Journal of Advanced Zoology

ISSN: 0253-7214

Volume ***44*** *Issue* ***S-1 Year 2023*** *Page* ***506:514***

Evaluation of the Influence of Alcohol Consumption on Variation of Tooth Colour in Patients Treated at the Iees Ibarra Hospital During the Period April-June 2022

Carlos Mauricio Saeteros Cárdenas Azizova[1], Samantha Elizabeth Díaz Solano[2], Pamela Nikol Acosta Tana[3]

[1,2,3]*Universidad Regional Autónoma de Los Andes Ambato. Ecuador.*

Email: ui.carlossc49@uniandes.edu.ec[1], samanthads50@uniandes.edu.ec[2], pamelaat02@uniandes.edu.ec[3]

ORCID ID: 0000-0001-8209-9814[1], 0009-0000-8320-3847[2], 0009-0000-2706-992X[3]

**Corresponding author's E-mail: ui.carlossc49@uniandes.edu.ec*

Article History

Received: 06 June 2023
Revised: 05 Sept 2023
Accepted:11Sept 2023

Abstract

The research carried out seeks to analyze and understand the influence of alcohol consumption on the level of dental colour variation in patients treated at the IESS Ibarra Hospital during the period from April to June 2022. In order to achieve the established objectives, the methodological approach was based on a quasi-experimental design, which involved five fundamental stages. The first phase of the study involved the approach and delimitation of the research problem. The second stage focused on the construction of the theoretical bases. Subsequently, precise methodological aspects were carried out to define the target population and establish the selection criteria for the experimental group. The choice of a cross-sectional approach was justified because the measurement of the level of tooth colour variation was performed on a single occasion for both groups. For data collection, the "Chromascop" colorimeter was used as a measurement instrument, which was applied consistently both in people who consume alcohol and in abstainers. The main results obtained showed that alcohol consumption tends to influence dental coloration, which suggests a relationship between alcohol consumption habit and dental colour variation.

Keywords: *Dental colour, Alcohol consumption, Variation, Dentistry, Patients.*

1. Introduction

The ethanol present in alcoholic beverages, resulting from the fermentation of sugars, has harmful effects not only on the liver, but also on oral health, triggering erosion processes in tooth enamel and manifesting a weakening that over time can lead to a yellowish appearance on the teeth [(1-7).]

When related to a drink with high levels of sugars and carbohydrates, they are considerably harmful to the teeth, especially for the enamel that over time will have several conditions. [(2-8)]

At the time of ingesting, it is processed by the liver as a toxin. Usually, this organ repairs and regenerates itself, but if the cells are badly damaged the liver tissue can be permanently scarred, when this happens it stops working as effectively, causing the accumulation of harmful substances in the body [(3-9).] As a consequence, the liver works four times more so that this substance is processed within the body, becoming "Acetaldehyde", which generates a substance called ROS (Reactive Oxygen Species) these are harmful and the more consumption, the more acid will create in your mouth that will finally affect your teeth [(2-8)].

The excessive intake of alcoholic beverages causes a wear of the enamel of the teeth definitively; therefore, it will lose its colour and its ability to protect against bacteria [(4-10)].

The colour of teeth is genetically determined; natural and healthy teeth are subtly yellow, brown or Gray; defined primarily by dentin, which is the second layer of tissue beneath the enamel, which is translucent [5-11]. There are reasons why changes in tooth colour can occur, such as metabolic diseases, taking medications, type of diet, consumption of tobacco or alcoholic beverages, poor habits in oral hygiene and even genetic issues [6-12].

The damage to oral health caused by alcohol consumption is a consequence of its acidogenic capacity, that is, its ability to produce acids when interacting with the mouth. The acids generated have the ability to gradually dissolve tooth enamel, which is the outermost and most protective layer of teeth. This erosion of the enamel exposes the dentin, an inner, less hard layer of the tooth, leading to a yellowish or stained appearance of the tooth surface.

In addition to enamel erosion, excessive consumption of alcoholic beverages can also lead to other oral problems, such as increased risk of tooth decay and periodontal disease. The presence of high levels of sugars and carbohydrates in these drinks Favors the proliferation of bacteria that produce acids, triggering a destructive process in dental tissues.

The impact of alcohol on oral health is especially worrisome, since the loss of tooth enamel is an irreversible process and can lead to increased tooth sensitivity, difficulty in chewing and increased susceptibility to the appearance of other oral pathologies. Prevention and education about the harmful effects of alcohol on oral health should be promoted by health professionals, especially dentists, to raise awareness among the population about the importance of maintaining responsible consumption and adopting adequate oral hygiene habits to preserve the integrity of the teeth and prevent oral problems associated with alcohol consumption.

Likewise, future research in this area will deepen the understanding of the specific mechanisms of tooth enamel erosion caused by alcohol, which will open the door to the development of prevention strategies and more effective treatments to protect the oral health of people who consume alcoholic beverages moderately or excessively. The interdisciplinarity between the fields of dentistry and medicine will be essential to address this problem in a comprehensive way and improve the quality of life of patients.

2. Materials And Methods

In this research, various resources and tools were used to carry out the analysis and study of the level of variation of dental colour in patients who consume alcohol at the IESS Ibarra hospital during the period from April to June 2022. The materials used included a computer with internet access, scientific documents and Google search engines, which allowed access to a wide range of information relevant to the study. Human resources also participated, such as mentors and experts in the area, who provided support and guidance in the development of the research. In addition, research theses and documentary research sources were taken into account to support and substantiate the work carried out.

Population and Sample

The target population for the population calculation was obtained through the Internist Directorate of the IESS Ibarra hospital, where information was collected on the number of patients treated in the aforementioned period. The population consisted of a total of 40 patients, divided into two groups: 20 abstaining patients and 20 patients who consume alcohol. The selection of these groups allowed a comparative analysis between both, which provides greater reliability and validity to the study. Because the population size did not reach a sample larger than 100 patients, it was decided to consider the total population as a sample, thus guaranteeing representative and solid results.

This study is part of an analytical, cross-sectional and quasi-experimental methodology, which seeks to evaluate and compare the level of tooth colour variation between abstaining patients and those who consume alcohol. The research is based on the analysis of two main variables: patients and tooth colour. The dependent variable refers to the groups of people participating in the study, classified into two categories: the experimental group, consisting of patients who consume alcohol, and the control group, composed of abstaining patients. On the other hand, the independent variable focuses on tooth colour, being evaluated through the "Chromascop" Colorimeter and classified according to categorical

indicators and measurement levels (01-4D) for the upper central incisor, establishing as average colour level (01-2C) for a tooth considered with normal colorimetry.

Statistical Analysis

Statistical analysis was carried out using qualitative and nominal methods, in order to examine the relationships between the variables mentioned. The research focused on comparing the results obtained regarding the level of variation of tooth colour between both groups of patients, using the "Chromascop" Colorimeter as a tool for the precise measurement of tooth colour in each case. The data obtained from this analysis allowed to validate the affirmative hypothesis previously raised and offered a greater understanding of the impact of alcohol consumption on dental colorimetry.

This study represents a valuable contribution to the understanding of the relationship between alcohol consumption and tooth colour variation in patients, which highlights the importance of adequately addressing the adverse effects of alcohol on oral health and promoting appropriate oral care and prevention practices among the population. The methodology used guarantees reliable results based on scientific evidence, which contributes to strengthening knowledge in the field of dentistry and its relationship with the general health of patients.

3. Results and Discussion

Table 1. Frequency of abstaining patients

20 abstaining patients			Colour measurement
N	Valid	20	20
	Lost	0	0

The population under study in this research the second group is made up of 20 *abstaining* patients, who have been applied the measurement of dental colour detailed in the following table.

Table 2. Frequency of 20 abstaining patients

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	1	1	5,0	5,0	5,0
	2	1	5,0	5,0	10,0
	3	1	5,0	5,0	15,0
	4	1	5,0	5,0	20,0
	5	1	5,0	5,0	25,0
	6	1	5,0	5,0	30,0
	7	1	5,0	5,0	35,0
	8	1	5,0	5,0	40,0
	9	1	5,0	5,0	45,0
	10	1	5,0	5,0	50,0
	11	1	5,0	5,0	55,0
	12	1	5,0	5,0	60,0
	13	1	5,0	5,0	65,0
	14	1	5,0	5,0	70,0
	15	1	5,0	5,0	75,0
	16	1	5,0	5,0	80,0
	17	1	5,0	5,0	85,0
	18	1	5,0	5,0	90,0
	19	1	5,0	5,0	95,0

Table 2 shows the frequency of twenty abstaining patients with their respective valid and accumulated percentages, each person is equivalent to 5% percentage, consequently, each person under study increases in a percentage, cumulative and in order, according to their valid percentage adds a total of 100%.

Table 3. Colour measurement for teetotaling patients

Frequency			Percentage	Valid percentage	Cumulative percentage
Váli do	2A	9	45,0	45,0	45,0
	1A	4	20,0	20,0	65,0
	1C	4	20,0	20,0	85,0
	2B	3	15,0	15,0	100,0
	Total	20	100,0	100,0	

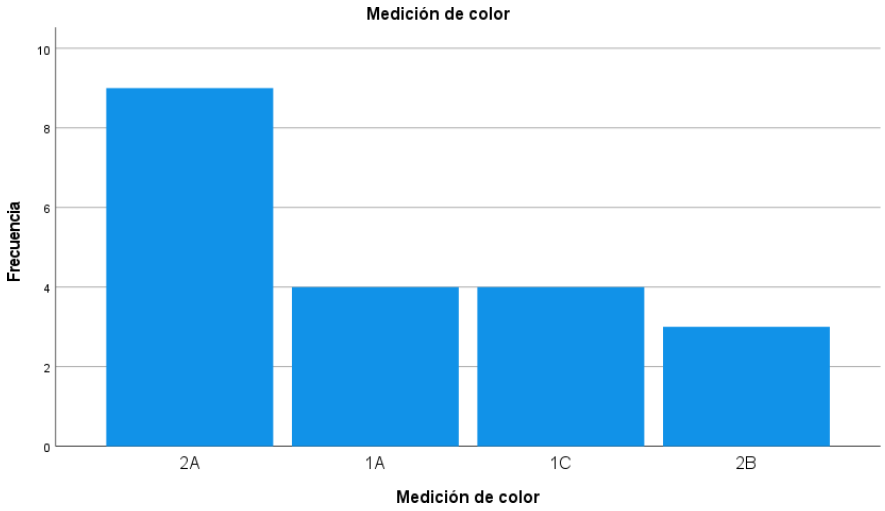

Figure 1. Colour measurement for teetotaling patients

In the variable colour measurement of the upper central incisor, the frequency distribution is completed by adding the percentages that correspond to each category with their respective valid percentages, which accumulate and increase in each category

In category 2A, a result of 45.0% is displayed, in category 1A, 65.0% is accumulated (45.0% of the previous category and 20.0% of the category in question), in category 1C, 85.0% is accumulated (65.0% of the previous category and 20.0% of the category in question), in the last category 2B, the total corresponding to 100.0% is accumulated (65.0% of the previous category and 15.0% of the category in question).

Table 4. Descriptive statistics

N		Rank	Minimal	Maximum	Stocking	Deviation standard
Colour measurement	20	3	2	5	3,30	,979
Valid N (per list)	20					

In the research that have a total frequency of 20 patients, the range established between the maximum and minimum score is 3, the mean or arithmetic average of a distribution, which is the sum of all values divided by the number of cases, in the study is equal to 3.30, the standard deviation reached an average deviation of the scores from the mean, The interpretation is that the measurement of the color of the sample deviates on average .979 from the mean.

Table 5. Frequencies of alcoholic patients

20 alcoholic patients			Color measurement
N	Valid	20	20
	Lost	0	0

In the first group, the population investigated is made up of 20 alcoholic patients, to whom the measurement of tooth color detailed in the following Table has been applied.

Table 6. Frequency of 20 alcoholic patients

Frequency	Percentage	Valid percentage	Percentage accumulated

Valid	1	1	5,0	5,0	5,0
	2	1	5,0	5,0	10,0
	3	1	5,0	5,0	15,0
	4	1	5,0	5,0	20,0
	5	1	5,0	5,0	25,0
	6	1	5,0	5,0	30,0
	7	1	5,0	5,0	35,0
	8	1	5,0	5,0	40,0
Valid	9	1	5,0	5,0	45,0
	10	1	5,0	5,0	50,0
	11	1	5,0	5,0	55,0
	12	1	5,0	5,0	60,0
	13	1	5,0	5,0	65,0
	14	1	5,0	5,0	70,0
	15	1	5,0	5,0	75,0
	16	1	5,0	5,0	80,0
	17	1	5,0	5,0	85,0
	18	1	5,0	5,0	90,0
	19	1	5,0	5,0	95,0
	20	1	5,0	5,0	100,0
	Total	20	100,0	100,0	

Table 6 shows the frequency of twenty alcoholic patients with their respective valid and accumulated jes, each person is equivalent in percentage form 5%, in encia, each person under study increases in a percentage way, cumulatively in, according to its valid percentage, in the last category a total of 100% is reached.

Table 7. Color measurement in alcoholic patients

		Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Válido	4B	6	30,0	30,0	30,0
	4A	4	20,0	20,0	50,0
	6C	3	15,0	15,0	65,0
	2E	2	10,0	10,0	75,0
	3C	2	10,0	10,0	85,0
	3E	1	5,0	5,0	90,0
	6B	1	5,0	5,0	95,0
	4C	1	5,0	5,0	100,0

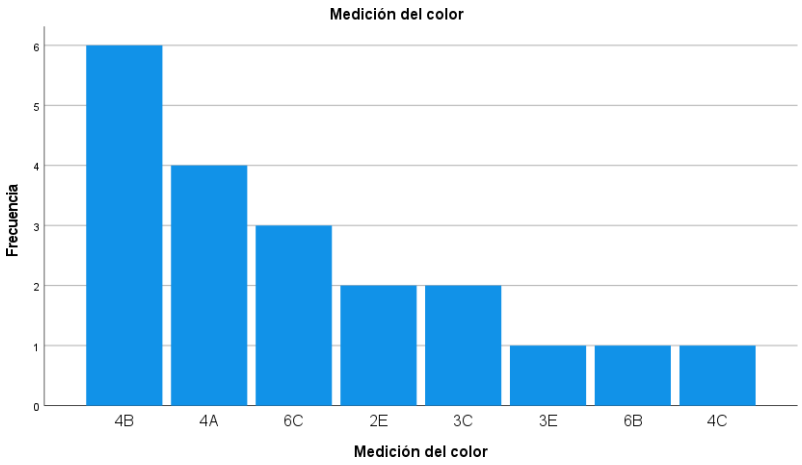

Figure 2. Colour measurement in alcoholic patients

In the variable measurement of colour of the upper central incisor in alcoholic patients, the frequency distribution is completed by adding the percentages corresponding to each category with their respective valid percentages, which accumulate and increase in each category. In category 4B, a result of 30.0% is displayed, in category 4A, 50.0% is accumulated (30.0% of the previous category and 20.0% of the category in question), in category 6C, 65.0% is accumulated (50.0% of the previous category and 15.0% of the category in question), in category 2E, 75.0% is accumulated (65.0% of the previous category and 10.0% of the category in question), in category 3C, 85.0% is accumulated (75.0% of the previous category and 10.0% of the category in question), in category 3E, 90.0% is accumulated (85.0% of the previous category and 5.0% of the category in question), in category 6B, 95.0% is accumulated (90.0% of the previous category and 5.0% of the category in question), And in the last category 4C, the total corresponding to 100.0% is accumulated (95.0% of the previous category and 5.0% of the category in question).

Table 8. Descriptive statistics

N		Rank	Minimal	Maximum	Stocking	Standard deviation
Measurement of the colour	20	8	11	19	14,70	2,296
Valid N (per list)	20					

The sample regarding alcoholic patients have a total frequency of 20 people, the range established between the maximum and minimum score is 8, the mean or arithmetic average of a distribution, which is the sum of all values divided by the number of cases, in the study is equal to 14.70, the standard deviation reached an average deviation of the scores from the mean, The interpretation is that the measurement of the colour of the sample deviates on average 2,296 from the mean.

Table 9. Unified Table

	40 patients		**Colour measurement**
N	Valid	40	40
	Lost	0	0

The population under study in this research is 40 patients, to whom the measurement of tooth color has been applied as detailed in the following Table.

Table 10. Table of frequencies of 40 patients

	Frequency		Percentage	Valid percentage	Cumulative percentage
Valid	Teetotallers	20	50,0	50,0	50,0
	Alcoholics	20	50,0	50,0	100,0
	Total	40	100,0	100,0	

The total population under study of this research work is 40 patients distributed 20 abstaining patients corresponding to 50.0%, and the category alcoholic patients accumulates a total of 100.0% (50.0% of the previous category and 50.0% of the category in question).

Table 11. Unified color measurement

	Frequency		Percentage	Valid percentage	Percentage accumulated
Valid	2A	9	22,5	22,5	22,5
	4B	6	15,0	15,0	37,5
	1A	4	10,0	10,0	47,5
	1C	4	10,0	10,0	57,5
	4A	4	10,0	10,0	67,5
	2B	3	7,5	7,5	75,0
	6C	3	7,5	7,5	82,5
	2B	2	5,0	5,0	87,5
	3C	2	5,0	5,0	92,5
	3E	1	2,5	2,5	95,0
	6B	1	2,5	2,5	97,5
	4C	1	2,5	2,5	100,0
	Total	40	100,0	100,0	

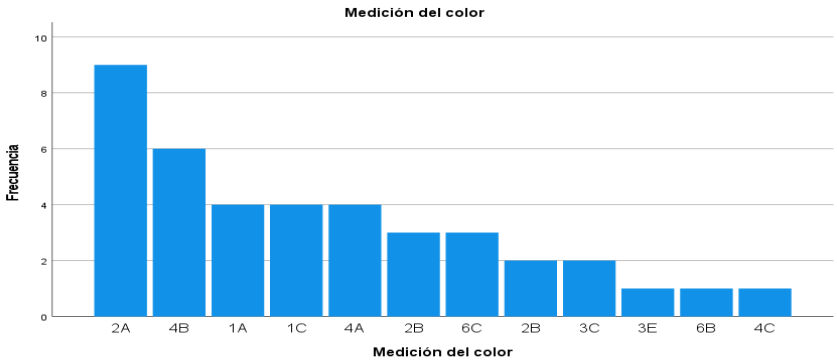

Figure 3. Unified color measurement

In the variable measurement of color of the upper central incisor in all patients, the frequency distribution is completed by adding the percentages corresponding to each category with their respective valid percentages, which accumulate and increase in each category. In category 2A, a result of 22.5% is displayed in category 4B, 37.5% is accumulated (22.5% of the previous category and 15.0% of the category in question), in category 1A, 47.5% is accumulated (37.5% of the previous category and 10.0% of the category in question), in category 1C, 57.5% is accumulated (47.5% of the previous category and 10.0% of the category in question), in category 4A, 67.5% is accumulated (57.5.0% of the previous category and 10.0% of the category in question), in category 2B, 75.0% is accumulated (67.5% of the previous category and 7.5% of the category in question), in category 6C, 82.5% is accumulated (75.0% of the previous category and 7.5% of the category in question), in category 2B, 87.5% is accumulated (82.5% of the previous category and 5.0% of the category in question), in category 3C, 92.5% is accumulated (87.5% of the previous category and 5.0% of the category in question), in category 3E, 95.0% is accumulated (92.5% of the previous category and 2.5% of the category in question), in category 6B, 97.5 per cent is accumulated (95.0 per cent of the previous category and 2.5 per cent of the category in question), and, in the last category 4C, the total corresponding to 100.0 per cent is accumulated (97.5 per cent of the previous category and 2.5 per cent of the category in question).

Table 12. Valid percentage

Valid			Cases Lost		Total	
N		Percentage	N	Percentage	N	Percentage
40 patients * Color measurement	40	100,0%	0	0,0%	40	100,0%

In the study the columns percentage and valid percentage are equal that corresponds to 100.0%, there are no lost values.

Table 14. Chi-square tests

Value		Gl	Asymptotic significance (bilateral)
Chi-square of Pearson	40,000 to	11	,000
Reason for verisimilitude	55,452	11	,000
Linear association by linear	35,744	1	,000
Number of valid cases	40		

A. 24 cells (100.0%) have expected a count less than 5. The minimum expected count is .50.

The P value is .000 affirms the affirmative hypothesis in which it is described that alcohol consumption tends to change tooth color.

Alcohol is a drink that contains high levels of carbohydrates, it is also composed of ethanol, which erodes tooth enamel, in a definitive way, losing its ability to protect against bacteria and producing a weakening and yellowing of the tooth.

According to Dr. Pascual [(1)] mentions that the enamel is the organ that protects the dentin, and when it wears away because of alcohol the teeth will present sensitivity, in addition the dentin is exposed and being this who provides the color to the teeth, its tonality will be increasingly yellowish or brown.[(1)]

In addition, Dr. Cubells [(4)] mentions that alcohol consumption in addition to causing liver problems also affects oral health, causing cavities, periodontal diseases and to a large extent wear of the enamel, which will lose its coloration and its ability to protect against bacteria. [(4)]

Similarly, Torres [(1-6)] cites that dental erosion is a loss of enamel due to the acidic agents with which it is in contact, this being the main consequence of alcohol intake, when it wears away the dentin is exposed, causing the loss of the natural color of the tooth. [(1-6)]

In accordance with the present study where a variation of tooth color is determined, through a colorimeter "Chromascop" for taking dental colorimetry in patients who consume alcohol and whose results show that the intake of this drink causes a variation in the color of the teeth making them more opalescent, harmonizes with the studies carried out by the authors Dr. Pascual [(1)], Dr. Cubells [(4)] and Torres [(1),] obtaining as a conclusion of the analysis, that the teeth do present a change in their tonality due to the excessive consumption of alcoholic beverages.

4. Conclusion

The consumption of alcohol is known for its ability to cause demineralization of dental tissues, which in turn causes an alteration in the coloration of the teeth due to the presence of its acidic components. Prolonged exposure to these acidic substances can have a negative impact on the oral health of individuals who consume alcohol on a regular basis.

In the present study, a thorough evaluation of dental colorimetry was performed in patients who consume alcohol. It was found that colour 4B was the most predominant in this population. This finding can be attributed to the change in oral pH that occurs at the time of alcohol ingestion, which triggers a demineralization process in dental tissues.

The results obtained in this research conclusively support the affirmative hypothesis proposed, demonstrating that alcohol consumption has a significant effect on the coloration of teeth. These findings underscore the importance of considering alcohol consumption as a relevant factor in the approach to oral health and highlight the need to promote awareness of the negative effects that alcohol can have on dental integrity.

In view of the results obtained, it is essential that dental health professionals are alert to the presence of patients with alcohol consumption habits, and that they provide recommendations and adequate guidance for the prevention and mitigation of adverse effects on dental colorimetry. Patient education about the risks associated with alcohol consumption and its impact on oral health is a crucial aspect of encouraging healthier lifestyle habits and preserving oral health over time. Further research is needed in this field to deepen the knowledge of the underlying mechanisms that link alcohol consumption with changes in tooth coloration, with the aim of developing more effective strategies for the prevention and treatment of possible negative consequences on oral health.

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