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Review Article

Taraxacum officinale AND *Cinnamomum* spp. - MEDICAL THERAPY REVOLUTIONIZING HEALTH

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Abstract

Since ancient times, the human being has sought in nature, components that can get help in the treatment or even in the cure of diseases. With the development of societies, plants have become an important therapeutic resource, since they have bioactive compounds that enable the synthesis of countless other synthetic substances for the treatment of various diseases that affect humans. Previous studies show the relationship that society has with certain species of medicinal plants and confirm some therapeutic effects. This review seeks to highlight the importance of medicinal plants as a form of complementary and alternative therapy in the treatment of diseases, emphasizing two examples: *Taraxacum officinale* and *Cinnamomum* spp. After a debate about previous studies, we highlight the value of the therapeutic potential of medicinal plants.

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1. Introduction

Knowledge passed down through generations is used today. The Brazilian flora is extensively rich in diversity and contains several plants of medicinal interest, which are used empirically and without much scientific knowledge (Brasil, Ministério da Saúde, 2006).

Today, there is an increase in interest in the study of medicinal plants, due to their importance and relevance in the treatment of various diseases and their empirical use by communities. Using the knowledge of the population about traditional medicine, we can direct the studies. The experiences shared by the individuals who use the medicinal plants allows researchers seek, in a targeted way, to their phyto chemical constituents and pharmacological

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properties (Souza *et al*., 2013; Campos *et al*., 2016; Mattos *et al*., 2018).

The World Health Organization (WHO) estimates that about 80 % of the population in developing countries, use traditional practices for primary treatment, and about 85 % of the population use medicinal plants or preparations from these (Souza *et al*., 2013).

WHO together with the United Nations Children's Fund (Unicef), in Alma-Ata, Geneva 1978, during the International Conference on Primary Health Care, recognized the need for guidance to the population regarding traditional medicine. In 1987, during the World Health Assembly, the need for knowledge and instruction to minimize risks during the administration of plant extracts was reinforced (Júnior, 2016).

At WHO guidance, member states should create policies aimed at guiding and using traditional medicine. In 2006, the Ministry of Health in Brazil launched the National Policy on Integrative and Complementary Practices, offering Primary Care to herbal medicine. Then the National List of Medicinal Plants of Interest to SUS was launched (RENISUS) (Mattos *et al*., 2018).

The need for pharmacological guidance is evident, as the population believes that the use of medicinal plants does not cause adverse or toxic effects, that because it is a natural product, the treatment is effective, safe and cheap (Smet Pagmde, 2004). We must observe all stages of plant management for therapeutic use, from cultivation to administration (Bochner *et al*., 2012). In plants, it is possible to find a great chemical biodiversity, bioactive compounds and molecules with therapeutic action, and it is from this diversity that the pharmaceutical industry seeks to isolate the chemically active part, with pharmacological action, to carry out treatments for existing diseases (George, 2011; Sharma *et al*., 2019). Industrially produced drugs have a controlled and known amount of active ingredients, which allows scientists to know all the expected effects of using the drug, while a medicinal plant can contain 400 or more biological active ingredients. This diversity of compounds, makes it difficult to know the biological effects of the plant, or its extract, because in the same plant that has a carcinogenic action compound, for example, it also presents several others, of anticancer action, which neutralizes the toxic effect, therefore, indiscriminate or excessive use without further guidance can cause health risk [10]. The adverse reactions caused using herbal medicines can be discreet, develop slowly, have a long latency period, or occur in an unusual way (Smet Pagmde, 2004).

In Brazil, there is The National Toxic-Pharmacological Information System (Sinitox), which receives notifications of the occurrence of intoxication by various agents, including plants, which occurred in the country. This data is collected and made available annually. With the dissemination of information cataloged by Sinitox, the population can seek guidance to minimize the risks of intoxication, inappropriate use and adverse reactions (Baltar *et al*., 2017). The following figure illustrates the number of notifications of the occurrence of intoxication and adverse effects received by Sinitox per year.

As previously mentioned, for several generations, natural resources have been used for survival, in matters of health and nutrition (Bieski *et al*., 2012). Indigenous groups and ancient civilizations developed techniques and accumulated knowledge about traditional medicine, using plant resources within their reach (Pranskuniene *et al*., 2019). This knowledge is conserved until today in some communities around the world, and it is highly valued for ethnobotanical and ethnomedicinal studies (Farooq *et al*., 2019).

Ethnobotany oversees understanding the interrelationship between individuals and the plants of a given region. Knowledge about species, socio-economic aspects, therapeutic properties, among other characteristics are

evaluated (Gonçalves and Pasa, 2015). Thus, making it possible to investigate new bioactive molecules from plants that have a therapeutic effect (medicinal plants), suggested by local traditional medicine (Melo *et al*., 2011).

The diversity of plants means that the availability of bioactive molecules to be studied is vast. Many therapeutic substances used today were originated from some plant resource.

Antineoplastic agents are the biggest concern of patients for their ability to damage healthy cells. Thus, some individuals resort to Alternative and Complementary Therapies, such as the use of plants concomitantly with Radiotherapy, chemotherapy and surgery, to relieve side effects (Melo *et al*., 2011; Gonçalves and Pasa, 2015).

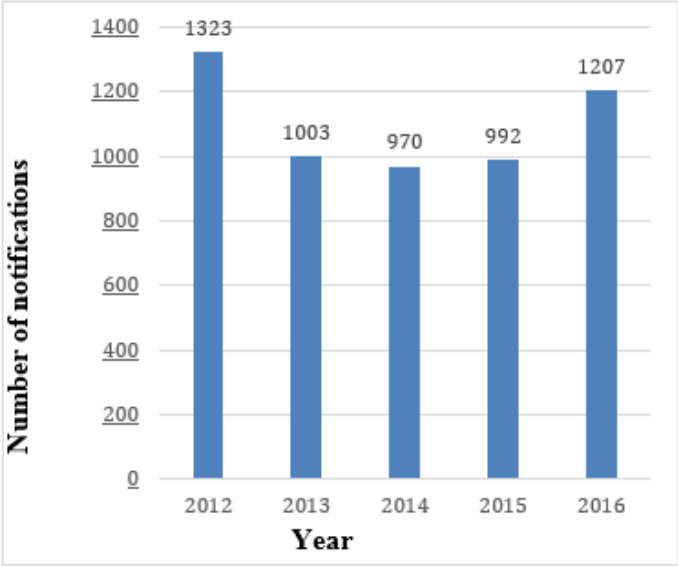

Figure – 1: Number of notifications received by Sinitox per year (Source: Adapted from Saude, 2016)

Despite the fact that the pharmaceutical industry is well developed around the world, and provides resources for modern medicine, WHO recommends the dissemination and development of policies for the use of alternative and complementary medicine, provided that it has reliable information (Bieski *et al*., 2012). WHO assumes, Alternative Medicine can help complement conventional treatments in health systems (Pranskuniene *et al*., 2019). So, based on ethnobotany, biodiversity, advancing technology and sustainability, this study aimed to discuss the evaluation of the pharmacological actions of two different plant species, however, commonly found in the daily life of the population. They are *Taraxacum officinale*, commonly known as Dandelion, and *Cinnamomum* spp., also known as cinnamon.

From the Asteracea family, the species *Taraxacum officinale*, is a plant of European origin, however, it has a good global distribution, growing better in humid areas, almost all year round, being better expressed in temperate regions and sub-tropical (Faria *et al*., 2019). Among the substances extracted from this species, the terpenic derivatives taraxerol, taraxasterol and the glycoside taraxacoside stand out, in addition to sterols (β-sitosterol, stigmasterol), caffeic acid, ρ-hydroxy-phenyl-acetic, asparagine, tannins, carotenoids, phytosterol, flavonoids, amino acids, saponins, inulins, among other components (Costa, 1979; Kissmann and Groth, 1992; Panizza, 1996; Teske and Trentini, 1997). This species has properties that give it several pharmacological actions, such as: diuretic, laxative, gastric juice stimulant, in addition to choleretic, cholagogue, depurative, anti-rheumatic activity, and can be applied against constipation, facial skin disease,

acidosis, headache, jaundice, uric acid disorders, anti-inflammatory action, and assists in increasing immunity. Recent studies also confirm and suggest to this species antibacterial and anticancer or non-metastatic tumor-reducing actions, also helping in better survival during chemotherapy or radio therapy, with reduced side effects (Teske and Trentini, 1997).

Regarding adverse effects, they have not yet been mentioned when consumed in common portions or as food. However, it is worth noting that mild hypotension was observed, due to the diuretic effect, and also contact dermatitis in individuals hypersensitive to latex sesquiterpene lactones (Alonso, 2000).

Cinnamon, on the other hand, is a plant commonly used as a spice, and it is present within the Lauraceae family (Koketsu *et al*., 1997). In search of the identification of the compounds present in *Cinnamomum* spp., it was found that the concentrations and substances present in the bark and leaves are different. In the leaves, the substance with the highest concentration was Eugenol, while in the branches the compound found in abundance was Linalol. It is worth mentioning the presence of Cuminaldehyde, as an important component of these species. This study was the pioneer in describing the components of cinnamon, subsequently allowing the isolation of some compound (Lima *et al*., 2005; Souza *et al*., 2019). Based on literary references, this study aims to elucidate the importance of using medicinal plants in alternative therapy, and at the same time make the population aware that teas, ointments, ointments, essential oils, or treatment with a product derived from natural origin, may represent a viable treatment option. Medicinal plants should also be administered with caution to minimize the risks of intoxication, side effects and adverse effects.

2. Methodology

This article was developed from a literature review on PubMed, SCIELO, Google Scholar platforms. The keywords used were "*Taraxacum officinale*", "*Cinnamomum* spp.", "Ethnomedicine", "ethnobotany", "traditional medicine", "toxicology", "biotechnology", "medicinal plants" "pharmacological actions", and "human life". After reading the titles of the articles, it was observed that some of them did not meet the study criteria, which were then excluded from this review. The most relevant articles were selected to read their abstracts, to compose this study. After reading the abstracts, articles were selected that potentially met the criteria originally proposed and read in full.

3. Results

This literature review clearly explains the importance of studies with herbal medicines, highlighting the species *Taraxacum officinale* and *Cinnamomum* spp., underlining the advance in antimicrobial, antineoplastic and carcinogenic prevention, antiviral, immunostimulatory or immunomodulatory and insecticidal action. In this context, the articles were carefully read, selected and grouped into two topics, subdivided into:

A) *Taraxacum officinale*

- Ethnobotany
- Antibacterial activity
- Antineoplastic and tumor-reducing activity
- Immunostimulating or immunomodulating activity
- Toxicity

B) *Cinnamomum* spp.

- Ethnobotany
- Antiviral Activity
- Antineoplastic activity
- Insecticidal activity
- Toxicity

4. Discussion

A) *Taraxacum officinale*

According to the traditions of the communities of Manoor Valley and Dhirkot, both in Pakistan, the leaves of *Taraxacum officinale (T. officinale*) can be used to treat diabetes. But in Dhirkot, the other parts are used for other purposes such as: stimulating the gallbladder,

indigestion, liver disease and jaundice (Rahman, 2019).

In Karst (Slovenia), syrup preparations have been reported to improve the immune system and treat sore throats, using *T. officinale* flowers. While in Gorjanci (Slovenia), the roots are macerated in Schnapps to treat stomach problems (Lumpert and Kreft, 2017). In addition, flowers, when mixed with lemons, are used for bronchitis in the ethnomedicine of people in the Albanian Alps (Kosovo) (Mustafa, 2012). Then, based on ethnomedicinal and ethnobotanical studies, the interest in discussing in this study the pharmacokinetic and pharmacodynamic actions, as well as their possible mechanisms of pharmacological action, was aroused.

A study by Faria (2019), in the laboratory of chemical and biological analysis, of the State University of the West Zone, to evaluate the possible antimicrobial action of the dandelion plant, was based on the aqueous extracts of the leaf, flower and root of the species *Taraxacum officinale (T. officinale)*, where both extracts were tested against bacterial strains of wild and resistant *Escherichia coli*, using the Agar diffusion method (antibiogram). According to literary studies, several secondary metabolites that make up this species, such as saponins, inulins, terpenoid derivatives, glycosides, sterols, flavonoids and other substances, may be responsible, both for the antibacterial effect, as well as to help reduce and fight inflammation. and non-metastatic tumors.

Regarding the strains of *Escherichia coli* treated with the aqueous extracts of *Taraxacum officinale*, according to Faria (2019), a very significant growth of bacterial inhibition halo was observed, both in the treatment with the flower extract and in the treatment with the extracts of the leaf and root. This result may be related to the consideration of Silva *et al*. (2004), where it was described that this bacterium is proficient in all DNA repair genes, establishing a possible antibacterial effect of the extracts (considering the literary statement, that mentions that the diameter of the halo formed by bacterial growth is inversely proportional to the Minimal Inhibitory Concentration - MIC) because they have the components mentioned above, acting on oxidative damage during the exponential growth phase.

This same line of inhibition was observed in another study by Faria (2019), where the antibiotics were also tested, using the antibiotics Cephalexin, Chloramphenicol, Ampicillin and Amoxicillin, alone and associated with the three types of aqueous extracts of the dandelions. The association of antibiotics with aqueous extracts of this species, obtained a larger diameter than when the isolated antibiotic was administered. With this, it can be suggested that the aqueous extracts of the species *Taraxacum officinale*, act as potentiators of antibiotics, and may also decrease the bacterial resistance of the strains of sensitive and wild *Escherichia coli*, to the tested antibiotics, giving greater emphasis to the antibiotic Amoxicillin, because the same, is the most common in therapies, and it is the one with the highest bacterial resistance index to *Escherichia coli*.

Regarding the results obtained, linked to the increase in the halo, there is a synergistic effect, in other words, there may be drug interaction between the plant complex, of the natural extract, and the main functional group of the tested antibiotic. Some of the best classics in the literature mention that derivatives of secondary metabolism of dandelion interfere with the mechanism of action of antibiotics, thus increasing their pharmacological activity (Alexandre *et al*., 2008).

In a literature review by Alexandre *et al*. (2008), they mention that phytotherapy interferes with the pharmacokinetics or pharmacodynamics of various drugs, through interactions or interferences between the chemical components of two or more molecules. These interactions may be related to the fact that antibiotics have many hydroxyl functional groups (-OH), a polar radical, allowing hydrocarbons, even if not polar, to interact well with phytocomplexes, which in many molecular arrangements also have numerous polar radicals. Thus, these hydrocarbons form

heterogeneous systems with water. In addition, in all cases, the polarity of the molecule depends on several chemical factors, as well as the arrangement of atoms and the presence of non-binding electrons. Many of these compounds that have a functional group (-OH) attached to saturated carbon atoms, are soluble in polar solvents, because of the association of hydrogen bonds. Thus, while many secondary plant metabolites are formed by phenolic compounds, drug interaction may be present, since phenols also have the (-OH) group attached to a carbon atom in an aromatic ring, thus forming a bond of hydrogen with water and increasing its solubility.

Based on this, Faria (2019) suggested a mechanism for the antibacterial action of *Taraxacum officinale*, on which it would be based on synergism, in other words, the action would take place through the drug interaction between the plant's phytocomplexes (saponins, inulins, taraxacosides), which are chemical heterocyclics responsible for this synergistic action, with the functional groups, in the hydroxyl case, of the tested antibiotics, thus, occurring all that process described above, of forming a hydrogen bond with water, increasing its solubility, where this increased solubility is directly related to several biological processes, including drug interactions with phytocomplexes, generating a kind of remodeling of the chemical structure of antibiotics, leading them to potentiate their antibacterial effect.

Another important action of *Taraxacum officinale* (dandelion) that has been researched, is its anticancer potential. A study by Faria (2019), at the end of 2019, shows an assessment of the anticancer potential of aqueous extracts of dandelion leaf, flower and root, based on oxidative stress, induced by Hydrogen Peroxide and Stannous Chloride, which are potent oxidative inducers, through the Disc diffusion method, on the bacterial strain *Escherichia coli*.

According to Machado *et al*. (2009), the organism has a complex system of antioxidant protection, as a defense mechanism against free radicals, which are formed continuously in normal cell metabolism and in various pathological events and, when in excess, can cause oxidation of biological molecules. The imbalance between the oxidative challenge and the body's antioxidant defense capacity is called oxidative stress.

The production of reactive oxygen species (ROS) is high in tissue injuries caused by trauma, infections, parasites, radiation, hypoxia, toxins and intense exercises, due to a set of processes, such as the increase in enzymes involved in the formation of radicals, activation of phagocytosis, release of iron and copper or an interruption of the electron transport chain (Rock, 1996). Thus, they are related to several pathologies in humans, such as arthritis, hemorrhagic shock, heart disease, cataracts, cognitive impairments, benign and malignant neoplasms and AIDS (Barreiros, 2006; Oliveira and Schoffen, 2010).

Mitochondria are the main source of free radicals, through the electron transport chain, during the production of energy from glucose and oxygen. Another important source of free radicals is the enzymes NADPH oxidases, which are membrane proteins, which have the function of transferring electrons across cell membranes (Barbosa, 2010).

The hydroxyl radical (-OH) is the most harmful to the organism, since it has a short half-life, which makes sequestration in vivo difficult. It is formed in the body mainly by two mechanisms: reaction of hydrogen peroxide (H_2O_2) with transition metals; and homolysis of water by exposure to ionizing radiation. The hydroxyl causes damage to DNA, RNA, proteins, lipids and cell membranes. In amino acids and proteins, the radical can react in the side chain, where it preferentially attacks cysteine, histidine, tryptophan, methionine and phenylalanine, causing damage with consequent loss of enzyme activity, difficulties in active transport across cell membranes, cytolysis and cell death (Barreiros, 2006).

Hydrogen peroxide is not very reactive towards organic molecules, in the absence of transition metals. However, it plays a fundamental role in oxidative stress, because it is able to easily cross cell membranes and generate hydroxyl radical, according to the equation: Mn^{++} H_2O_2 → M (n + 1) ++ HO · + HO- (Barreiros, 2006). The same oxidative stress induction can be observed when using Stannous Chloride, having the same mechanism as Hydrogen Peroxide.

According to Barreiros *et al*. (2019), flavonoids (a component present in *Taraxacum officinale*) interact with biomembranes and act as modulators, generating a physical impediment to the spread of ROS and Reactive Nitrogen Species (RNS), so that there is a decrease in the kinetics of reactions responsible for oxidative stress. Based on the foregoing, one can understand the results concluded by Faria (2019), that the pharmacological effects applied to this species of the dandelion plant described in the literature, such as the anticancer action, it is seen, in this method, by the same way of the antioxidant effect, since the bacteria and the human being have a very similar cellular structure, differing mainly by the bacteria presenting cell wall and the human being does not. Therefore, based on these literary studies, when inducing oxidative stress in bacteria (oxidative damage), it is as if the human organism is developing a tumor, which is a form of injury. Thus, the anti-cancer action can be justified by the reduction of oxidative stress, since the smaller the halo of bacterial growth inhibition, the greater the oxidative inhibition, the greater will also be the reduction of oxidative stress, leading to a decrease in the lesion, which can be a tumor. This ability is conferred to the flavonoid constituent of the plant *Taraxacum officinale*, which induces tumor cells to death without damaging healthy cells. Another constituent of the plant, which has an anti-cancer chemical composition, is saponin. This component both inhibits the production of cancer cells and induces the inhibition of angiogenesis (inhibition of vascularization) in the tumor cell, leading to apoptosis. Based on the literature previously exposed, it can be suggested that the aqueous extracts of the leaf, flower and root of *Taraxacum offcinale* (dandelion) have anti-cancer and/or tumor-reducing action, with a view to reducing oxidative stress bacterial strains of *Escherichia coli*. Currently, *T. officinale* is inscribed in many pharmacopoeias, such as: Switzerland, Hungarian, Russian, Polish, Austrian, Chinese and British, in addition to being considered a natural flavoring and can be inserted into food in small portions. *T. officinale* is vast in minerals such as iron, copper and potassium, has vitamins B1, PP and D and contains far more vitamins A (14,000 IU/100 g) and C than the vast majority of vegetables (Newall, 2002).

According to Teske and Trentini (1997), its accumulation in zinc gives it anti-free radical action, being able to protect liver cells from indirect problems, and its high potassium content guarantees a better balance of spoliation by urine. When used in experiments with rats, it showed moderate anti-inflammatory action, decreasing pain attacks and rheumatic disorders.

Evidence with experience made by the authors mentioned in the paragraph above, also suggested that *Taraxacum officinale* leads to the production of nitric oxide. Nitric oxide is important for systemic regulation and defense of the immune system however, this molecular action can be inhibited by cadmium. The aqueous extract of *Taraxacum officinale* has been shown to abolish this inhibitory effect generated by cadmium, and this action was dose-dependent, restoring the production of nitric oxide by macrophages in the peritoneal cavity of rats. It is proposed that this effect occurs mainly as a result of the extract's ability to induce the release of the Tumor Necrosis Factor-alpha (TNF-α). Therefore, in a delicate situation like the one we are currently experiencing, the pandemic, having the immune system regulated, ready to react to foreign bodies and thus protect the human body from possible viral contamination, is essential. So, *Taraxacum officinale* can act in this scenario, as an alternative therapy, in order to increase immunity, leaving the body more protected.

After an extensive discussion proving the therapeutic actions of *Taraxacum officinale*, it is extremely important to also discuss the toxicological action of this species. *Taraxacum officinale* is a plant widely studied for its various beneficial effects on human health, such as anti-inflammatory, anticarcinogenic, antimicrobial, antioxidant, hepatoprotective and diuretic action. Their studies show safety in the use of different types of extracts and even in the consumption of the whole plant (Kyaw and Myint, 2019). Even with all the studies, and safety reports, some toxic and adverse effects were observed, such as a skin hypersensitivity reaction in patients who have an allergic reaction to the chemical compounds in the latex of this plant. Consumption in large quantities generated a gastric disorder reaction, causing gastrointestinal irritation and due to its diuretic effect, it would cause mild hypotension effects (Ribeiro *et al*., 2004).

B) *Cinnamomum* spp.

The effects that are suggested by traditional communities in the Pantanal region (Brazil), regarding *Cinnamomum verum*, are treatments for obesity and toning effect. In Myanmar (Asia), the bark is used to improve digestion and produce an aphrodisiac effect (Defilipps and Krupnick, 2018). Unlike the previous ones, the Garo tribes of Durgapur, Bangladesh, suggest eating the bark to treat asthma and cough (Khan, 2015). Although, the bark is the most common part to be used in preparations with *Cinnamomum* spp., seeds of *C. verum*, are used by traditional medicine in Myanmar, to produce a paste capable of treating diarrhea and gonorrhea when consumed (Defilipps and Krupnick, 2018). When it comes to topical use, the leaves of *Cinnamomum tamala* and the bark of *Cinnamomum schaeff* are used to form pastes. The paste of *C. tamala* treats headaches and acne, while that of *C. schaeff*, relieves scorpion bites and spider bites (Khan, 2015).

Myanmar inhabitants use a mixture of *C. schaeff* and lemongrass powders, which according to their traditional medicine, are able to help in the recovery of inflammation in the liver and intestine. They also use *Cinnamomum camphora* soaked in rose water to treat people poisoned by arsenic (Defilipps and Krupnick, 2018).

Cinnamon is widely used and its parts can be used to give flavor and aroma, however, science seeks to understand what are the compounds and their activities present in this plant. Souza *et al*. (2019) managed to gather some biological effects that could be of interest to researchers, with a focus on the search for studies that describe antimicrobial activity. Most of the works found describe the use of essential oils. This author used aqueous extracts to verify the permanence of biological effects. Whereas, Souza (2019) gathered studies with biological effects, focusing on microbiology, Upadhyay (2017), sought to gather several pharmacological activities described in the genus *Cinnamomum* spp. in this study, in addition to antimicrobial activity, immunomodulatory, anxiolytic, antidepressant, soothing, anti-inflammatory activities were found, presenting studies with antineoplastic and antiviral action.

Performing literary searches on antiretroviral activity, three studies were found with activities in Influenza A (H7N3), Herpes simplex virus-I, Anti-HIV-I, preventing heparan sulfate bonds and gp120 coreceptors, reversing the exhaustion of T cells (lymphocytes T CD4), inhibiting the positive regulation of TIM-3 and PD-1 (CD4 and CD8 receptors, respectively), acting in different viral forms. The identification of compounds present in cinnamon allowed the isolation and identification of its derivatives, which have antiretroviral activity in the HIV virus. According to Moshaverinia (2020), a different methodology was used to test the antiretroviral activity of Herpes simplex virus 1, using the hydro alcoholic extract, it is important to emphasize that the molecule is specific to interrupt the viral cell cycle, without affecting the cell cycle human. It was proposed that the extract could cause an impediment in the binding of virus surface proteins, which consequently would make binding with the receptor impossible. A second proposal for a mechanism would be the action of the extract

components on the viral envelope, which would also lead to the prevention of virus replication (Moshaverinia *et al*., 2020).

In order for HIV infection to occur, it is necessary to involve some molecules, heparan sulfate (HS), CD4 T cells and coreceptors (CCR5/ CXCR4), being recognized by the GP 12047 receptor. Connell (2016) uses a derivative compound to prevent the binding of heparan sulfate and coreceptors. This study looked at the antiviral effects of cinnamon extract, in the process of HIV-1 infection, in the stage of disease generation.

The extract of *Cinnamomum* spp. it was prepared with several steps to remove compounds of no interest from the study, keeping only the polyphenols that were active (Connell, 2016). Hussain (2018) searched *Cinnamomum* spp. an alternative to minimize the damage caused by drugs, which are nephrotoxic and hepatotoxic. Cinnamon has a hepatoprotective and nephroprotective action because it reduces the effects caused by Acetoaminophen in tests performed on mice (Hussain *et al*., 2019).

The animals were initially induced to kidney and liver damage by administering the Acetoaminophen by gastric tube. The lesion was determined by biochemical and histopathological tests. The use of cinnamon prevented a significant increase in the enzyme Alanine Aminotransferase (ALT) and the enzyme Glutamic Oxalacetic Transaminase (AST) and reduces the histological changes in the liver. In the kidneys, normal levels of creatinine, urea and total proteins were maintained, reversing the damage to histological structures (Hussain *et al*., 2019).

A compound isolated from the cinnamon bark, Cuminaldehyde, has an antineoplastic potential on lung adenocarcinoma A549, obtaining a significant reduction in proliferation, induction of apoptosis and suppression of topoisomerase 1 and 2. In additional research, carried out with rats, it was possible to observe the same results (Chen *et al*., 2016). There are researches aimed at the toxicity and pharmacokinetics of the different forms of *Cinnamomum* spp. Some studies report some pharmacological safety in the administration of this plant (50, 51), others describe that, to cause intoxication, the doses they must be high (2000 mg/kg), having a nephrotoxic and hepatotoxic effect, with an increase in organ weight and an increase in cholesterol level (Ranasinghe *et al*., 2013).

Histologically the organs showed morphological distortions, changes in hepatocytes, infiltrated in the sinusoidal lining, in the kidneys, degenerative changes were observed in the glomerular and Bowman capsule (Zhang *et al*., 2019). The essential oil of a species of Cinnamomum, *C. cassia*, can cause extensive eczematous dermatitis and bullous, which disappears with the interruption of use, and in it is found coumarin, which seems to have a hepatotoxic effect. Rats treated with high doses of Cinnamon oil showed a depressive effect, being associated with toxicity, with low doses the effects were weak (Ulbricht, 2011). The presence of cinnamaldehyde, cinamyl acetate and phenipropyl acetate, in the plant of this species, has an anti-asthmatic action, promotes menstruation and relieves pain, but in high doses it can cause respiratory changes and dilation of blood vessels (Cronquist, 1979; Bateman *et al*., 1998).

5. Conclusion

Many of the bioactive effects suggested by the traditional use of medicinal plants are confirmed through scientific studies. Scientific knowledge about phytochemicals, with therapeutic capacity, is essential to formulate new drugs or improve existing ones. Based on the discussion made previously, the potential of *Taraxacum officinale* and *Cinnamomum spp*. was highlighted for the treatment of several diseases, mainly infections and neoplasms. Therefore, it is of high value to study and evidence the biological effects of plant species, potentially medicinal, on human health, so that safety and efficacy, in specific treatments, are described and evaluated.

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