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Buddleja scordioides HBK (Salvilla) a medicinal plant in Bolsón de Mapimi, Durango, Mexico

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ABSTRACT: Traditional medicine is an alternative resource for the treatment of multiple symptoms associated with gastrointestinal diseases such as inflammation. Traditional medicine or complementary medicine is recognized today as a fundamental resource to preserve the health of millions of beings, the use of natural resources such as medicinal plants is an empirical therapeutic resource with valuable results in its healing practices, in addition to helping to protect and strengthen the cultural identity of a population, in addition to being a healing resource of wide social recognition. The objective of this review was to know the medicinal uses of the Buddleja scordioides HBK (Salvilla) plant from Bolson de Mapimí, Durango. This systematic literature review was carried out from January 2018 to march 2021. Herbal infusions, unlike pharmacological medicines, contain multiple chemical compounds of diverse nature, which act synergistically to give an anti-inflammatory response. B. scordioides has various flavonoid compounds such as rutin, quercetin, and quercitrin have been detected. The antispasmodic activity found, supports the rational use, in traditional medicine B. scordioides is used in the treatment of gastrointestinal cramps, spasms and colic. It is a plant classified as tolerant to lead with great potential to be used in phytoremediation programs for lead-contaminated soils. The methanolic extract of B. scordioides has properties of photoprotective activity. The ethnopharmacology use of the B. scordioides plant is supported by scientific research that attributes its antioxidant and anti-inflammatory activity to the plant´s phytochemical content.
KEY WORDS: wild plant, infusión herbal, medicina folklorica, salud intestinal, actividad antioxidante.

I. INTRODUCTION

A great diversity of common herbs has medicinal properties, being a natural source of bioactive compounds [1]. Medicinal plants show great interest today because of its multiple physiological effects [2]. In the Loganiaceae family, previously classified in the Buddlejaceae family; Currently, it is classified in the Scrophulariaceae family [3], the genus *Buddleja* (also *Buddleia*) comprises around 100 species of which 50 are native to the American continent, North and South America, East and South Africa and the South Asia [4], of which 16 species grow in Mexico [3], according to Rzedowsky (1991) in Mexico there are about 20 species of *Buddleja*, *Buddleja scordioides* HBK (Buddlejaceae).

The species *B. scordioides* (salvilla), whose presence and consumption is located in the North of Mexico, has been used in a traditional way for the treatment of some pathologies, especially related to gastric diseases [6]. In the desert of Chihuahua and the State of Coahuila, Nuevo León, Tamaulipas, Durango, Zacatecas, Aguascalientes, San Luis Potosí, Guanajuato, Querétaro, Hidalgo, Jalisco, Mexico and the Federal District [7]. It is found in the tropics and subtropics of North and South America, Africa, and Asia. In Mexico and they are used for their medicinal properties [5].

It is important to indicate that approximately 80% of the world population depends on the use of wild plants for treating illnesses and keeping up with their health [1]. *Buddleja scordioides* HBK (KUNTH), has as synonyms brush, butterfly bush, bush, royal sage, salvilla, escobilla, mato, salvia real [3,7] and swab [8]. Known in Spanish as salvia de bolita, hierva de manita, salvia chiquita, salvia de campo, became officially recognised in the 1930 Mexican Pharmacopoeia where it was shown to have antisudorific activity [3]. Vague and limited information regarding the types and quantity of chemical compounds found in this plant is available.

It is a shrub up to 1.5 m tall, highly branched and aromatic, with elongated, very wavy and rough leaves. The flowers are yellowish green, the fruits are globose and have yellow seeds, it grows in the arid areas of northern Mexico. It lives in dry and semi-dry and temperate climates between 1800 and 2300 meters above sea level. In the municipality of Mapimi, Durango, its medicinal use includes the treatment of digestive ailments, such as stomach pain and diarrhea, as well as being used as a eupeptic. *Buddleja* species are widespread and share some remarkable similarities in their medicinal uses. This may well indicate the presence of the same or similar compounds with a particular pharmacological action [3].

Traditional medicine is an alternative resource for the treatment of multiple symptoms associated with gastrointestinal diseases such as inflammation. Herbal infusions, unlike pharmacological medicines, contain multiple chemical compounds of diverse nature, which act synergistically to give an anti-inflammatory response [9].

Traditional medicine or complementary medicine is recognized today as a fundamental resource to preserve the health of millions of beings, the use of natural resources such as medicinal plants is an empirical therapeutic resource with valuable results in its healing practices, in addition to helping to protect and strengthen the cultural identity of a population, in addition to being a healing resource of wide social recognition. The objective of this review was to know the medicinal uses of the *Buddleja scordioides* HBK (Salvilla) plant from Bolson de Mapimí, Durango.

II. MATERIAL AND METHODS

This systematic literature review was carried out from January 2018 to march 2021. The databases of the EndNote information manager and the EBSCO host database were used, using the following search terms: *Buddleja scordioides* HBK, *B. scordioides* and salvilla recovering articles only when they had free access. The search was supplemented by a specific search of Journals and scientific journals such as: Journal of Herbal Medicine, Herbal medicine NCBI-NIH, Phytotherapy, Journal of Natural Medicine, Pharmacognosy Research, Pharmacognosy Journal, etc.

III. RESULTS AND DISCUSSION

Phytochemical constituents

Medicinal plants contain a diversity of chemical compounds, phytochemicals, with demonstrated important biological activities. These compounds are produced by the secondary metabolism of plants, which have evolved from different biotic or abiotic factors, and used by the plant for defense or survival [2].

B. scordioides has various flavonoid compounds such as rutin, quercetin, and quercitrin have been detected. The flavonoids and other phytochemicals found in these sources have been considered in many studies by their biological activity, the role they play in the diet and to understand their mechanism of action [1]. In general, plants synthesize a variety of secondary metabolites that contain the phenolic group. The synthesis of these compounds is influenced by environmental factors. Considering a chemical approach, their structures vary from simple molecules such as phenolic acids, the so-called nonflavonoid phenols, to condensed polymers called tannins. The synthesis of these products is directly involved in plant-herbivorous interactions. The phytochemicals present in these plants are associated with processes of germination and maturity of the plant. Several biochemical strategies are established to allow them to defend themselves from pathogens and predators, such as phytoalexins. These strategies involve the synthesis of compounds capable of promoting and inhibiting environmental aggression through abiotic and biotic stresses [1].

In this context, the plant contains essential oil, gallic acid, tannic acid, oxalic acids as well as glycosides such as linarin and verbascoside [7]. Verbascoside with antibacterial activity, triterpenoid saponins and other glycosides have been extracted from the scordioides species. The presence of some flavonoids such as rutin, quercetin and quercitrin. The flavonoid and iridoid glycosides are the main secondary metabolites of the species of the genus *Buddleja* [3]. Compounds identified in *B. scordioides* were flavonoids, iridoids, phenylpropanoids, sesquiterpenes and saponins using as solvent hexane, methanol, ethyl acetate and acetone [1]. Using infusions were identified acids hydroxybenzoic, acids hydroxycinnamics, flavanols, flavanones and flavones [10]. With infusions concentrated were identified flavanols, flavanones and flavones [11].

Potential Uses

Due to interesting phytochemical and ethnopharmacological observations, the genus *Buddleja* has been extensively investigated. Its species are widespread and share some remarkable similarities in their medicinal uses. This may well indicate the presence of the same or similar compounds with a particular pharmacological action [3]. The acids hydroxybenzoic, acids hydroxycinnamics, flavanols, flavanones and flavones have have anti-inflammatory effect and gastroprotective [10]. The flavanols, flavanones and flavones have antioxidant effect [11]. Recently, it has been examined the antioxidant and anti-inflammatory effect of a nutraceutical extract rich in flavonols and flavones extracted from *B. scordioides* with aqueous and hydroacetonic solutions

[12], those hydroacetonic mixtures improve the concentration of bioactive compounds with energetic stability that allows cellular interactions with antioxidant and anti-inflammatory responses.

An alternative to management and increased consumption of herbal beverages is the employment of concentration methods. The advantages of an herbal concentrate over a powder or on the diluted herbal infusion, it is found in the fact that a concentrate is easier to handle than a diluted infusión [6].

For which the effect has been evaluated of a concentration treatment on salvilla infusions and its phytochemical profile. Infusions at 1% (0.1 ºBrix) were concentrated in a falling film evaporator up to 0.2 ºBrix. We evaluated pH, ºBrix, total solids, color (L*, a*, b*), phenols and total flavonoids contents, scavenging capacity of diphenylpicryl hydrazine (DPPH) radical, chemical analyzes of compounds were carried out phenolics present in the experimental samples (infusions and concentrates) by UPLC-ESI-MS / MS, and the chemical composition by Reversed-Phase Acquity UPLC™ BEH Column (2.1 x 150 x 1.7 µm), maintained at 20-40 °C. There were no differences in pH between concentrates and infusions. Color differences were found, the concentrates were less luminous, phenols content in concentrates increased, together with a decrease in flavonoids associated with a possible degradation of the galactoside hyperoside, observed by mass spectrometry and related to the increase in acacetin and quercetin and its derivatives in concentrates. There was a decrease in the scavenging capacity of free radicals in concentrates associated with a posible pro-oxidant activity [6].

Gastrointestinal disorders

The *B. scordioides* Kunth Scrophulariaceae plant is known for its anti-inflammatory effects and is commonly used to combat symptoms related to gastrointestinal disorders such as diarrhea, pain and inflammation. The easy acquisition and popular consumption of *B. scordioides*, make this plant an important research objective for the area of intestinal health [9].

In Mexico, its main use is as an antispasmodic, diarrhea, stomach pain (colic) and gastrointestinal disorders [3], as well as in the tratment for tuberculosis, catarrh, headaches, colds, and ptyalism. The results of that experimental study demonstrate that the chloroformic extract of *B. scordioides* has a relaxing effect on the rabbit jejunum and the guinea pig ileum, and that this activity may be the basis for some of its uses in traditional medicine. Therefore, the antispasmodic activity found, supports the rationale use, in both folk and traditional medicine of *B. scordioides* in the treatment of gastrointestinal cramps, spasms and colic. This activity was also observed with *Buddleja perfoliata*, which suggests that it could be used to treat the same afflictions, both *Buddleja* species possess similar smooth muscle relaxant mechanism of action, in view of the fact that both inhibit K^+ induced contraction and they act through serotoninic, muscarinic and histaminic receptors. Therefore, those data support the idea that this extracts may interfere either with calcium mobilization from intracellular stores, or with the calcium interaction with regulatory proteins (e.g., calmodulin), or at other levels of the calcium signaling pathway as a second messenger, such as, by decreasing the contractile machinery sensitivity to calcium, as discussed previously. This leads us to suggest that the spasmolytic effect of *B. scordioides* and *B. perfoliata* can be attributed to the same or similar compounds occurring in both species, and which might be present in similar quantities.

Therefore, the antispasmodic activity found, supports the rational use, in traditional medicine *B. scordioides* is used in the treatment of gastrointestinal cramps, spasms and colic.

Bioremediation

B. scordioides is a plant classified as tolerant to lead with great potential to be used in phytoremediation programs for lead-contaminated soils [8], study carried out in Zacatecas, Mexico, its mining activity has generated huge affected areas contaminated by heavy metals, especially lead. In this investigation it was concluded that *B. scordioides* can be classified as a lead tolerant plant and is a good candidate for use in phytoremediation of lead contaminated soils.

Sunscreen

In the last decade, when the ultraviolet ray arrives with greater intensity as a consequence of a depletion of the ozone layer in the atmosphere [13], the above has resulted in adverse effects on the skin of people ranging from erythema even cancer [14]. Ávila-Acevedo et al. (2005) tested the protective effect against cell death induced by ultraviolet radiation (UV) at 290-320 nm, it was evaluated using *Eschericha coli* (*E. coli*) ATCC 25922, as a cell model. The results showed that the methanolic extract of *B. scordioides* possesses a pronounced photoprotective activity compared to the negative control. The bacterial population (108 cells / ml), protected with methanolic extract of *B. scordioides*, reached cell death at an interval of 37 to 65 min. This study clearly links the popular use of *B. scordioides* with its photoprotective effect. The methanolic extract of *B. scordioides* has properties of photoprotective activity, this can be explained by the presence of UV absorbing compounds in the extract such as verbascoside and linarin. The results show that verbascoside has a better photoprotection quality than the other compounds tested. The advantage of verbascoside could be represented by the good extinction coefficient and by its antioxidant properties.

IV. CONCLUSION

The medicinal uses of the *Buddleja scordioides* HBK (Salvilla) plant from Bolson de Mapimí, Durango, were known. As well as its properties as a sunscreen and its application in bioremediation. Alternative medicine is a good, safe and effective option of complementary treatment to conventional or allopathic medicine, because its combination can enhance and favor the result of a therapy; it can also help mitigate adverse effects such as nausea, vomiting, fatigue, depression after chemotherapy. *B. scordioides* is a species used as a medicinal plant to treat symptoms associated with gastrointestinal inflammation process. The ethnopharmacology use of the *B. scordioides* plant is supported by scientific research that attributes its antioxidant and anti-inflammatory activity to the plant´s phytochemical content.

CONFLICTS OF INTEREST

The authors do not bring conflicts of interest with regard to the manuscript present.

REFERENCES

[1]. Díaz-Rivas JO, González-Laredo R., Chávez-Simental JA, Montoya-Ayón JB, Moreno-Jiménez MR, Gallegos-Infante JA, Rocha-Guzmán NE. Comprehensive characterization of extractable phenolic compounds by UPLC-PDA-ESI-QqQ of *Buddleja scordiodes* plants elicited with salicylic acid. Journal of Chemistry 2018b; 1-10.

[2]. Díaz-Rivas JO, Herrera-Carrera E, Gallegos-Infante JA, Rocha-Guzmán NE, González-Laredo RF. Gastroprotective Activities of *Buddleja scordioides*-Role of Polyphenols against Inflammation. J Chem Biol Ther 2016; 1(2): 1-8.

[3]. Cortés AR, Delgadillo AJ, Hurtado M, Domínguez-Ramírez AM, Medina JR, Aoki K. The Antispasmodic Activity of *Buddleja scordioides* and *Buddleja perfoliata* on Isolated Intestinal Preparations. Biol Pharm Bull 2006; 29(6):1186-1190.

[4]. Deneb-Camacho M, Hernández-Peruaquia SI, Lilian-Morfin L. Tepozán (*Buddleia cordata*). FESC-UNAM. Proyecto PAPIME PE205907, 2009.

[5]. Rzedowsky J. Diversidad y orígenes de la flora fanerogámica de México. Acta Botánica Mexicana 1991; 14:3-21.

[6]. Díaz-Rivas JO, Esparza-Carrillo C, Gallegos-Infante JA, Rocha-Guzmán NE, González-Laredo RF, Moreno-Jiménez MR. Empleo de un evaporador de película descendente agitada y su efecto sobre el perfil polifenólico de infusiones de salvilla (*Buddleja scordioides*). Biotecnia. Revista de Ciencias Biológicas y de la Salud 2019; XXI(2): 106-113.

[7]. Ávila-Acevedo JG, Castañeda CM, Benites FJ, Duran DA, Barroso VR, Martínez CG, Muñoz LJ, Martínez CA, Romo de Vivar A. Photoprotective activity of *Buddleja scordioides*. Fitoterapia 2005; 76:301-309.

[8]. Salas-Luévano MA, Manzanares-Acuña E, Letechipía-de León C, Vega-Carrillo HR. Tolerant and Hyperaccumulators Autochthonous Plant Species from Mine Tailing Disposal Sites. Asian J Exp Sci 2009; 23(1):27-32.

[9]. Villegas-Novoa C, Moreno-Jiménez MR, Rocha-Guzmán NE. Infusión de la planta medicinal *Buddleja scordioides* Kunth utilizada para tratar la inflamación intestinal. Ciencia UAT 2020; 14(2):21-33.

[10]. Díaz-Rivas JO, Herrera-Carrera E, Gallegos-Infante JA, Rocha-Guzmán NE, González-Laredo RF. Gastroprotective potential of *Buddleja scordioides* Kunth Scrophulariaceae infusions; effects into the modulation of antioxidant enzymes and inflammation markers in an in vivo model. Journal of ethnopharmacology 2015; 169: 280-286.

[11]. Díaz-Rivas JO, Gallegos-Infante J, Valdez-Fragoso A, Rocha-Guzmán N, González-Laredo R, Rodríguez-Ramírez A, Gamboa-Gómez, CI, Moreno-Jiménez M. Comparative study of phenolic and content in infusions and concentrated infusions of *Buddleja scordioides* treated by high-intensity pulsed electric fields (HiPEF). Beverages 2018a; 4(4): 8.

[12]. Villegas-Novoa C, Gallegos-Infante JA, González-Laredo RF, García-Carrancá AM., Herrera-Rocha KM, Jacobo-Karam JS, Moreno-Jiménez MR, Rocha-Guzmán NE. Acetone effects on *Buddleja scordioides* polyphenol extraction process and assessment of their cellular antioxidant capacity and anti-inflammatory activity. Medicinal Chemistry Research 2019; 1-15.

[13]. Brash DE, Rudolph JA, Simón JA, Ling A, Mckenna GJ, Baden HP, Halperin AJ, Posten J. A role for sunlight in skin cancer: UV-induced p53 mutations in squamous cell carcinoma. Proc Natl Acad Sci USA 1991; 88:10124-10128.

[14]. Taylor CR, Sober AJ. Sun exposure and skin disease. Annual Review of Medicine 1996; 47(1):181–191.