

Medicinal plants useful in people with arterial hypertension: A review

Karina Tovar Angeles¹,^{ID} Laura Denisse González Islas¹,^{ID} Odette Islas Ávila¹,^{ID}
Josefina Reynoso Vázquez²,^{ID} David Pérez Becker³,^{ID} Jesús Carlos Ruvalcaba Ledezma^{*4}^{ID}

¹Academic Area of Pharmacy [ICSa-UAEH] Institute of Health Sciences-Autonomous University of the State of Hidalgo, Mexico

²Academic Area of Pharmacy and Coordination of the Master's Degree in Public Health [ICSa-UAEH] Institute of Health Sciences-
Universidad Autónoma del Estado de Hidalgo, Mexico

³Student Area academic of Medicine [ICSa-UAEH] Institute of Health Sciences-Universidad Autónoma del Estado de Hidalgo, Mexico

⁴Academic Area of Medicine and Master's Degree in Public Health [ICSa-UAEH] Institute of Health Sciences-Autonomous University of
the State of Hidalgo, Mexico

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Corresponding Author: **Jesús Carlos Ruvalcaba Ledezma** | E-Mail: dcspjcarlos@gmail.com

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ABSTRACT

Hypertension is one of the chronic diseases affecting the population worldwide, contributing to cardiovascular problems and mortality in Mexico, where 1.6 million deaths have been reported due to cardiovascular problems, with a figure of 250 million people affected by hypertension.

Objective: Describe the therapeutic effect of traditional medicine “plants” useful in hypertensive people from the perspective of science.

Methodology: A strategic search of information was carried out in different internet databases such as: Crossref Metadata Search (3), SciELO (5), PubMed (2), Elsevier (3), Redalyc (1), Google Scholar (1) Others (2) compiling a long list of information of articles, books. Using keywords such as: natural antihypertensives, antihypertensive effect of plants, therapeutic use of plants, phyto-medicines, herbal remedies, medicinal plants, natural products, healing plants.

Results: more than 500 articles were found in which information related to hypertension and medicinal plants was presented, of which 90 were reviewed according to the required information and only 19 presented information related to medicinal plants or similar, leaving only 16 articles selected to gather information on the subject.

Conclusions: Herbal medicine has become popular as an alternative to treat various diseases, including hypertension. Finally, regulations have been established in Mexico to regulate the use of herbal medicine, seeking to ensure good practices in the elaboration of herbal remedies.

Keywords: antihypertensive, antihypertensive effect, therapeutic use of plants, phyto-medicament, herbal remedy, medicinal plants, natural products, healing plants.

Introduction

Hypertension is one of the most relevant and high-risk diseases in the world's population, thus increasing the cases of mortality derived from cardiovascular problems in people. the risk factors within this problem have been studied in such a way that more accessible solutions can be found for those who suffer from it. Derived from that there are different alternatives for treatment in which not only conventional medical methods are used, but also a new approach in traditional herbal medicine [1]. According to the Pan American Health Organization (PAHO) in Mexico there have been 1.6 million deaths due to cardiovascular problems, where hypertension has figures of 250 million people suffering from hypertension, therefore, it has developed a series of preventive proposals where PAHO includes the following: physical activities, salt reduction, food rich in fruits, vegetables and obesity prevention [2].

The WHO states that the limit for detecting hypertensive candidates, where the main value is 140/90, 140 mmHg systolic, and 90 mmHg in diastolic [3].

In the article “Physical activity as a measure of control of arterial hypertension” it is described that an investigation was carried out where the physical activity sought by older adults in a range of 30 years or more is that, by practicing physical exercises, it helps them to procure a better control in their blood pressure,

and thereby decrease suffering some symptom derived from this disease [3].

Physiopathology

The mechanism of arterial hypertension is due to abnormal sodium transport across the cell wall. This is because the sodium-potassium pump (called Na, K-ATPase) functions inadequately. After all, there is an increase in the permeability of sodium ions. As a consequence, an elevation in the intracellular sodium concentration occurs. As Na⁺, K⁺-ATPase can generate noradrenaline downstream to sympathetic neurons, inhibition of the process can increase the effect of noradrenaline, and thus lead to an abnormal elevation in blood pressure. Increased pulse rate when at rest may result in increased activity of the sympathetic nervous system and thus lead to the development of hypertension [4].

Herbalism and its usefulness in people with arterial hypertension

The popularity of the therapeutic use of plants has taken a wide path for the beginning of new alternatives for diseases that deteriorate the patient's health, such as obesity, diabetes, hypertension, thyroid, asthma etc. Recent discoveries with plants used in the Mexican territory have provided a significant

effect for cancer, such as the *S. marginatum* plant, which has shown a therapeutic effect when processed as a hot beverage (tea), making this of public interest [5].

The authors of the article "*Effect of an infusion of Hibiscus sabdariffa L in hypertensive patients in an urban population: an important comorbidity before COVID-19*", Jamaica is traditionally one of the plants with the greatest impact in Mexico. In which they point out that this plant has a great therapeutic value derived from the use of its flowers in the clinical setting since it has been shown to have an antihypertensive effect with its main components of anthocyanin and proanthocyanidin, plus the inhibition of calcium flow in the uncontrolled population of BP (blood pressure) [6].

Herbal medicine or herbal remedy is defined as the preparation that involves the use of parts of a plant in combination or specific individual, derived from empirical or scientific knowledge of plants to which therapeutic effects are attributed, to heal or relieve symptoms of a condition or disease [7].

Derived from that, there are different alternatives for treatment in which not only conventional medical methods are used, but a new approach in traditional herbal medicine.

Epidemiology

The Secretary of Agriculture and Rural Development of the Government of Mexico has pointed out that Mexico is the second place in the number of medicinal plants registered in the world. Since 90% of the population has been involved in the use of medicinal plants for the relief of ailments or discomforts, however, the percentage of safety and study of some plant species is only 5% [8].

In Mexico, from 1989 to 1994, the Ministry of Health stipulated a section that classifies traditional medicine with normative orientation, thus helping to fulfill the systematic, regulatory criteria of health law, which triggered the need to regulate the use of herbal medicine, thus giving rise to the project of the official Mexican standard PROY-NOM-248-SSA1-2006, good manufacturing practices for establishments dedicated to the elaboration of herbal remedies [9].

Objective: Describe the therapeutic effect of traditional medicine "plants" useful in hypertensive people from the perspective of science.

Research question: Which plants have therapeutic effects in people with arterial hypertension?

General characteristics

Garlic

Commonly known more as a spice for cooking, garlic has proven to have therapeutic and culinary effects in different countries and regions of the world, it is easy to find it in temperate regions or tropical areas in different parts of the world, initially the first civilization to use it for therapeutic effects was in ancient Egypt, as it was used to prevent or treat heart problems, information that was collected from the oldest document in the world codex Ebers or better known as "Ebers papyrus", which was written in the years 1550 BC [10].

Celery

Celery is one of the most popular vegetables to maintain an excellent diet in different nutritional processes, it is distributed in almost all parts of the world since its habitat is within the temperate, tropical and subtropical places, the parts that are

most used for therapeutic effects are the seeds and leaves, this plant was traditionally used in Mexico as part of complementary treatment of hypertension, as well as the Philippines and Trinidad and Tobago [10].

Hibiscus

One of the countries that has resorted more to the use of Jamaica is Africa, since it is one of the traditional alternatives of choice to treat hypertension, as well as in Mexico, Egypt, and Sudan. Its habitat is found more in places with warm, tropical, and temperate temperatures. Its active principle is extracted in a preparation of infusion or decoction [10].

For the infusion of this plant, pilot clinical trials have been evaluated, which selected patients with hypertension, who took the infusion with a content of (10g/240ml) in a control period of 4 weeks to 33 patients of an urban population in Mexico [6].

Piper Aduncum

It is a plant native to Brazil. It is considered an important kind of medicinal plant because it has pharmacological effects derived from its essential oils and chemical compounds (ethanol and methanol) and is commonly found in Amazonian, tropical, and subtropical areas [11].

Dragon Fruit

It is a cactaceae plant native to Mexico produced mostly in the region of Tamaulipas, this is harvested wild, and has a great nutritional impact as the whole plant itself can be edible, but the part of the plant that is most investigated is the fruit, we can find it in the following areas of Tamaulipas, Ciudad Victoria, San Carlos, Jaumave, and Tula [13]. The extract of this fruit is the most important since it has its therapeutic effect by blocking calcium channels [12].

Purple corn

Purple corn is a seed from Mexico and Peru. For some indigenous people, purple corn was one of the most sacred foods since it was cultivated in ancient times in wild lands. It has some health benefits which treat cardiovascular problems, mostly high blood pressure, and its potential antioxidant activities [14].

Methodology

A strategic search of information was carried out in different internet databases such as: Crossref, Scielo, Pubmed, Elsevier, Redalib, compiling a long list of information from articles, books, etc. With the following terms or keywords as "herbal medicine", "herbal medicines", "Medicinal plants with effect on hypertension", "Phytomedicines", "Antihypertensive effects", "Natural products", "Healing plants", "Therapeutic use of plants". More than 500 articles were found, and 90 were reviewed, of which 19 presented information related to medicinal plants or similar and only 16 were selected to gather selected information on the subject.

Results

As a result of the review of the cited articles, it was found that the different plants mentioned share different components in common which are flavonoids, alkaloids, saponins, phenolic compounds, anthocyanins, etc., which through their review and research help to inhibit the enzyme angiotensin converter known as (ACE), since they have vaso relaxing effects on vascular smooth muscles, thus producing the antihypertensive effect.

The responses found by acquiring certain plant component extracts were first tested in animals, mostly hypertensive rodents, which were observed as experimental models in vivo and in vitro to identify whether the active components exert effects that can halt the progression of hypertension in the rodent's body.

Jamaica was one of the plants that was most closely observed through human consumption, as mentioned by Montes, Y, et al (2024) authors of the article "effect of an infusion of *Hibiscus sabdariffa* L in hypertensive patients in an urban population: an important comorbidity before COVID-19".

Different types of plants proposed by researchers from different countries have been compiled and have been shown to contribute to the reduction of hypertension, as shown in the following (Table 1)

Table 1. Characteristics of the therapeutic effects of each of the plants

Plant name	Scientific name	Family	Characteristics	Properties	Active compound
Garlic [10]	<i>Allium sativum</i>	Amaryllidaceae	It presents the form of subway bulbs, with elongated leaves, thin, with a measure of approximately 3 to 8 cm, has no seeds or fruits, only pink or white flowers.	-Antihypertensive -Inhibition of thrombi. -Skin diseases such as scabies and eczema. -Intestinal antiparasitic	Acts on the renin angiotensin system. The bulb contains sulfur compounds, (γ-Glutamylcysteine) which exert pharmacological activities.
Celery[10]	<i>Apium graveolens</i>	Umbeliferas	It has an elongated shape with thick stems, aromatic, with branches extended from the main stem, its leaves are thick pinnate shape of a whitish green color, measuring approximately 60 cm long.	-Antihypertensive. -Complementary treatments for: -Liver problems. -Respiratory system problems (cough, bronchitis and asthma). -Digestive problems (diarrhea). -Diabetes.	Its main pharmacological activity is due to its chemical components such as apigenin which inhibits the entry of calcium in the cells that reside in the smooth muscle, promoting the stimulation of muscarinic receptors.
Hibiscus[10]	<i>Hibiscus sabdariffa</i>	Malvaceas	It has yellow or white flowers, with reddish spots at the base of its petals.	-Antihypertensive -Toothache. -Antipyretic. -Urinary tract infections.	Its antihypertensive activity is due to anthocyanin compounds (delphinidin-3-sambubioside, and cyanidin-3-O-sambubioside)[5]. Those responsible for the inhibition of calcium channels are (hibiscus acid and garcinia).
Mexican bush sage [1]	<i>Piper aduncum</i>	Matico	It has simple alternate lance-shaped leaves, with a characteristic odor, has different forms, but the most common is the form of a shrub 3-4 meters high, can be branched, has small fruit as a drupe [11].	-Antihypertensive -Anti-inflammatory. -Cicatrizant	The antihypertensive activity is due to the composition of flavonoids, alkaloids, saponins, steroids, essential oils and tannins (natural polyphenols), which inhibit the action on the Angiotensin Converting Enzyme (ACE).
Dragon fruit[12]	<i>Selenicereus undatus</i>	cactaceae	It is a cactus that varies in size with pink flowers and a pulp with a variety of red, white or pink color [13].	-Antihypertensive -Anti-inflammatory. -Antimicrobial. -Antioxidant.	The antihypertensive activity of pitaya is the blocking of calcium channels.
Purple corn[14].	<i>Zea mays</i>	Gramineas	It is a fruit with a purple pigment derived from anthocyanin, consisting of a cob (crown and kernel) [15].	-Antihypertensive -Antioxidant. ⁽¹⁴⁾	The activity is due to its chemical compounds rich in flavonoids and phenolic compounds [15].
Canary Seed [16].	<i>Phalaris canariensis</i>	Poaceae	It is a plant classified as herbaceous, with a height of 60 to 100 cm high, with firm stems, flat leaf and oval-shaped spikelet containing the seed.	-Antioxidant. -Renal affections. Hypercholesterolemia -Antihypertensive.	Canary seed peptides have inhibitory activity on ACE (angiotensin converting enzyme).

Source. Direct. Tovar et al, 2025

Canary Seed

The canaryseed is one of the seeds popularly known for being consumed by birds, since when mixed with other seeds, a rich composition of proteins can be obtained, making it a potential element for a healthy diet. The production of this seed is more significant in southwestern provinces, highlighting countries such as Canada, Argentina, and Thailand. It is considered in Mexico as one of the foods that can contribute to traditional herbal medicine as it is commonly used to treat some kidney conditions, hypertension, and especially hypercholesterolemia (Table 2 and 3) [16].

Table 2. Main active principles of plants with antihypertensive activity

Plant	Nombre científico	Active compound
Garlic[10].	<i>Allium satiyum</i>	-Its main antihypertensive action is due to the compound from the bulb containing sulfur compounds (Y-Glutamylcysteine) [10].
Celery[10].	<i>Apium graveolens</i>	-The main component is Apigenin as it inhibits calcium channels [10].
Hibiscus[10].	<i>Hibiscus sabdariffa</i>	-Anthocyanins (delphinidin-3-sambubioside, and cyanidin-3-O-sambubioside) are responsible for the inhibition of angiotensin converting enzyme (ACE) [10]. -Hibiscus and garcinia acids are vaso relaxant in vascular smooth muscle as they inhibit calcium channels [10].
Mexican bush sage[1].	<i>Piper aduncum</i>	-Flavonoids, alkaloids, saponins, steroids, essential oils, tannins [1].
Dragon Fruit[12].	<i>Selenicereus undatus</i>	-Pectin [17].
Purple Corn[14].	<i>Zea mays</i>	-Flavonoids and phenolic compounds [14].
Canary Seed[16].	<i>Phalaris canariensis</i>	-ACE inhibitory peptides carry polar amino acid residues such as proline [16].

Source: Direct. Tovar, et al, 2025

Tabla 3 Antihypertensive effect in animals

Plant	Nombre científico	Animal
Garlic	<i>Allium satiyum</i>	----
Celery	<i>Apium graveolens</i>	----
Hibiscus	<i>Hibiscus sabdariffa</i>	----
Mexican bush sage	<i>Piper aduncum</i>	----
Pitaya	<i>Selenicereus undatus</i>	----
Purple corn	<i>Zea mays</i>	----
Canary seed [16].	<i>Phalaris canariensis</i>	Male winstar rats were used as pilot tests by administering boluses of canaryseed peptide concentrations [16].

Source: Direct. Tovar, et al, 2025

Discussion

This article detected information regarding the use of traditional medicine of useful plants in people with arterial hypertension, as stated in the text, the impact of arterial hypertension has reflected high rates of morbidity and mortality, as well as has impacted the economic and social condition of public health, particularly in developing countries such as Mexico, where lifestyles are unhealthy and access to preventive medical services is limited. Knowledge of the disease, from its pathophysiology to its evolution, allows us to understand the biological approach to the disease, which allows us to propose more specific and safer treatments. Currently, the growing use of herbal medicine as a therapeutic complement in the control of arterial hypertension is relevant to the tradition of the use of medicinal plants, such as Jamaica, which has been used in the treatment of hypertension. (Hibiscus sabdariffa) [6], Garlic (*Allium satiyum*), Celery (*Apium graveolens*), Mexican sage bush (*Piper aduncum*), Dragon fruit (*Selenicereus undatus*), Canary seed (*Phalaris canariensis*), the use of medicinal plants is mainly in Mexico, thus highlighting the potential of therapies in conjunction with medicinal plants, as well as the need to seek more clinical studies in Mexico of plants that support the safety and efficacy of the validation of their therapeutic effects [6,10,14,16]. The treatment based on medicinal plants is used in families whose availability to medical treatment resources is limited, so the impact of the socioeconomic situation in Mexico does not cover the cost of medicines to which they are entitled, that is, "Right to health" to be acquired by the same vulnerable population to have mini-health systems in our country

-devastated and in their poverty, herbal medicine represents one of the main options to seek to restore their health.

Conclusions

Herbal medicine represents an option for the vulnerable population, especially in the face of the devastating shortage of medicines and health supplies at the health institutions. The lack of a response to the "Right to Health" seems to have been forgotten. These resources must be purchased by the vulnerable population themselves, given the devastated mini-health systems in our country. Amid poverty, herbal medicine represents one of the main options for restoring their health. The results of this review show that medicinal plants are used as support or even treatment by socioeconomically vulnerable populations, primarily those living in poverty and extreme poverty.

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