Revista Iberoamericana de las Ciencias de la Salud | RICS ISSN: 2395 - 8057

https://doi.org/10.23913/rics.v11i22.115

Artículos científicos

Uso etnobotánico de Psidium guajava en tres estados de México

Ethnobotanical Use of Psidium Guajava in Three Mexican States

Uso etnobotânico de Psidium guajava em três estados do México

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Resumen

El objetivo de este trabajo es recuperar los saberes que la población de tres estados de la república mexicana (Campeche, Estado de México y Yucatán) posee sobre la *Psidium guajava* como planta medicinal. Se realizó un estudio transversal en el cual se aplicaron encuestas sobre el conocimiento etnobotánico de la guayaba. Las encuestas etnobotánicas realizadas demuestran que el uso de plantas medicinales para el tratamiento de enfermedades respiratorias, incluida la covid-19, es una costumbre popular y frecuente; entre las plantas mencionadas destaca *Psidium guajava* porque tradicionalmente se ha asociado a la mejoría de los síntomas respiratorios de la tos, gripa o asma debido a sus propiedades antimicrobianas.

Palabras clave: etnomedicina, farmacognosia, metabolitos secundarios.

Abstract

The objective of this work is to recover the knowledge that the population of three Mexican states (Campeche, State of Mexico and Yucatan) has about *Psidium guajava* as a medicinal plant. A cross-sectional study was carried out in which surveys on the ethnobotanical knowledge of guava were applied. The ethnobotanical surveys conducted show that the use of medicinal plants for the treatment of respiratory diseases, including COVID-19, is a popular and frequent custom; among the plants mentioned, Psidium guajava stands out because it has traditionally been associated with the improvement of respiratory symptoms of cough, flu or asthma due to its antimicrobial properties.

Keywords: ethnomedicine, pharmacognosy, secondary metabolites.

Resumo

O objetivo deste trabalho é recuperar o conhecimento que a população de três estados da República Mexicana (Campeche, Estado do México e Yucatán) tem sobre o Psidium guajava como planta medicinal. Foi realizado um estudo transversal no qual foram aplicadas pesquisas sobre o conhecimento etnobotânico da goiaba. Os levantamentos etnobotânicos realizados mostram que o uso de plantas medicinais para o tratamento de doenças respiratórias, inclusive a covid-19, é um costume popular e frequente; Dentre as plantas

citadas, destaca-se o Psidium guajava por ter sido tradicionalmente associado à melhora de sintomas respiratórios de tosse, gripe ou asma devido às suas propriedades antimicrobianas.

Palavras-chave: etnomedicina, farmacognosia, metabólitos secundários.

Fecha Recepción: Enero 2022 **Fecha Aceptación:** Julio 2022

Introduction

Ethnobotany defines the interrelationships between human groups, biodiversity and the conservation of plant species; this is aided by various scientific disciplines such as botany, anthropology, chemistry, medicine, pharmacology, toxicology, ecology and other sciences that give it a variety of approaches and applications (Rodríguez, Valdés, Hernández and Soria, 2019). The objective of ethnobotany is the recovery, search and study of knowledge and the rescue of botanical knowledge that human beings acquire about the properties and uses of plants in any sphere of life, although mainly in medicine, gastronomy, ornamental-religious and for use as tools (Martínez, Palacios, Guízar and Villanueva, 2021; Rodríguez et al., 2019; Zambrano, Buenaño, Mancera and Jiménez, 2015).

As a cultural product, the knowledge that humanity has about plants is constantly evolving and can erode or change according to environmental and social conditions. Hence the importance of ethnobotanical studies, since they serve to prevent the accelerated loss of traditional knowledge, in addition to giving added value to plants as bases for nutritional or medicinal products (Rodríguez et al., 2019). In this sense, in ethnobotanical research, oral sources and the testimonies of people, who are called informants, are of great importance, which is why interviews and surveys are frequently used as tools to obtain data. It is worth pointing out that the ethnobotanical study in the communities represents the first step in the medicinal application of plant products for pharmacological purposes, that is, to prevent or treat diseases. (Rodríguez *et al.*, 2019).

The use of plants for the treatment of diseases is an ancient practice that is still in force in certain regions or communities, especially in marginalized or rural areas, where their low economic capacity makes access to allopathic medicines difficult. Unfortunately, the knowledge of traditional medicine has tended to be lost due to generation gaps and changes in lifestyles, which has led in parallel to the loss of ancestral values. Therefore, it is important to rescue the ethnobotanical knowledge, in particular the ethnomedicinal knowledge of plants, because the traditional practices inherited by the original peoples are considered, in

addition to being an ally for the treatment of diseases, a key resource in the generation and care of the biodiversity (Martínez et al., 2021; Zambrano et al., 2015).

In the face of the current pandemic due to the type 2 coronavirus that causes severe acute respiratory syndrome (SARS-CoV-2), ethnobotany has gained special importance, since, lacking conventional treatments from Western medicine, people have sought alternative treatments such as preventive or curative in medicinal plants (Leos, Saavedra and Viveros, 2020; Villena et al., 2021). In this sense, it has highlighted the popular use for the prevention or treatment of the 2019 coronavirus disease (covid-19) of the Psidium guajava species, popularly known as guava, belonging to the Myrtaceae family (subfamily Myrtoideae), whose distribution ranges from from Mexico to Brazil. Traditionally it has been used above all in the treatment of gastrointestinal problems such as diarrhea and intestinal colic; also, due to its astringent properties, it is used to treat skin diseases and hemostatic and antiseptic actions are reported; Some reports indicate an antimicrobial, healing and hypoglycemic action and highlight its use as an anticatarrhal agent (Domínguez, Cruz and González, 2015; Rodríguez, Lafourcade and Pérez, 2013; Yusuf et al., 2021).

Virtually all parts of the guava have medicinal value according to various historical records; the leaves are commonly used to prepare infusions or decoctions and the aqueous extracts are used to control diabetes, gastrointestinal and inflammatory disorders, vaginal problems, rheumatism, respiratory diseases and infectious diseases. There are reports that the tender leaves are chewed to treat toothache and tinctures are prepared for oral use in the treatment of mouth diseases. (Yusuf *et al.*, 2021).

The objective of this study is to provide information on the current state of knowledge of Psidium guajava and the use that the population of three states of the Mexican Republic (Campeche, State of Mexico and Yucatan) give to this medicinal species.

Methodology

The methodology implemented in this work falls within the qualitative approach, considered as the strategy that allows a better understanding of the motivations of people in their relationship with plants (Muiño, 2012). A cross-sectional study was carried out from August 18 to October 31, 2021, during which surveys were applied in three states of the Mexican Republic (Campeche, State of Mexico and Yucatan) to the general public aged between 24 and 69 years. For a first approach, a pilot test was carried out with open

interviews with urban dwellers who were permanent residents of the study area in order to record the habits of use and consumption of the plant species; The sociodemographic descriptors of the informants (age, sex, educational level) were recorded. Subsequently, a semi-structured electronic questionnaire was developed using Google Forms with 12 questions on the ethnobotanical knowledge of guava (Psidium guajava) that included photographs of the tree, leaf and fruit for identification and corroboration of knowledge by the informants. The questionnaire was developed and validated by expert judgment using Aiken's V (Aiken's V > 0.9). A total of 322 individuals were interviewed (Vilena-Tejada et al, 2021).

Respondents participated voluntarily, after giving their consent, they remained anonymous and had the option to end the survey at any time, keeping all information confidential. All survey participants were well aware of the intentions of the study and that the data would be used for academic purposes and would be published anonymously. All the participants who answered the questionnaire were not involved in the research stages (planning, execution and presentation of reports of the study).

Results

The survey consisted of 12 items: four were to obtain sociodemographic data, two were to identify the plant photographically and the rest were to know the use and knowledge that the respondents have about guava. The characteristics of the study sample are shown in Table 1.

Table 1. Respondents on the ethnobotanical use of guava according to their sex and place of origin

	Mujeres	Hombre	Total
Campeche	62	48	110
Yucatán	60	48	108
Estado de México	53	51	104
Total	175	147	322

Source: self made

In addition, Table 2 shows the age groups of the study participants according to their origin. Although the respondents were randomly and voluntarily selected, it can be seen that the age groups of 30, 40 and 50 years constitute the majority of the participants.

Table 2. Distribution of the ages of the respondents

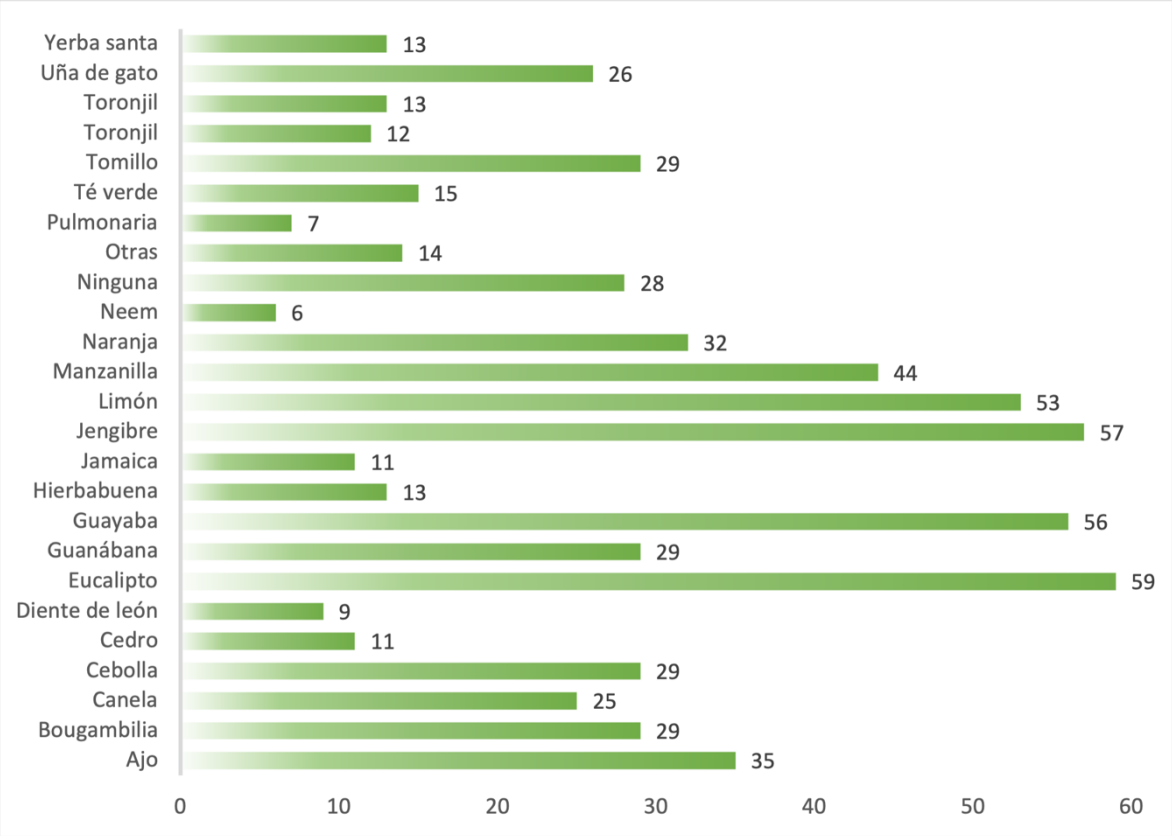
Rango de edad	20-29	30-39	40-49	50-59	60-69
Campeche	14	33	32	24	7
Yucatán	15	35	28	21	9
Estado de México	17	36	27	21	3
Total	46	104	87	66	19

Source: self made

In the first instance, they were asked if they knew of plants that will be used to prevent or treat covid-19. The results obtained are shown in figure 1. There it can be seen that 28 of the study participants said they did not know any plant for this purpose; the rest generally mentioned between two and three medicinal plants. Regarding the question about the use of medicinal plants to prevent or treat covid-19, 49 of the people surveyed who had previously mentioned knowing medicinal plants said they did not consume any, this gave a total of 77 people (23.9%) (figure 2) .

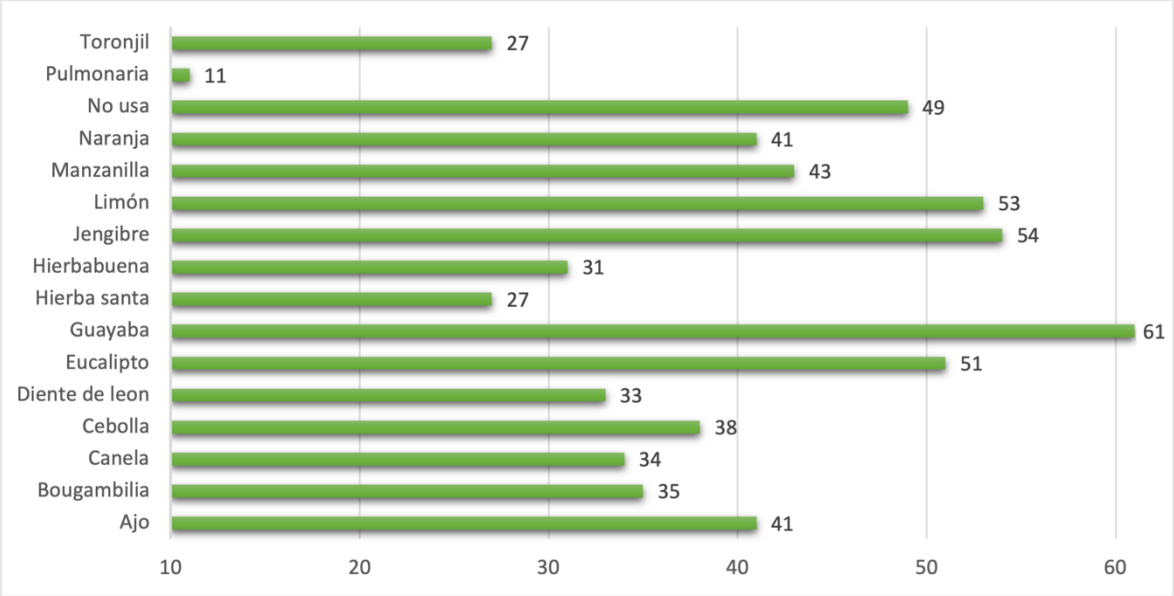
Subsequently, the study participants were asked if they knew guava, 84.6% (272 individuals) answered affirmatively; this statement was verified by showing photos of the tree, leaf and fruit so that they could identify and name it; Of the 272 individuals who claimed to know guava, 201 people identified the photographs as guava, 63 as guava and eight said it was pomegranate, that is, they made a mistake in identifying the vegetable.

Figure 1. Frequency of mentions about the knowledge of medicinal plants that are used for the treatment of covid-19



Source: self made

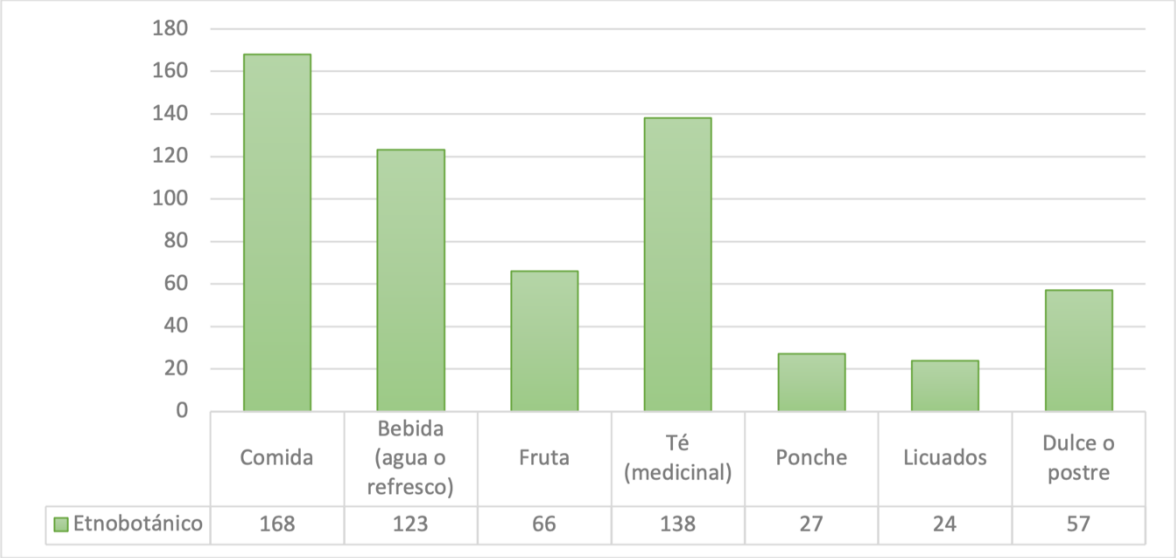
Figure 2. Frequency of consumption of medicinal plants for the treatment or prevention of respiratory conditions



Source: self made

The 272 people who answered knowing guava mentioned that the main uses they give to the species is to eat its fruit directly or make it into drinks (water or guava soft drink). In this sense, he highlighted that people made a distinction between punch, which is a multi-component drink generally prepared for Christmas festivities; It also highlighted its use in smoothies and sweets such as ate or guava paste; 138 individuals mentioned that guava leaves are used as a medicinal plant (figure 3).

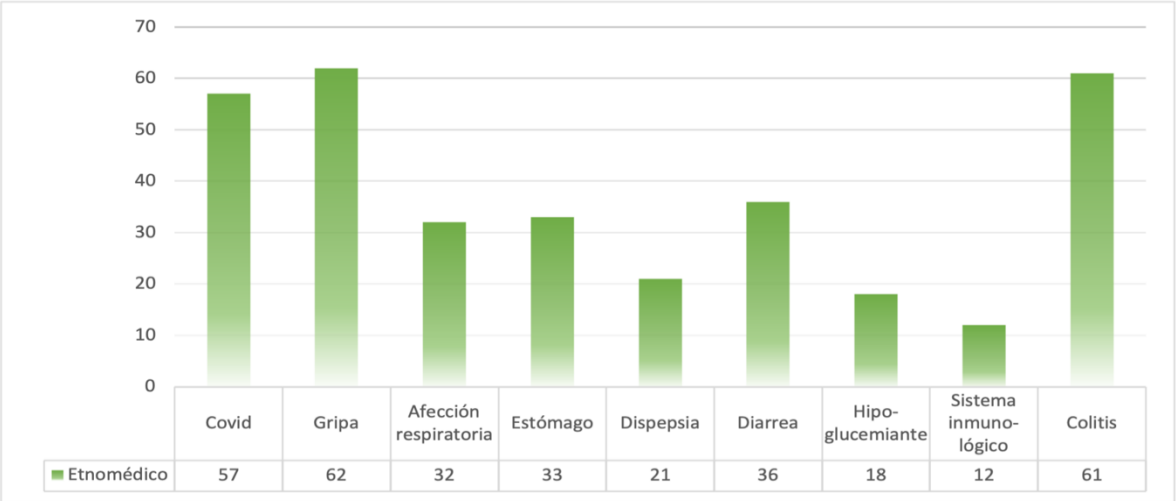
Figure 3. Ethnobotanical uses that respondents give to guava



Source: self made

In reference to the ethnomedical use, people commented that they mainly use it for the treatment of respiratory conditions (colds, coughs, flu and covid-19) and another prominent use was for the treatment of gastrointestinal discomfort such as dyspepsia, diarrhea, colitis. Only 18 respondents mentioned that they use guava in the treatment of diabetes and 12 commented that it was used to strengthen the immune system (figure 4). The main way of preparing guava leaves was the infusion or decoction to drink it as tea; another form recently popularized by the use of specialized vessels is maceration.

Figure 4. Ethnomedical uses that respondents give to guava



Source: self made

Discussion

Mexicans, like the inhabitants of many developing countries, due to their health system as well as socioeconomic characteristics and cultural aspects, are mostly accustomed to accessing the local flora for the treatment of various ailments (Lawal, Olufade, Rafiu and Aremu , 2020). Among the reasons to continue with these habits are the high cost of medicines, limited access to health care facilities and that there is a tradition of medicinal use of plants that gives them a familiarity and confidence in their use.

Although there is practically knowledge available to use plants or their extracts to treat any ailment, the ethnomedicinal use of plants for the treatment of digestive and respiratory system conditions stands out for their frequency (Lawal et al., 2020; Semenya and Maroyi, 2018 ; Tangjitman, Wongsawad, Kamwong, Sukkho, and Trisonthi, 2015). Regarding the treatment of these last effects, as a consequence of the current health contingency due to covid-19, they have gained meaning and relevance in the general population; For this reason, in the present work, we investigated which are the plants that the population used both to prevent and treat the disease itself (etiological treatment) or its symptoms (symptomatological treatment). In this regard, the latter, the symptomatological treatment, is the one that predominates in the knowledge of the interviewees, since it is easier to associate plants that have previously been used against cough or infections, and in a similar way with what has happened with the allopathic drugs, herbal medicines have been used as a correlate of their traditional uses.

In this sense, the plants reported by the interviewees such as citrus (Rutacea family), ginger (Zingiberaceae family), guava (Myrtaceae family), among others, are species that have been used in the treatment of respiratory diseases such as catarrh , cough and flu (Lawal et al., 2020; Semenya and Maroyi, 2018). Generally, these plants are prepared by decoction and infusion of leaves or flowers, this coincides with what is reported in the literature as the plant parts and the most used forms of extraction. (Semenya y Maroyi, 2018).

It is important to recognize that ethnobotanical surveys serve to summarize and detail the relationships that exist between humans and plants, as well as the relationships of humans with their environment, as well as to know the knowledge that is had and the use that is made of it. gives to plant species (Orch, Zidane and Douira, 2020; Papp, Bartha, Boris and Balogh, 2011). Similarly, ethnobotanical surveys among users of medicinal plants make it possible

to inventory the species used and safeguard the information acquired by the population (Orch et al., 2020).

The use of popular plants serves as a guide for pharmaceutical research, especially in the treatment of infectious diseases (Morais et al., 2016). This is the initial stage of ethnomedical research, which must continue with the verification of its effects and phytochemical characterization to discover the active principles and the factors that modify their expression, as well as to study their safety and efficacy (Souza , Williamson, and Hawkins, 2018; Ullah, Sarfraz, Ullah, Ullah Khan, and Kanwal, 2021).

In this study, the mention of guava as a medicinal plant that is used as a tisane, alone or in combination with other allopathic drugs to prevent or treat the symptoms of covid-19, stood out. Guava (Psidium guajava L.) is a plant known and used in traditional medicine for the treatment of different conditions; this motivates pharmacological research to delve into the concomitant action of guava leaf extracts in different diseases with high prevalence worldwide (Campos e Silva et al., 2021; Díaz, Verardo, Gómez, Fernández and Segura, 2017) ; guava is native to tropical regions from southern Mexico to northern South America (Campos e Silva *et al.*, 2021).

Guava is a very versatile plant that is used primarily as a food and medicinal plant in tropical and subtropical countries around the world. The ethnobotanical use reported in this research corroborates that the population of these three states of Mexico sees it mainly as edible and medicinal (Campos e Silva et al., 2021; Pérez, Mitchell and Vargas, 2008; Morais et al., 2016), this is consistent with the uses given to Psidium species that are used commercially: fruits, essential oils, wood and for ornamental purposes, in addition to their medicinal use (Campos e Silva et al., 2021)

It stands out that ethnobotanically guava is used consumed directly as a fruit or for the preparation of foods such as juices, smoothies, sweets and ice creams; In addition, it is used as an ornament, to obtain wood and as a medicine in the form of tea, infusion, decoctions and poultice to treat inflammation, diarrhea, rheumatism and diabetes and as a diuretic and antimicrobial (Campos e Silva et al., 2021); however, among the utilities described for guava, there was no mention in this study of its use as decoration or wood, perhaps due to the focus of the questions, since in the pilot study people did mention that the smell of the tree and the guava fruit is characteristic and pleasant.

The biological activity of guava leaves has been attributed to its content of phytochemical compounds, particularly polyphenols (Díaz et al., 2017), and various phytochemical components belonging to the family of flavonoids, terpenoids and carotenoids have been identified to which they are associated. identified as active ingredients (Pérez et al., 2008).

Although it is reported in the scientific literature that various parts of the Psidium guajava are used such as the root, bark, leaves, fruits, flowers and seeds for medicinal purposes (Morais et al., 2016), in the present study it was found that the population practically only uses the leaves as medicine and the fruit as food; there was no mention of the use of the root or bark for medicinal purposes.

The way of preparing the parts of the plant to obtain medicinal extracts consists especially of infusions and decoctions for oral and topical use (Morais et al., 2016), this is consistent with what was reported by the respondents who said they drink the leaf tea of guavas, although the technical term is really tisane or decocto if it is obtained by decoction, that is, by boiling the leaves in water or infusion if it is obtained by pouring hot water over the plant material; It stands out that in the case of guava, decoction is the most used way to obtain the aqueous extract.

According to specialized literature, indigenous communities empirically use the leaves and flowers of Psidium guajava for the treatment of diarrhoea, while the roots are used to treat cough, stomach aches, dysentery, antiparasitic, toothache, indigestion and constipation; the bark is used for the treatment of wounds and ulcers, dysentery, skin diseases, hypoglycemic, vaginal bleeding, fever, dehydration and respiratory disorders such as asthma (Campos e Silva et al., 2021), these activities have not only been reported but studied (Díaz et al., 2017; Pérez et al., 2008); but the most reported uses for guava leaf extracts in traditional medicine is for the treatment of disorders of the digestive system (Tangjitman et al., 2015). This study did not comment on its use for toothache, skin diseases, or as an antiparasitic; It may be due both to the loss of knowledge of the uses or to the prevalence or predominance of others due to the temporal context of the users, since now the most relevant issue is the treatment of respiratory problems.

Many pharmacological studies have supported its traditional uses, since it has been shown that guava extracts exhibit antioxidant, hepatoprotective, antiallergic, antimicrobial, antigenotoxic, antiplasmodial, antispasmodic, cardioactive, hypoglycemic, antitussive and

antinociceptive properties (Pérez et al., 2008). however, there are still not enough reports to support its use in the treatment of covid-19. In any case, as demonstrated in this research, in the collective imagination, the perception of the efficacy of guava to improve the health status of infected people allows people to consume guava leaf tea for this purpose, this It must lead to pharmacological studies aimed at guaranteeing efficacy and safety, such as the evaluation of possible adverse reactions that may occur or interactions with other plants, diseases or medications.

Conclusions

Ethnobotanical surveys carried out on residents of three states of the Mexican Republic show that the use of medicinal plants for the treatment of respiratory diseases, including covid-19, is a popular and frequent custom; Among the plants mentioned, Psidium guajava stands out because it has traditionally been associated with its antimicrobial properties and in the improvement of respiratory symptoms of cough, flu or asthma and the popular belief is that it is now effective against SARS-CoV-2, although this It must be supported by scientific studies, not yet available, necessary to avoid affecting the health of consumers and guarantee its efficacy and safety.

Future lines of research

According to the information compiled in this work, it would be convenient to verify in the laboratory the antiviral action of guava or its beneficial effect as an aid in the treatment of patients with covid-19; It is also necessary to carry out preclinical trials on the safety and efficacy of guava extracts and to investigate the biological activities attributed to it.

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