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Traditional Medicine: A Rapid Assessment of Formulas and Plants Used In the Treatment of Covid-19 In The Pacific Region (Chocó-Colombia)

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Abstract

In this study we quickly review the medicinal plants used for the treatment of covid-19 under a traditional knowledge approach in the Pacific region of northeast Colombia. A survey was applied on Google Drive and it was randomly distributed through WhatsApp. Participation was voluntary and without restriction of racial ethnicity, age, gender or sexual orientation. The survey was applied with the purpose of knowing first-hand the plants used by people to mitigate COVID-19 disease and the degree of knowledge between men and women. Open and closed and multiple choice questions were structured. The survey was closed as soon as it reached a total of one hundred participants (n = 100). The information was analyzed using ethnobotanical indices and basic descriptive statistics. Finally, a search was made for scientific articles related directly and indirectly to the study. Our study yielded a total of 37 species grouped into three large formulas, infusion and hot drinks (56%), fresh baths (33) and jelly (11%). Zingiber officinale (1.0), Eucalyptus globulus (0.86), Matricaria recutita (0.52) and Gliricidia sepium (0.56) were the species with the highest use value in the middle of the pandemic. No statistically significant difference was observed between men (n = 25, 2.420 ± 1,782) and women (n = 75, 2.947 ± 1.902) in relation to the level of knowledge. On the other hand, the plants used have validations of chemical compounds that help to counteract respiratory infections caused by viruses. This study serves as a reference for the construction of public health policies based on traditional Colombian medicine. Ethnobotanical studies are postulated as the main way to search for a cure against the covid-19 virus.

Keywords: Covid-19; traditional knowledge; medicinal plants

Introduction

According to the World Health Organization (WHO), the disease with the greatest boom in the world today "COVID-19" was detected in late December 2019 and received more attention in mid-March of the year 2020 due to the exponential increase in cases around the world. [1] Specifically, the disease appears in Whuan, China in early 2020 exactly in February. [2] the most notorious symptoms are high fever, cough and fatigue, and in the worst case the respiratory system is compromised until the person die. [3,4] According to data updated to July 04, 2020 of the 10.922.324 confirmed cases in the world, 523.011 have died as a result of the pandemic [5]. The mortality rate worldwide arouses a growing interest on the part of the scientific community in the search for alternatives to generate vaccines and medications that can stop the spread of the pandemic, and most importantly, protect human life. [6] Hence the interest in putting into practice the traditional knowledge associated with the use of medicinal plants in particular as a strategy to mitigate the impacts of COVID-19. [7,8]

A recent report indicates that in the world 390.000 plant species are estimated where at least 60. 000 have exclusively medicinal use and 26.000 of these medicinal uses have been scientifically and ancestral confirmed in different geographical regions [9,10]. Another notation that adds to the rise of medicinal plants is that trade has increased internationally with import revenues that tripled over time 1.3 (1998) to 3.3 billion (2018). [9] These growth trends respond to a great extent to the urgency to satisfy economic and health needs mainly. [9-11] For example, in China recently a study indicates that the Radix glycyrrhizae rhizome is an option that is important for its healing properties, and according to chinese government guidelines, it can be used as a guide for the treatment of COVID-19; however, it is needed clinical evidence in the to assess efficacy.[12] Another specific case that attracts the attention of plants is the amount (121) of amino acids that lectin (griffithsin) contains, produced by red algae of the genus Griffithsia, which act as an inhibitory agent for many viruses including the VIH virus, ebolavirus and some coronaviruses. [12,13]

In this sense, plants open important possibilities to efficiently control the covid-19 pandemic, in the absence of effective treatments. [6] Although there is a long way to show the efficacy of many important species in traditional Colombian medicine, our main objective is to provide information on traditional clinical formulas based on medicinal plants used in times of pandemic in Choco biogeographic.

MATERIALS AND METHODS

Data search and determination of plants

Consultations were made with colleagues with experience in the subject to assess the relevance of the study. Subsequently, a survey was applied using the Google Drive tool and was distributed randomly through WhatsApp. Participation was voluntary and without restriction of racial ethnicity, age, gender or sexual orientation. [8] The survey was applied with the purpose of knowing first-hand the plants used by people to mitigate the disease of COVID-19 and the degree of knowledge in relation to the gender role. Open and closed and multiple choice questions were structured. The survey was closed as soon as it reached a total of one hundred participants (n = 100). A selective search was conducted for key articles written in English published between January and June 2020 in high-impact indexed journals. [14] The plants were recognized by photographs and the description of the diagnostic characteristics of the participants. In addition, specialized databases, the list of plants (http://www.theplantlist.org) and the virtual herbarium of the universidad nacional de Colombia (http://www.biovirtual.unal.edu.co/nombrecomunes) were consulted./en/) to corroborate scientific names assigned to species.

Type and approach of studies

The study is descriptive with a mixed approach. It seeks to measure qualitative and quantitative variables through the use of a data collection instrument based on the description and detailed analysis of information related to traditional knowledge associated with the use of medicinal plants in times of a pandemic.

Inclusion and exclusion criteria

Native and introduced plants were included for the analysis. The formulas associated with industrial drugs were rejected because it was an ethnobotanical study.

Data analysis

The information collected was tabulated in an Excel spreadsheet and was purified until obtaining the necessary information for the respective analyzes. The use value index that refers to the importance of use that a given species has according to its reporting frequency in the sampling was applied and is obtained through the following process explained in equation (1).[15]

Additionally, the relative popularity level of each species was determined to assess its sociocultural importance, applying equation (A.2). [16] and the level of significant tramil use (UST) that values species with frequencies greater than or equal to 20% and that must be subject to scientific validation. It is calculated by dividing the number of use citations for each species (s), by the number of respondents surveyed, applying equation (3).[17]

Equation (1)

UVis = (∑ 〖 species frequency. is〗)/ (maximum value of the most used species)

Where VUis is the use value index of the species is. Maximum value of the most used species is the maximum value of the species that obtained the highest report in the entire sample, that is, the most used. It can be the same species or a different species. The VUis varies between 0 and 1, being 1 the species with the highest use value, which is why it is appreciated and sought for its high utility. Significant differences were evaluated between men and women with respect to the level of knowledge in relation to the number of plants reported through a t studen test (0.05).

Equation (2)

RPL= nif/(n)

Where 'n' if is equal to the number of informants citing the species, and 'n' equal to the total number of informants.

Equation (3)

Where use of species (s) is equal to the number of citations for each species and (nis) number of people surveyed.

Results

Botanical composition and use value

The list yielded a total of 37 plant species comprised of 22 families and 32 genus. Two of the species were unidentified. The families best represented by number of species were Lamiaceae with seven species (19%) and Verbenaceae with three (8%). The other families were represented by two and one species (Fig. 1). According to the use value Zingiber officinale (1.0), Eucalyptus globulus (0.86), Matricaria recutita (0.52), Gliricidia sepium (0.56) are the species that obtained the highest values within the sample (Table 1).

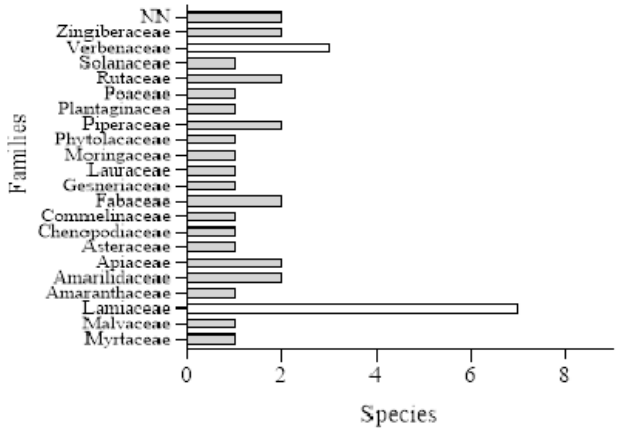

Figure1. Distribution of botanical families by number of species. Lamiaceae encompasses a significant number of species with high potential and applicability in the pharmaceutical industry because they have chemical compounds capable of inhibiting microbial activities.

Pearson's correlation coefficient shows a positive linear relationship between the values that a species takes in the different indexes of sociocultural importance and the number of citations of the species within the sample (Fig. 2).

Local name	Scientific name	Families	n	UV	RPL	SUL ≀
Ajo	Allium sativum	Amaryllidaceae	7	0.14	0.07	2.57*
Albahaca	Ocimum sp	Lamiaceae	2	0.04	0.02	0.74
Amaranto	Amaranthus sp	Amaranthaceae	1	0.02	0.01	0.37
Anamú	Petiveria alliacea	Phytolaccaceae	1	0.02	0.01	0.37
Apio	Apium graveolens	Apiaceae	2	0.04	0.02	0.74
Canela	Cinnamomum verum	Lauraceae	2	0.04	0.02	0.74
Cebolla morada	Allium cepa	Amaryllidaceae	2	0.04	0.02	0.74
Celedonia	Peperomia pellucida	Piperaceae	2	0.04	0.02	0.74
Ciempiecito	NN	NN	1	0.02	0.01	0.37
Cilantro	Eryngium foetidum	Apiaceae	1	0.02	0.01	0.37
Coca	NN	NN	1	0.02	0.01	0.37
Cúrcuma	Curcuma longa	Zingiberaceae	2	0.04	0.02	0.74
Espabonilla	Glosslomapanamense	Gesneriaceae	1	0.02	0.01	0.37
Eucalipto	Eucalyptus globulus	Myrtaceae	43	0.86	0.43	15.81*
Galve	Senna reticulata	Fabaceae	1	0.02	0.01	0.37
Guácimo	Luehea seemannii	Malvaceae	1	0.02	0.01	0.37
Hierbabuena	Mentha x piperita	Lamiaceae	4	0.08	0.04	1.47
Jengibre	Zingiber officinale	Zingiberaceae	50	1	0.5	18.38*
Limón	Citrus x limon	Rutaceae	40	0.8	0.4	14.71*
Limoncillo	Cymbopogon citratus	Poaceae	14	0.28	0.14	5.15
Llantén	Plantago major	Plantaginacea	1	0.02	0.01	0.37
Manzanilla	Matricaria recutita	Asteraceae	26	0.52	0.26	9.56
Matarratón	Gliricidia sepium	Fabaceae	28	0.56	0.28	10.29*
Menta	Mentha rotundifolia	Lamiaceae	1	0.02	0.01	0.37
Moringa	Moringa olifera	Moringaceae	5	0.1	0.05	1.84
Naranja	Citrus x aurantium	Rutaceae	4	0.08	0.04	1.47
Orégano	Origanum vulgare	Lamiaceae	3	0.06	0.03	1.1
Orozul	Phyla dulcis	Verbenaceae	1	0.02	0.01	0.37
Paíco	Chenopodium ambrosioides	Chenopodiaceae	1	0.02	0.01	0.37
Poleo	Clinopodium brownei	Lamiaceae	1	0.02	0.01	0.37
Prontoalivio	Lippia alba	Verbenaceae	5	0.1	0.05	1.84
Romero	Rosmarinus officinalis	Lamiaceae	2	0.04	0.02	0.74
Santa maría	Piper peltatum	Piperaceae	1	0.02	0.01	0.37
Sauco	Solanum sp	Solanaceae	12	0.24	0.12	4.41
Siempreviva	Tripogandra serrulata	Commelinaceae	1	0.02	0.01	0.37
Toronjil	Melissa officinalis	Lamiaceae	1	0.02	0.01	0.37
Verbena	Stachytarpheta cayennensis	Verbenaceae	1	0.02	0.01	0.37

Table1. Quantitative analysis of medicinal species used in the prevention and treatment of COVID-19.

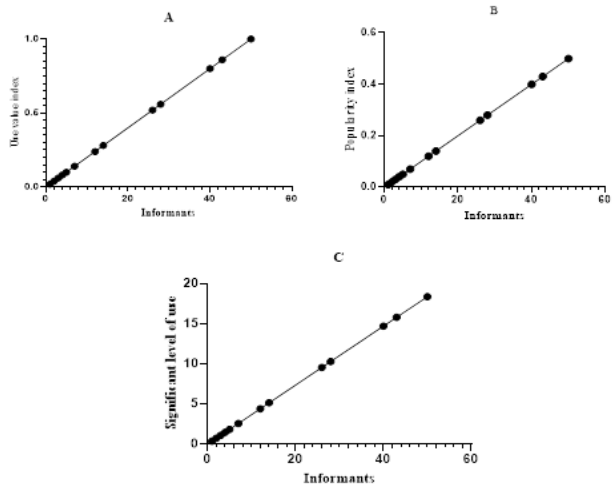

Figure2. Linear relationship between the values that a species takes in the different indexes of sociocultural importance based on the number of citations within the sample. The number of informants has an important incidence when it comes to quantitatively evaluating the uses of plants.

Traditional knowledge

The participants were divided into 75 women and 25 men. The t studen test (men n = 25, 2.420 ± 1.782 and women n = 75, 2.947 ± 1.902, P> 0.005) indicates that there are no statistically significant differences between men and women regarding the level of knowledge of medicinal plants used among of the pandemic. Differences are measured from the number of plants reported by each participant used for that purpose. The 37 species were grouped into three large formulas, infusion and / or hot drinks (56%), fresh baths (33%) and jelly (11%). According to the information reported by the participants, the formulas come from cultural beliefs (64.0%), recommended (24.0), others (7.0%) and acquired from the internet (5.0%). Additionally, plants are used more frequently in infusion and hot drinks (Fig. 3). Of the 100 people, 19 reported having acquired the disease and describe in detail different herbal formulas used for home treatment (Table 2).

Code plants	Formula
E	The leaves are cooked and taken in hot aromatics and infusion
MZ	The plant is cooked and lemon juice is added and it is taken hot
PCS	Several leaves are cooked, lemon is added and it is drunk in hot aromatics
AMG	Leaves are cooked and fresh baths are given from head to toe
MT	Leaves are crushed in water, then strained and fresh baths are prepared
JLE	Cook a piece of the rhizome, add lemon to taste and drink hot
AC	Crush several cloves of garlic, chop the onion, then mix and take a tablespoon three times a day
NLCJMZ	Three oranges, four lemons, two cinnamon sticks, a fist of chamomile, a piece of ginger are squeezed, then all the ingredients are cooked in two liters of water and taken hot in the mornings and nights
HA	The leaves are cooked and taken in hot aromatics and infusion
JEMZLI	In a liter of boiling water, add three centimeters of ginger, three cross-cut lemons, seven lemongrass leaves, add honey and drink hot
MGSES	The leaves are crushed in water and left to serene for a day. Then fresh baths are given for after days in the mornings, then several days are allowed to pass and the elderberry with santamaria is added. Subsequently, hot drinks and infusion of garlic, lemon, ginger, lemongrass are taken during the treatment
EJ	1/4 of panela, a piece of ginger rhizome, a crushed garlic clove, onion juice, lemon and chamomile juice and zest, boil the ingredients for half an hour. Then inhalations are made and a cup is taken three times a day for a week

Table 2: Medicinal formulas for the treatment of COVID-19 (participants account covid-19).

ʅ Code: E= Eucaliptus, MZ= Manzanilla, PCS= Prontoalivio + Celedonia + Sauco, AMG = Anamú + Matarratón + Guácimo, MT=Matarratón, JLE= Jengibre + Limón + Eucaliptus, AC=Ajo + Cebolla, NLCJMZ=Naranja + Limon + Canela + Jengibre + Manzanilla, HA=Hierbabuena + Albahaca, JEMZLI= Jengibre + Eucaliptus + Manzanilla + Limoncillo, MTGSES= Matarratón + Galve + Sauco + Espabonilla, EJ = Eucaliptus + Jengibre. *Note: Do not drink hot drinks during treatment.

Figure 3: Frequency and ways of using plants. Plants were grouped into three large groups of formulas.

Infusion and hot drinks = (2 + 3 + 4 + 6 + 7 + 8 + 9 + 19 + 20 + 21 + 24 + 27 + 28 + 29 + 26 + 10 + 11 + 12 + 13 + 14 + 16 + 17 + 18 + 32 + 30 + 33 + 34 + 35 + 36) = hot drinks are made in panela water or made only in water. Panela or honey is also added and inhalations are made during the night and in the morning. In

some cases they are taken as ordinary water. Fresh baths (1 + 5 + 15 + 22 + 23 + 25) = macerate and head-to-toe baths to control body temperature. Jelly (31 + 37) = the leaves are crushed and honey is added to it and one tablespoon is taken three times a day.

Discussion

The traditional knowledge associated with medicinal plants nowadays is taking on particular importance worldwide, possibly due to the appearance of the new disease of COVID-19.[18] Traditional medicine reveals the exclusivity of many plants used for the treatment of health problems, where notable differences are observed between one botanical family and another based on its sociocultural importance. [19] Lamiaceae for example is one of the families with a wide distribution throughout the world with at least 200 genus and 4000 species, many of them medicinal. [19] A significant number of the species that make it up have applicability in the pharmaceutical industry. [20] The historical medicinal antecedents of many of the species in the family, especially the genus Rosmarinus [21], Occimun [22,23] and Salvia [24] make it one of the most representative families in the diversity of medicinal plants in territories around the world [25,26] with special socio-cultural importance in Afro-descendant communities located in the tropic [22]. Additionally, the curative effectiveness is attributed to the contents of carnosic acid, carnosol, betulinic acid, camphor and rosmarinic acid [20], [27], [28] and phenolic compounds, di- and triterpenes and essential oils. [29] These components have the ability to inhibit actions of microorganisms harmful to human health. [30]

Something similar happens with C. citratus, an important species in ancestral medicine in communities of tropical countries in southwest Asia [31] its healing potential is attributed to the content of essential oils, including terpenes, alcohol esters, aldehydes and ketones. [32,33] Z. officinale one of the most valued species in the chocoano tropic in the midst of the pandemic, currently has a high demand for use and commercialization, possibly due to its effectiveness in the treatment of COVID-19 as revealed by the study. Its rhizome represents an importance in food and in empirical medicine linked to the transfer of knowledge from generation to generation. [34] Validaciones fitoquímicos indican que su efectividad curativa está relacionada con contenidos de hidrocarburos monoterpenos y sesquiterpénicos (α-zingibereno, ar-curcumeno, β-bisaboleno y β-sesquiphellandreno). [35,36]

G. sepium the phytochemical potential is related to the concentration of phenol (1.7 mg / ml) and flavonoids (0.46 mg / ml), in addition the alkaloid and saponins contents have the power to inhibit infectious microorganisms. [37] Other observations report values of 3.94 mg / g of flavonoids, which makes this species an important resource to alleviate health problems caused by pathogens. [38] The species continues to be promising in ethnomedicine and biomedicine because twelve important bioactive compounds are currently presumed to be present to address health problems. [39] Lastly, recent studies report that the natural phytoconstituents (alliin, ajoenes, flavonoids, allicin and vinyldithines) of A. sativum decrease the expression of proinflammatory cytokines and strengthen the immune system, therefore the species becomes a very useful resource to counteract COVID-19 virus infections.[40,41]

Ethnobotanical study trends added to entopharmacological studies confirm that medicinal plants are almost the only alternative to prevent and treat COVID-19 disease [18] Therefore, the knowledge associated with medicinal plants can lead to the development of environmental awareness to face future challenges in health issues. [42] However, many studies are required to help validate the effectiveness of plants. [43] But for now, government guidelines can be advanced to promote public health policies linked to traditional medicine that save lives around the world. [44,45]

Conclusion

This study invites reflection on the importance of conserving biological diversity for the sustainability of life. It also serves as a reference for the construction of public health policies based on traditional medicine. However, it is recommended to carry out phytochemical studies to validate the effectiveness of chemical components, not only of popular plants, but also other promising species that are invisible in the scientific world.

Ethnobotanical research is promising in the search for alternatives to counteract public health phenomena in the future. Furthermore, we presume that the pandemic opens pathways to strengthen and preserve traditional culture in territories around the world.

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