179.1 | 490 | 0.00% | 14179.1 | 125 | 0.00% |
| 50 | 14577.3 | 198 | 2.48% | 14577.3 | 3600 | 0.00% | 14577.3 | 394 | 0.00% |

Note. This table represent the results of the objective function, execution time and GAP of the IRP policy ML ($H=3$).

Figure 1 Time behavior and GAP for policy ML (H=3)



Note. This figure represents the behavior of the objective function, execution time and GAP of the IRP policy ML (H=3).

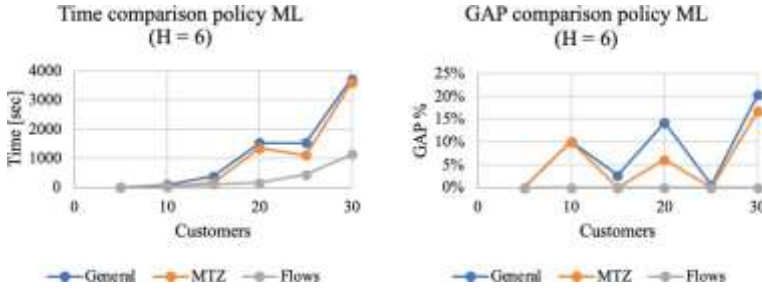
Table 2 shows the results of the execution times, objective function and GAP of the ML model considering H=6, Similarly, the figure 2 shows the behavior obtained from the models by means of the different subtour elimination formulations, comparing the execution time and GAP.

Table 2. Results objective function, execution time and GAP of the IRP policy ML (H=6)

| Policy ML (H=6) | | | | | | | | | |
|-----------------|---------|----------|---------|---------|----------|---------|---------|----------|---------|
| General | | | MTZ | | | Flows | | | |
| n | F.O. | Time (s) | GAP (%) | F.O. | Time (s) | GAP (%) | F.O. | Time (s) | GAP (%) |
| 5 | 3187.3 | 4 | 0.00% | 3187.3 | 2 | 0.00% | 3187.3 | 4 | 0.00% |
| 10 | 4189 | 95 | 10.04% | 4142.93 | 33 | 10.03% | 4141.53 | 3 | 0.00% |
| 15 | 5493.1 | 385 | 2.67% | 5389.08 | 182 | 0.00% | 5389.08 | 125 | 0.00% |
| 20 | 6264.68 | 1531 | 14.20% | 6144.48 | 1347 | 6.11% | 6114.04 | 166 | 0.00% |
| 25 | 7083.7 | 1532 | 0.48% | 7052.06 | 1107 | 0.00% | 7052.06 | 450 | 0.00% |
| 30 | 8853.36 | 3729 | 20.21% | 8816 | 3600 | 16.68% | 8050.73 | 1134 | 0.00% |

Note. This table represent the results of the objective function, execution time and GAP of the IRP policy ML (H=6).

Figure 2. Time behavior and GAP for policy ML ($H=6$)



Note. This figure represents the behavior of the objective function, execution time and GAP of the IRP policy ML ($H=6$).

IRP policy order up to level (OU)

Table 3 shows the results of the execution times, objective function and GAP of the IRP policy OU model considering $H=3$, where there is a directly proportional behavior in relation to customers, that is, as the number of customers increases, so do the times of execution. Similarly, the figure 3 shows the behavior obtained from the models by means of the different subtour elimination formulations, comparing the execution time and GAP.

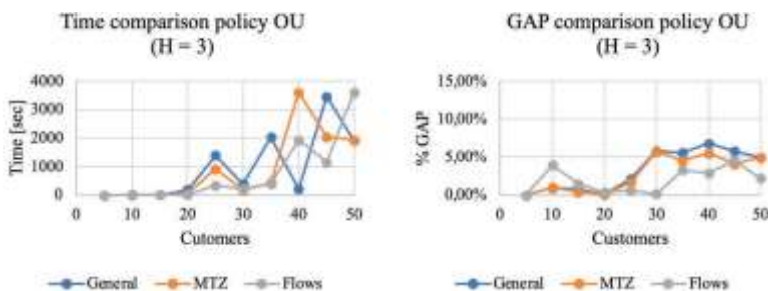
Table 3. Results objective function, execution time and GAP of the IRP policy OU ($H=3$)

| Policy OU ($H=3$) | | | | | | | | | |
|---------------------|---------|----------|---------|--------|----------|---------|--------|----------|---------|
| General | | | | MTZ | | | Flows | | |
| n | F.O. | Time (s) | GAP (%) | F.O. | Time (s) | GAP (%) | F.O. | Time (s) | GAP (%) |
| 5 | 2142.26 | 1 | 0.00% | 2142.3 | 1 | 0.00% | 2142.3 | 0 | 0.00% |
| 10 | 4767.94 | 2 | 0.97% | 4767.9 | 4 | 1.03% | 4767 | 1 | 3.92% |
| 15 | 5696.84 | 13 | 0.81% | 5696.8 | 10 | 0.43% | 5696.8 | 16 | 1.49% |
| 20 | 7244.22 | 183 | 0.09% | 7244.2 | 48 | 0.11% | 7244.2 | 15 | 0.38% |

| | | | | | | | | | |
|----|---------|------|-------|--------|------|-------|--------|------|-------|
| 25 | 8657.04 | 1393 | 2.11% | 8657.7 | 915 | 1.63% | 8653.8 | 346 | 0.62% |
| 30 | 12973.6 | 379 | 5.82% | 12949 | 163 | 5.70% | 12623 | 213 | 0.15% |
| 35 | 13885.8 | 2033 | 5.55% | 12275 | 441 | 4.51% | 12152 | 401 | 3.30% |
| 40 | 14532.9 | 3582 | 6.81% | 14448 | 3600 | 5.51% | 13986 | 1923 | 2.90% |
| 45 | 15108.2 | 3455 | 5.76% | 15044 | 2049 | 4.09% | 15049 | 1144 | 4.56% |
| 50 | 15591.3 | 1918 | 4.97% | 15651 | 1926 | 4.98% | 15403 | 3600 | 2.17% |

Note. This table represent the results of the objective function, execution time and GAP of the IRP policy OU (H=3).

Figure 3. Time behavior and GAP for policy OU (H=3)



Note. This figure represents the behavior of the objective function, execution time and GAP of the IRP policy OU (H=3).

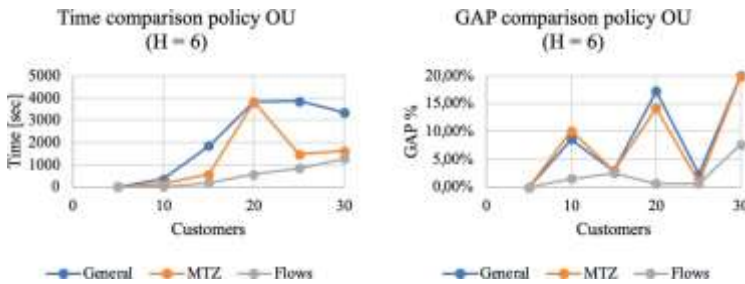
Table 4 shows the results of the execution times, objective function and GAP of the OU model considering H=6, Similarly, the figure 4 shows the behavior obtained from the models by means of the different subtour elimination formulations, comparing the execution time and GAP.

Table 4. Results objective function, execution time and GAP of the IRP policy OU (H=6)

| Policy OU (H=6) | | | | | | | | | |
|-----------------|---------|----------|---------|--------|----------|---------|---------|----------|---------|
| General | | | MTZ | | | Flows | | | |
| n | F.O. | Time (s) | GAP (%) | F.O. | Time (s) | GAP (%) | F.O. | Time (s) | GAP (%) |
| 5 | 3200.62 | 3 | 0.00% | 3200.6 | 2 | 0.00% | 3200.6 | 2 | 0.00% |
| 10 | 4374.67 | 361 | 8.56% | 937215 | 143 | 10.03% | 4331.09 | 11 | 1.48% |
| 15 | 5495.85 | 1850 | 2.93% | 5469.1 | 572 | 2.83% | 5461.04 | 183 | 2.47% |
| 20 | 6592.31 | 3809 | 17.22% | 6711.2 | 3817 | 14.18% | 6331.5 | 563 | 0.60% |
| 25 | 7102.32 | 3851 | 2.31% | 7075.7 | 1472 | 0.92% | 7075.7 | 842 | 0.63% |
| 30 | 8922.5 | 3351 | 19.98% | 915.02 | 1612 | 19.82% | 8757.7 | 1269 | 7.61% |

Note. This table represent the results of the objective function, execution time and GAP of the IRP policy OU (H=6).

Figure 4. Time behavior and GAP for policy OU (H=6)



Note. This figure represents the results of the objective function, execution time and GAP of the IRP policy OU (H=6).

Discussion

As the number of clients increases, the computational time grows, this trend is maintained regardless of the model with which the subtours are eliminated, there is also a high degree of affectation in computational times due to the network topology (configuration of customer coordinates).

Similarly, there is a relationship between the computational times and the quality of the response measured by the GAP, where an inversely proportional relationship is preserved, that is, at a lower GAP, the computational times tend to rise.

It is evident that the flow model is the one that presents the least computational time, and it is also the model that always finds the optimal response for the tested instances. The MTZ model is the second-best model in terms of response times and quality. Finally, the general model is the one with the longest execution times and the highest GAP values.

It should also be noted that, given the increase in the number of clients and the time horizon, the OU policy presents higher GAP values even though it had longer execution times necessary for its resolution compared to the ML policy.

Analyzing the two models, it is concluded that, with an increase in the number of clients and the time horizon, the general model under the two supply policies presents GAP values higher than those of the flow model and the MTZ.

On the other hand, the general model has fewer variables and restrictions. However, it takes more time to find a solution, on the other hand, the flow model has more variables and restrictions, but finds an answer in less time. This difference begins to stand out through the increase in the number of customers. This result was expected because the MTZ model presents a smaller dimension in the number of variables and restrictions, compared to the Flows model.

Conclusions

The IRP models were implemented in the algebraic programming language AMPL evaluating the instances proposed by Archetti et al. (2007), considering ML and OU inventory policies, also performing sensitivity analysis against the restriction of subtour elimination (MTZ, General, Flows). In addition, the flexibility of the model is considered, knowing that the IRP is a problem adaptable to different needs of companies such as: inventory management policies, consideration of different time horizons, geographic location of clients, consideration of individual demands, among other variants.

These mathematical models implemented in AMPL can solve the classic IRP with a vehicle and under different inventory policies, allowing to obtain the distribution plans and inventory management of the organizations.

The most efficient model for the elimination of subtours is the IRP under the restriction of elimination of subtours of flows, both for the ML and OU supply policy, this becomes evident as the number of clients or the number of periods evaluated, increases. In the same order, the second model with the best times is the IRP under the restriction of elimination of subtours MTZ and finally the IRP under the restriction of elimination of General subtours.

Regarding the inventory supply policy, the ML policy is the one with the best GAP values, compared to the OU policy, that is, it is closer to optimal when inventory management is carried out by ML policy than by policy. OU.

As proposals for future development, there are still aspects that can be improved in the proposed models, such as reducing computational times to obtain optimal responses through the implementation of new restrictions that allow solving larger instances and with longer time horizons. Also evaluate different alternatives to the exact optimization as heuristics that allow to be as close as possible to the optimum in much shorter computing times. In addition, as has already been exposed, the IRP is a flexible problem where stochastic demands, use of multiple vehicles, handling of perishable products, among other variants could be considered.

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Es importante establecer y visibilizar a los estudiantes los beneficios relacionados con la formación en investigación, dentro de los cuales encontramos el fortalecimiento de las capacidades de liderazgo así como el compromiso activo y las experiencias en independencia y colaboración. Así mismo, la formación integral hacia una mayor apreciación del valor de la literatura disciplinaria, generando de esta manera habilidades de pensamiento crítico, indagación y análisis. Además, esto permite forjar la confianza en sí mismo para presentar las propias ideas a la comunidad, permitiendo al estudiante la preparación de futuras actividades académicas, incluidos estudios de posgrado.

La investigación formativa tiene como propósito la difusión de la información existente y permitir que el estudiante la integre como conocimientos, considerándolo como un aprendizaje permanente y necesario. Uno de los principales problemas que debe enfrentar la investigación formativa es el número de docentes con las capacidades necesarias para generar en el estudiante capacidades investigativas, exigiendo al profesor universitario adoptar una actitud contraria al objeto de enseñanza, generando un carácter complejo y dinámico del conocimiento.