

Phytotherapics in tissue healing and its interface with professionals of health in Brazil**Fitoterápicos na cicatrização de tecidos e sua interface com profissionais de saúde no Brasil**

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ABSTRACT

The World Health Organization and many other national health conferences have stimulated the use of phytotherapeutics and medicinal plants in primary health care in Brazil. Phytotherapeutics and the use of medicinal plants are part of the folk medicine practice, which complements the treatment that is usually employed by lower income population. There is a growing interest in researches about improving the knowledge of plants' medicinal properties used in tissue healing. This process occurs as a biological response after injury, where uncountable signaling pathways are stimulated to restore the homeostasis of the affected structure. It is observed that Brazil has been developing important researches to improve the knowledge of plants' medicinal properties favoring a greater prescription by the health professionals and also a better use by the population. Phytotherapeutics act in tissue repair in different ways, and the present review describes the use of these in healing in experimental researches and its interface with professionals of health. In this research, we checked scientific articles (Medline, Scielo, Lilacs, Coordination of Superior Level Staff Improvement (CAPES), PubMed and Google Scholar) published between years 2000 and 2018. Companies, researchers, professionals of health and the general population have shown an interest in phytotherapeutics compounds as alternatives for the treatment of various conditions and the healing of injuries. This is due to the lower side effects, easy access and low cost of herbal medicines compared to allopathic medicines and the rich biodiversity from the Brazilian flora. However, it is necessary for the health professionals training and motivation, aiming at a correct and safe prescription and the use of herbal medicines in tissue healing, as well as the insertion of this practice into their professional qualification.

Keywords: Phytotherapeutics; health professionals; herbal medicines; tissue repair, healing

RESUMO

A Organização Mundial da Saúde e muitas outras conferências nacionais de saúde estimularam o uso de fitoterápicos e plantas medicinais na atenção primária à saúde no Brasil. Os fitoterápicos e o uso de plantas medicinais fazem parte da prática da medicina popular, complementando o tratamento normalmente empregado pela população de baixa renda. Há um interesse crescente em pesquisas sobre a melhoria do conhecimento das propriedades medicinais das plantas usadas na cicatrização de tecidos. Este processo ocorre como uma resposta biológica após a lesão, em que incontáveis vias de sinalização são estimuladas para restaurar a homeostase da estrutura afetada. Observa-se que o Brasil vem desenvolvendo pesquisas importantes para melhorar o conhecimento das propriedades medicinais das plantas, favorecendo uma maior prescrição pelos profissionais de saúde e também um melhor aproveitamento pela população. Os fitoterápicos atuam na reparação tecidual de diferentes maneiras, e a presente revisão descreve o uso destes na cicatrização em pesquisas experimentais e sua interface com profissionais de saúde. Nesta pesquisa, foram verificados artigos científicos (Medline, Scielo, Lilacs, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), PubMed e Google Scholar) publicados entre os anos de 2000 e 2018.

Empresas, pesquisadores, profissionais de saúde e população em geral mostraram um interesse em compostos fitoterápicos como alternativas para o tratamento de várias condições e a cura de lesões. Isso se deve aos menores efeitos colaterais, facilidade de acesso e baixo custo dos fitoterápicos em comparação aos medicamentos alopáticos e à rica biodiversidade da flora brasileira. No entanto, é necessário que o treinamento e motivação dos profissionais de saúde, visando à prescrição correta e segura e ao uso de fitoterápicos na cicatrização tecidual, bem como a inserção dessa prática em sua formação profissional.

Palavras-chave: Fitoterápicos; profissionais de saúde; fitoterápicos; reparação de tecidos, cura

1 INTRODUCTION

From the earliest days of mankind, the use of plants for therapeutic purposes has been popular,¹ being it a practice that goes through millennia, being historically present in the wisdom of common sense, articulating the culture of past and present generations.² Numerous studies in the fields of ethnobotany and ethnopharmacology emphasize the importance of phytotherapeutics, constituting a set of internalized knowledge in different cultures.³

The term "herbal" is defined as "a product obtained from a medicinal plant, or its derivatives, with the exception of isolated substances, for prophylactic, therapeutic or palliative purposes". Despite advances in modern medicine, much of the world's population depends on the use of compounds from herbal medicines.⁴

Currently, the use of phototherapeutics occurs all over the world and in Brazil, this practice also comes from the cultural miscegenation involving Africans, Europeans, and indigenous people, and for many Brazilian communities, it is the only available therapeutic resource.⁵ Among the main reasons that drive the great growth of the phototherapeutics world market every year it stands out the valorization of having healthier life habits and consuming natural products; the obvious side effects of synthetic drugs; the discovery of new active principles of plants and the scientific confirmation of its therapeutic activities.⁶ Due to Brazil's vast floristic biodiversity, the Brazilian population, especially those living in rural areas, commonly use their empirical knowledge about the therapeutic potential in herbal medicines.^{7,8}

The herbal medicines therapeutic use knowledge is usually a characteristic in the older population,⁹ especially in those over 60.¹⁰ However, some familiarity about herbal medicines and their use has being lost as past generations go disappearing without leaving its legacy to future ones.

Specifically, in the wound healing process, herbal medicines have been mentioned since prehistory, when they were used in the form of cataplasms, in order to stop bleedings and favor tissue repair, many of them being used orally for systemic performance.⁷ Countless species with medicinal power are employed in wound healing.¹¹ It's possible to find in Brazil a large number of people who do not have access to a conventional injury treatment leading to important functional alterations.¹²

Despite the importance of phototherapeutics, their use is generally empirical and the preparations do not often follow strict quality control standards. Therefore, some therapeutic protocols may result in adverse effects to the patient.¹³ The reckless use and different purposes from those traditionally employed such as their misidentification, the presence of adulterants and contaminants, the possible associations and synergisms, as well as the incorrect obtaining or preparation can cause serious health problems. It is important to avoid self-medication or an indiscriminate use since the use of herbal medicines or even phototherapeutics does not mean total absence of side effects and adverse or toxic reactions.¹⁴

Thus, in view of healing being a complex process and the use of compounds extracted from herbal medicines in the treatment of tissue injuries, the present study aimed to carry out a systematic review from specialized literature on the use of plants with medicinal power in healing and its interface to health professionals.

2 METHODOLOGY

For the composition of the present review a bibliographic survey was carried out in the databases *Medline*, *Scielo*, *Lilacs*, Coordination of Superior Level Staff Improvement (CAPES), PubMed and the search of data in the Academic Google using keywords in Portuguese and English, isolated or in combination: herbal medicines, phytotherapeutics, healing; tissue repair, wounds and professionals of health.

To select the material, three steps were taken: the first one was characterized by the literature search between July, 2018 to February, 2019 with the selection of 87 scientific articles; the second included the reading of titles and abstracts, aiming for a greater approximation and information, excluding those that had no relation or relevance to the theme; for the third stage, we searched texts which were available in full, totaling 79 articles. These were included in the review and constituted clinical trials, original articles, reviews and systematic reviews from the literature. As criteria for eligibility and inclusion of articles published between the years 2000 and 2018, we analyzed the origin of the journal and

indexation, studies that presented data referring to the use of herbal medicines in the healing process, as well as the performance and information of the health professionals involved. In reading and evaluation, articles that presented the eligibility criteria were selected and included in the consensus survey. As an exclusion criterion, incomplete reference and presently discredited information were used.

3 TISSUE HEALING AND PHYTOTHERAPEUTICS

Currently, the use of herbal medicines and herbs has increased by about 60% in the world population and are used in primary health care with the emphasis on healing and metabolic disorders.¹⁵ These drugs have minor side effects compared to conventional medicines and specifically in healing, act through multiple mediators to prevent inflammation and oxidative stress, in the disinfection, debridement, increase of collagen synthesis^{16,17} and treatment of burns,^{15,18-20} arousing the interest of pharmaceutical companies and researchers from different areas of study.^{16,17} Many studies have demonstrated the healing of skin injuries using phytotherapeutics²¹⁻²⁷ which play a key role in primary health care in 80% of the developing and underdeveloped countries of the world.¹⁷ These can be considered as future medicines for the prevention or cure of injuries.^{28,29}

During the repair of a wound, the injured tissue is replaced by a vascularized connective tissue, whether the injury has been traumatic or necrotic.³⁰ This process can occur spontaneously by the first intention when there is an immediate union of the injury edges, with minimal tissue loss, absence of an infection and minimal edema; second intention, when the wound is extensive and infected, great tissue destruction and the edges do not remain united; and by third intention, with the approximation of the margins of the wound (skin and subcutaneous) after the initial open treatment. The latter occurs mainly when there is a wound infection, which must be treated first, and then later sutured.³¹

The mechanism of tissue healing is quite complex involving a perfect and coordinated cascade of cells and molecular events that promote the reconstitution of injured tissues.^{21,32,33} The tissue submitted to trauma or surgical procedures responds by triggering the repair mechanism characterized by three phases that overlap and present specific characteristics: inflammatory, proliferative and remodeling phases.^{17,34} During the inflammatory phase it occurs the hemostasis, leukocyte migration and the beginning of the tissue repair cascade. The proliferative phase is characterized by fibroplasia, angiogenesis, and reepithelialization. In the remodeling phase, newly formed vessels are present, collagen deposition in the injury site, and

tissue contraction favoring a decrease in the size of the connective tissues involved in the injury.^{35,36} In addition, collagen turnover occurs, where collagen type III that makes up the extracellular matrix is replaced by type I collagen, synthesized by fibroblasts.³⁴

Thus, for the use of phytotherapeutics in healing, in-depth studies on the performance of these compounds are necessary for the phases of this process.³⁷ Research on phytotherapeutics are extremely complex because, given the wide variety of plants with therapeutic properties, little is known about the active principles, constituent's isolation, mechanism of action and side effects,¹ mainly in the processes of tissue healing.³⁸

Between the years of 1992 and 2012, 52 plant species were studied experimentally or clinically, of which 46 presented a high healing potential, totaling 88.5%.³⁹ Barata-Silva et al.,⁴⁰ with the objective of recovering information from the use of plants with medicinal potential, based on ethnobotanical surveys, verified in traditional populations in Rio Grande do Sul - Brazil, that 36 arboreal species are used therapeutically, with a predominance of leaves (83%), in relation to the other parts of the plant. In a field research on therapeutic potential of *Myracrodruon urundeuva*, known as aroeira do sertão, with 392 farmers in the rural area of Jardim city (Ceará - Brazil), it was observed that 32% (125) were aware of its medicinal properties and 68% (267) reported improvement in wound healing, skin infection and other diseases after the use of the species.⁴¹

A highly studied species is *Stryphnodendron adstringens* (barbatimão) whose compounds stimulate the proliferation of keratinocytes in the injured area, facilitating the re-epithelization of the wound.¹¹ Hernandez et al.⁴² used an ointment based on the semi-purified fraction of *S. adstringens* (Barbatimão) tree bark extract concentration of 1% in excisional skin wounds of rats and report that the ointment exerted a trophic effect on the proliferation of keratinocytes along the margin of reepithelialization. Lima et al.⁴³ attribute the medicinal effects of *S. adstringens* (barbatimão) on healing to the high content of tannins in their chemical composition, being able to reach levels of 20% to 50%. The biological role of these compounds has been the subject of several studies, mainly in the ecological interactions between plants and herbivores. Research on the biological activity of tannins has shown important anti-inflammatory and healing actions.⁴⁴ In the healing process, tannins have the ability to form hydrogen bonds or durable hydrophobic bonds with proteins, polysaccharides or both, resulting in the formation of the tannin-protein or tannin- polysaccharide. Because they are insoluble in water, tannins form a protective layer on the injury and, below this layer, the healing process occurs naturally favoring hemostasis after injury.⁴³

In the healing process of experimental skin injury in *Wistar* rats treated with *Aloe vera* and *Caesalpinia ferrea* were observed a fibrin-leukocyte crust detached from the epithelium, neovascularization and discrete inflammatory infiltrate, being both phytotherapeutics and healing.⁴⁵ *Casearia sylvestris*, a native tree from Mexico, Central, and South America, and popularly known as Guaçatonga, with great ecological, pharmacological and commercial importance, also has important healing properties.⁴⁶ Campos et al.⁴⁷ treated second-degree burns on the back of rats with hydroalcoholic extracts of leaves of *C. sylvestris* which accelerated the repair of burns inhibiting the synthesis of inflammatory mediators. This result suggests the therapeutic potential of this species in the treatment of inflammatory conditions as it occurs in this type of injury. Another study with 2nd degree burns in diabetic and non-diabetic *Wistar* rats treated with *C. sylvestris* showed important results in diabetics with greater quantification of inflammatory infiltrate and fibroblasts.³⁷

Nitz et al.⁴⁸ compared the effects of the aqueous extract of *Coronopus didymus* and *Calendula officinalis* on excisional injuries in *Wistar* rats. They observed that *C. didymus* promoted an increase of fibroplasia and collagen fibers in relation to *C. officinalis*, and concluded that the topical use of the aqueous extract of *C. didymus* is efficient in the healing process of skin wounds. The same was stated when using ointment based on *Bellis perennis*, *C. officinalis* and *Myristica sebifera* as an aid in the healing of skin injuries induced in rats.⁴⁹ *Pfaffia glomerata*, a species belonging to the *Amaranthaceae* family, known as fafia, corango-sempré-viva and Brazilian *ginseng*, provided greater contraction of surgical incisions in *Wistar* rats.⁷

A study using a hydroalcoholic extract of *Porophyllum ruderale* in association with 670 nm InGaP laser irradiation in 2nd degree burns in *Wistar* rats showed an increase in fibroplasia and collagen fibers in all experimental periods.²⁷ Polleti et al.,⁵⁰ using Haihuá CD9 magnetic stimulator in association with *Aloe vera* on rats skin burns, observed a deposition and organization of collagen fibers in the repair area and granulation tissue, a gradual increase in the quantification of glycosaminoglycans (GAGs) and MMP-2 activity, favoring the repair of this type of injury.

Phytotherapeutics also act in the healing of the transected calcaneus tendon: topical application of *Calendula officinalis* increased the concentration of collagen and non-collagen proteins, as well as the organization of collagen in the initial phase of the process;⁵¹ *Aloe vera* modified the arrangement of GAGs and increased the content of GAGs and non-collagenous proteins.⁵² The *Arrabidaea chica* extract also showed beneficial effects during Achilles tendon

repair, as it acted to recover the gait of the animals, it increased the total collagen content and contributed to a greater organization of the collagen fibers at the beginning of the healing process.^{53,54}

There is a large contingent of publications with phytotherapeutics worldwide, and Brazil has been developing important researches to advance the population's knowledge of plants' medicinal properties.^{39,55} Despite the scientific evidence of the use of herbal medicines in tissue repair there is a need to advance so that the scientific community can arouse the interest and deepening of studies on the clinical applicability of our flora.⁵⁶

In Brazil, there are also programs and policies that stimulate the insertion of this type of therapy in SUS, which demonstrates the search for a humanized and integral care.³⁹ But despite the growing search for integrative drug therapies, it is necessary to develop more studies in this area so that herbal practices become safer and more effective.^{55,57}

4 MEDICINAL PLANTS AND PROFESSIONALS OF HEALTH

The implantation of phytotherapeutics in the local health network, or in primary health care, has deserved intense discussion, but there are contradictions regarding the precepts of the implanted medicine since many of the curative conceptions are not based on scientific norms. The growth of researches on herbal medicines or phytotherapeutics is an alternative to the modern medicine care, but it is practically non-existent in both public and private health services.⁵⁸ If scientific knowledge is preferentially employed to the detriment of popular information, those considered not "scientific" are excluded. Alternative health care is devalued and there is a dependency between doctors and the pharmaceutical industry, characterizing what we call the medicalization of society.⁵⁹

According to the Report of the International Seminar on Integrative and Complementary Practices in Health, it is clear that besides the doctor, other health professionals may prescribe Phytotherapeutics,⁶⁰ however many professionals of health do not delegate an actual value to herbal treatment because in their academic graduation they did not receive the knowledge about this therapy and assume the position that natural medicines do not present any pharmacological effect. A study at a Brazilian university shows that alternative therapies are poorly addressed during undergraduate and most students state that they have not received any information about them.⁶¹ A study by Oliveira *et al.*⁶² with health professionals from five primary health care centers, showed that 78% of these professionals did not receive information about the use of medicinal plants during undergraduate courses, and the majority

(83.5%) did not have the opportunity to discuss it with teachers or tutors. Among the presumed reasons for the absence of this type of approach in vocational training were reported: lack of scientific evidence, discrimination, protectionism by the pharmaceutical industry, lack of time, and lack of knowledge about this type of therapy.⁶¹ Research on prescription and specialization in herbal medicine in the western region of Paraná-Brazil with ten health professionals has showed that only one physician and one nurse from the Basic Health Units (UBS) have the training to prescribe herbal medicines.¹² Fontenele et al.⁶³ reported that 92.6% from the health professionals interviewed in Teresina (Piauí, Brazil) stated that information about phytotherapeutics is based on popular culture, whether isolated or with an intersection of scientific knowledge, acknowledging that their specific information on the subject is limited. Health professionals working at UBS's in Anápolis (Goiás, Brazil), when questioned about the use of herbal medicines, showed a different posture, according to their academic background: all physiotherapists, pharmacists, and dentists positioned themselves favorably (100%) among the percentage only 17% were physicians, 65% nurses and 86% licensed practical nurses.⁶⁴ Professionals of higher education (n = 96), linked to the Family Health Strategy of Petrolina City (Pernambuco, Brazil), recognize the importance of the use and indications of Herbal Medicines and Phytotherapeutics; 99% of the interviewed stated that they need information about alternative therapies, among them phytotherapeutics, and 62.5% reported not being able to guide their patients about the use of herbal medicines.⁶⁵

Resolution CFN 402/2007 authorized Bachelor's in Nutrition the prescription for herbal medicines. Therefore, nutritionists may prescribe the use of fresh plants *in natura*, or as herbal drugs in their different pharmaceutical forms. In the prescription, the botanical nomenclature is mandatory, being optional the popular name, the part of the plant to be used, the pharmaceutical form and the way of preparation, the time of use of the phytotherapeutics, the dosage, the frequency of use and the schedules.⁶⁶ According to the 5th Article of the aforementioned resolution, the dietitian when prescribing herbal medicines should recommend those of which the origin is known and, when industrialized, with labeling adequate to the standards of the National Agency of Sanitary Surveillance - ANVISA.⁶⁶

Health professionals in Viçosa (Ceará, Brazil) reported prescribing herbal medicines and so do they know all the medicines produced in the municipality by the Live Pharmacies Program, Phytotherapeutics Laboratory created in 2002.⁶⁷ In the mentioned municipality are manipulated several herbal medicines from the region's medicinal flora to make viable conversion from traditional to conventional use of plants classified as medicinal.⁶⁷ In this

study, it was agreed among the participants the interest in improving their qualification in herbal medicines through permanent education and interest in participating in the activities of the phytotherapeutics program, mainly educational lectures and community work.⁶⁷

Currently, it is possible to observe a growing acceptance of phytotherapeutics by health professionals, including physicians. This fact may be associated, among other aspects, with the scientific evidence of the therapeutic properties of various medicinal plants for many pathologies' treatment, motivating the inclusion of phytotherapeutics in the scope of SUS - Sistema Único de Saúde in Brazil.⁶⁸ Advances in scientific research have allowed the development of recognized safe and effective herbal medicines. The high cost of industrialized medicines, the lack of access to medical and pharmaceutical services, the economic crisis, and the tendency of the population to use less aggressive therapies for primary health care have provided this advances.⁶⁰

However, Dutra⁶⁴ reports that the favorable position for the use of medicinal plants and herbal products differ among categories of different health professionals: 100% of physiotherapists, pharmacists and dentists; 86% of licensed practical nursing; 65% of nurses; and only 17% of physicians. Probably the lack of professional preparation hinders the adoption of medicinal plants as a therapeutic resource in the public health network. This fact should stimulate research on this subject, since the use of less expensive therapies for chronic-degenerative diseases enhances human and financial investments destined to the health sector.⁶⁷

Research developed among Health Unit Coordinators in one of the eight District Health Offices of the Municipal Health Department of Porto Alegre (Rio Grande do Sul, Brazil), showed that only one of them participated in training activities of phototherapeutics. The others showed interest in the incorporation of complementary or integrative therapies to the Primary Health Care network, among them the insertion of phytotherapeutics in the relation of essential medicines of the municipality. It was also verified that most of the interviewed have already used phytotherapeutics, which demonstrates the personal acceptance of these therapeutic resources.⁶⁹

Michiles⁷⁰ identifies the need for a greater commitment of health managers to comply with official guidelines on the topic of phytotherapeutics. Unfortunately, it is reported that most disregard that actions to support phytotherapeutics programs can contribute to the country's technological development and economic independence in the area of medicines. Thus, establishing mechanisms for the qualification of professionals of the local health system

is a responsibility of the municipal manager. According to the National Policy on Integrative and Complementary Practices (PNPIC) for SUS, in the section of "Medicinal Plants and Phytotherapeutics", it is necessary to define locally the formation and permanent education in medicinal plants and phytotherapeutics for professionals who work in health services.⁷¹

In view of the above, it is essential to include health professionals in phytotherapeutics medicine, for this it is necessary to know the pharmacological activities and toxicity of the medicinal plants of each Brazilian Biome, in relation to the customs, traditions and socio-educational conditions of the population.⁶⁰ Therefore, these professionals who are able to prescribe phytotherapeutics must consider several factors that may interfere in the performance of the active complex obtained through the plants, since each individual has a genetic aspect that can express different activities of the bioactive substances. These substances can be compromised due to climatic conditions such as rainfall index, luminosity, soil conditions and other factors. Thus, it is indispensable to know well the taxonomy of the botanical raw material that will be used, since herbal medicines may present a high risk of intoxication and side effects.⁷²

For a greater diffusion of the use of herbal medicine, the medical professional plays a decisive role. The actions and concepts practiced by this professional are regularly interpreted by the people as legitimate and acquire the character of "truth". Thus, considering the cultural values, the physician's position regarding the use of phytotherapeutics is an aspect of fundamental importance for the understanding of the use of phytotherapeutics in basic health care.⁷³

A study in the municipality of Canoas (Rio Grande do Sul, Brazil) questioned physicians about the use of herbal medicine and showed that 77.8% use in their personal lives and 70.4% with their patients. On the therapeutic actions, greater frequency was found for calming effect in the treatment of anxiety symptoms. In the interviews, the term "prescription" was not used. Professionals preferred terms such as recommending, advising, guiding, and using. Thus, they only "recommend" the phytotherapeutics of which they have knowledge of. The participants expressed the lack of clinical studies proving efficacy, indications, validity of use, dosage and contraindications of herbal medicines, repeatedly using the term "evidence-based medicine" and in the case of phytotherapeutics, the participants consider the failure to spread studies with phytotherapeutics among the medical profession. They refer to the possibility that studies that prove the scientific efficacy of phytotherapeutics could be carried out, but they do not have access or encouragement to seek them. In this way, the professionals'

unfavorable attitude regarding the use of herbal medicines is reinforced by the broader representations of the medical class.⁷³

In this sense, it is worth pointing out that in Brazil, the country with the greatest biodiversity in the world, continental territorial extension, great cultural richness and knowledge about medicinal plants originated from the three ethnic groups that form the Brazilian population (indigenous, African and European), the primary health care and the SUS have so few recorded experiences of actions with medicinal plants.⁷⁴ This fact reveals the absence of integration of different areas of knowledge (chemistry, biochemistry, pharmacology, botany, pharmaceutical technology, among others), necessary to obtain a result research and development of new phytotherapeutics.⁷⁵

Regarding the availability of phytotherapeutics and herbal medicines in the UBS's of the state of São Paulo - Brazil, only 11% had the availability of phytotherapeutics and or herbal medicines, corresponding to 16.1% of São Paulo cities.⁷⁶ Oliveira et al.⁷⁷ reported in 2003 that only 12 cities of São Paulo used phytotherapeutics with the encouragement of the Local Government in the Public Network. In the municipality of Caruaru (Pernambuco, Brazil) the medicinal plants most prescribed by the few health professionals are mint - *Mentha spicata* (51.3%) and chamomile - *Matricaria chamomilla* (46.1%) with the respective expectorant indications (54,3%) and anxiolytic (42.8%).⁷⁸ These data correlates with the study carried out by doctors in the municipality of Canoas (Rio Grande do Sul, Brazil), who reported on the use of chamomile (33.3%) and *Gingko biloba* (18.5%).⁷³

Costa et al.⁷⁹ reported that the use of phytotherapeutics is one of the main therapeutic options used by the population of the city of Campinas (São Paulo - Brazil), which can be explained by the implementation of the Municipal Phytotherapy Policy, which encourages the use and offers access to phytotherapeutics in municipal pharmacies. An important factor that certainly contributes to the use of herbal medicines and phytotherapeutics in the municipalities are the municipal laws that guarantee in some way so the programs can remain independent of changes in political management and investments in the training of health professionals.⁷⁶

5 FINAL CONCLUSIONS

Since the mechanism of tissue healing is a systemic event, it encompasses a range of factors that need to interact with each other in order to have an efficient improvement in this event. For greater use and validation of the healing potential of phytotherapeutics, there is a need for carefully conducted researches on the characterization of the product used, as well as

its mechanism of action. In this way, the objective is to arouse greater interest in the pharmaceutical industries regarding the development of herbal products with proven quality and encourage further studies in the area.

Regarding the use of herbal medicines by the general population, there is a need for public policies with specific legislation, favoring the increase of research, changes in paradigms in professional training and greater knowledge on the part of these professionals in the prescription of these compounds for safety in their use.

Once the incidence and prevalence of wounds are increasing in the general population, with significant social consequences among patients, such as the development of chronic sequelae, herbal therapy should be encouraged in relation to allopathic drugs and also because of their reduced side effects. Thus, it is necessary to invest in researches and health professional's specific area training.

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