Artigo Original

ESTUDO ETTNOFARMACOLÓGICO DE PLANTAS UTILIZADAS NA FLORESTA AMAZÔNICA DO MÉDIO XINGU

ETHNOPHARMACOLOGICAL STUDY OF PLANTS USED IN THE MIDDLE XINGU REGION AMAZON FOREST

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Palavras-chave: Etnofarmacologia; Médio Xingu; Amazônia, Brasil; Medicina Tradicional.

Os povos amazônicos possuem saberes medicinais construídos pela simbiose com a floresta. Este fato reforça a importância de estudos sobre o uso tradicional de produtos naturais, descrevendo as plantas utilizadas para fins medicinais. Portanto, este trabalho teve como objetivo realizar um levantamento etnofarmacológico de plantas utilizadas por moradores da região do médio Xingu, Pará, Brasil. **Métodos:** Foram utilizados questionários baseados no uso terapêutico de plantas. **Resultados:** Realizou-se 36 entrevistas, sendo descritas 38 plantas. Das espécies catalogadas, houve maior número utilizado no tratamento de doenças infecciosas, digestivas e circulatórias, com 21 espécies de plantas citadas para o tratamento dessas doenças (a família Lamiaceae foi a mais citada com nomes populares). Outras famílias demonstraram uso associado ao tratamento de doenças infecciosas e parasitárias: Acanthaceae, Annonaceae, Bignoniaceae, Costaceae, Crassulaceae, Cucurbitaceae, Lecythidaceae, Plantaginaceae, Portulacaceae, Rubiaceae, Smilacaceae, Solanaceae, Urticaceae, Vitaceae e Zingiberaceae. Com funções endócrinas e nutricionais, foram listadas espécies da família Amaranthaceae. Para doenças de pele, as famílias Portulacaceae e Vitaceae. **Discussão/Conclusões:** Os resultados mostraram que os curandeiros tradicionais possuem algum conhecimento sobre diversas doenças. No entanto, são necessárias investigações científicas sobre os efeitos e toxicidade dos medicamentos fitoterápicos usados para tratá-los.

Keywords: Ethnophamacology; Medium Xingu; Amazon; Brazil; Traditional medicine.

The Amazonian peoples have medicinal knowledge built by symbiosis with the forest. This fact reinforces the importance of studies on the traditional use of natural products, describing the plants used for medicinal purposes. Therefore, this work aimed to carry out an ethnopharmacological survey of plants used by residents of the middle Xingu region, Pará, Brazil. **Methods:** Questionnaires based on the therapeutic use of plants were used. **Results:** 36 people were interviewed and 38 plants were described. Of the cataloged species, there was a greater number used in the treatment of infectious, digestive and circulatory diseases, with 21 plant species cited for the treatment of these diseases (the Lamiaceae family was the most cited with popular names). Other families demonstrated use associated with the treatment of infectious and parasitic diseases: Acanthaceae, Annonaceae, Bignoniaceae, Costaceae, Crassulaceae, Cucurbitaceae, Lecythidaceae, Plantaginaceae, Portulacaceae, Rubiaceae, Smilacaceae, Solanaceae, Urticaceae, Vitaceae and Zingiberaceae. With endocrine and nutritional functions, species of the Amaranthaceae family were listed. For skin diseases, the Portulacaceae and Vitaceae families. **Discussion/Conclusions:** The results showed that traditional healers have some knowledge about different diseases. However, scientific investigations are needed regarding the effects and toxicity of the herbal medicines used to treat them.

INTRODUCTION

Ethnopharmacology is a field of ethnobiology that studies the complex relationships human set societies (present and past) with plants and animals, especially medicines, used in traditional medicine systems (BEAL and REINHARD, 1980; BERLINK, 2012). Plants use represented, for centuries, the only therapeutic agents' source for humankind. In the 19th

century beginning, in pharmaceutical chemistry development, plants represented the primary source of substances for drug development (HOSTETTMANN, QUEIROZ and VIEIRA, 2003). Conducting ethnopharmacological studies has several advantages. Through them, it is possible to formulate valuable hypotheses about the pharmacological activities of plants and animals mentioned by a population of a specific region, since the traditional use can be seen as a pre-screening for pre-clinical evaluations (HUGHES et al., 2022). The popular use of plants led to research on the definition of their biological properties and their derivatives. From these works, more and more phytochemicals with excellent pharmacological properties were discovered, sometimes proving the efficacy found in empirical use (KRISHNAN et al., 2014).

Brazil has approximately 5.44 million km^2 of forests, including the Amazon rainforest, which concentrates the greatest biodiversity of medicinal, edible, oilseed and coloring plant species on the planet, and also has a high degree of endemism. However, brazilian ethnopharmacology and ethobiology publications are still scarce and requires an immersion in sociocultural systems, usually based on a patriarchal logic and thus, ethnopharmacological knowledge that spans generations is devalued and often lost due to registration lack (SILVA et al., 2019). The middle Xingu has a lot of medicinal knowledge built up over centuries of interaction with the Amazon Rainforest. Even though it is ancient knowledge, the use of natural resources remains current, representing the cultural identity of the community. However, ethnopharmacological studies involving this region are scarce and the use of herbs and their associated knowledge are disappearing at an alarming rate in the Amazon Rainforest, as well as in other biomes around the world (REYES-GARCÍA et al., 2014; PEDROLLO et al., 2016). Thus, this article aims to carry out an ethnopharmacological survey of natural products used in the Middle Xingu region and describe the biologically active principles derived from medicinal plants, as well as create a database for the uses of natural medicinal products.

METHODS

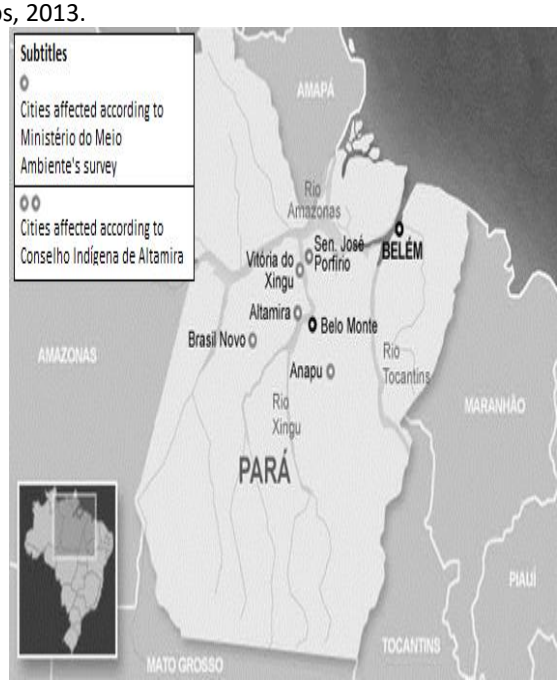
RESEARCH DESIGN

This is a prospective study, based on an ethnopharmacological survey of natural products used by residents of: Altamira, Anapú, Brasil Novo, Senador José Porfírio and Vitória do Xingu. The data collected from the questionnaire are based on the observation and description of the use of plants for therapeutic purposes by people or social groups in the Middle Xingu region.

PLACE

The study area is 195.300.790 km², covering the cities: Altamira, Anapú, Brasil Novo, Senador José Porfírio and Vitória do Xingu, resulting in a total population of 161.784.000 according to the 2010 IBGE demographic census (Figure 1).

Figure 1 - Middle Xingu region map, highlighting the 5 cities location reported in the study. Source: adapted from World Maps, 2013.



TARGET POPULATION

This population includes Amazon people who live in cities around Xingu River, both genders, aged over eighteen years, mainly elderly people indicated as knowing natural resources for medicinal purposes. These people were part of riverside community and/or were descendants of indigenous ethnicgroups - Xipaya, Kuruaya, Kayapo.

DATA COLLECTION

Data collection was carried out from November 2017 to February 2019, through interviews, group discussions with knowledgeable people, and meetings with practitioners of medicinal therapies, in which two questionnaires were applied to users of medicinal therapies: questionnaire A (identification, level of education,) and questionnaire B (identification, origin of learning about medicinal plants, therapeutic use applied to the acquired acquaintance, main pathologies treated, popular name of the plant and method of preparation). Each resident who agreed to participate in the ethnopharmacological survey in the region signed an informed consent form. The popular plants' names were assigned and, later, crossed (local/scientific names). The Xingu River region collected samples were identified with popular region members and confirmed by Orlando Santa Brigida Lisboa with the botanical identification report issued by Embrapa Oriental NID 19 2018 and NID 30/2018 - EMBRAPA ORIENTAL, comparison with exsiccata from the IAN herbarium collection.

STATISTICAL ANALYSIS

The data were collected and entered in Microsoft® Office Excel® 2016 software. In the application of Descriptive Statistics, tables were constructed to present the founded

results. Analytical statistics were used to evaluate the sample results variables through the G Adherence Tests for univariate tables. Descriptive and analytical statistics were performed using BioEstat® 5.4 software. It adopted a P-value less than or equal to 0.05 as a significance level, indicating significant values with an asterisk (*).

a) Quantitative indexes for medicinal plants

a.1) Use value

The use value shows the relative importance of plants known locally (VITALINI et al., 2013). It is calculated as follows; use value=ΣUi/N, where Ui is the total number of citations per species, and N is the total number of informants.

a.2) Informant consensus factor (FIC)

FIC was used for the general analysis of plants used by the informants. FIC indicates how homogenous the information obtained, and it is calculated based on the following formula: FIC= (Nur-Nt) / (Nur-1) where, Nur is the number of individual use reports for a particular illness category, Nt is the total number of species used by all informants for this illness category (CHEIKHYOUSSEF et al,. 2011). FIC values ranged from 0.00 to 1.00.

a.3) The fidelity level (FL)

The FL, is the ratio between the number of informants who independently suggested the use of a species for the same major purpose and the total number of informants who mentioned the species for any use, was calculated for the most frequently reported diseases or ailments for the categories with the highest FIC (ANDRADE-CETTO and HEINRICH, 2011). It is calculated as follows: FL(%) =Np/Nx100; where Np is the number of informants that claimed a use of a species to treat a particular disease, and N is the number of informants that used the plants as a medicine to treat a particular disease.

ETHICAL ASPECTS

Ethical aspects were respected at all study stages, in accordance with National Health Council (CNS)/Ministry of Health (MS) Resolutions 466/12 and 510/16, which deal with standards for research involving human beings. The present work was submitted to the Research Ethics Committee of the Institute of Health Sciences/Federal University of Pará, so that, after its approval, data collection began, as provided for in resolution CAAE 54932715.7 .0000.0018.

RESULTS AND DISCUSSION

SOCIODEMOGRAPHIC DATA

The ethnopharmacological research of natural products was carried out in the middle Xingu region, which includes the cities of Altamira, Anapú, Brasil Novo, Senador José Porfírio and Vitória do Xingu from November 2019 to February 2020. During this period, about 36 people were interviewed among them are the riverside people, as well as the urban and rural population, who use folk and traditional medicine as a natural practice in their daily lives.

As for the interviewee's sex, 31 (86.1%) were female and only 5 (13.9%) were male (Table 1). Through this analysis, it was noticed that the female gender prevailed in this research, corroborating the national and international ethnobotanical medicinal studies (MARINHO, SILVA and ANDRADE, 2011; ASHUR et al., 2017). Nacional Studies like Borba and Marcedo (2006), and Vasquez, Mendonça, and Noda (2014), and international study by Shewamene, Dune, and Smith (2021) complete the female higher prevalence evidence in research related to these studies, they define that women's knowledge about medicinal plants is quite broad and diversified, as they are responsible for medicines preparation and family's health care. The interviewees' ages ranged from 20 to 80 years or more, with a 41.7% percentage in the age group ranging from 60 to 79 years (Table 1). In previous works with medicinal plants, similar data were found Silva and Souza (2007) study showed in an analysis of a medicinal plants ethnobotanical survey used by the Vila Canaã population in the southwest region of Pará (Brazil), the participants' ages ranged from 24 to 82 years. It is associated with a high rate of use of traditional drugs with advanced age (SEO et al., 2013). The studies by these authors on the advanced age of informants about traditional knowledge of folk medicine reveal that traditional communities have some difficulty in recognizing the younger population as knowledgeable about the local vegetation.

Respondents' schooling was divided into five groups, and it is important to note that 41.7% of the participants had completed elementary school, 27.8% had completed high school, 5.6% had higher education and 27% had no schooling (or did not declare it) (Table 1). People with little or no education choose treatment for their illnesses through folk medicine while those with higher education prefer the use of modern medicines (PELTZER and PENGPID, 2018; KIM et al., 2020). This fact suggests that the level of education can influence the interest in the knowledge of medicinal plants. One cannot fail to mention the high influence of indigenous culture and riverside communities in this region. However, the literature also reports an increase in the use of alternative therapies and traditional medicine among the population with advanced levels of education (KARATAS et al., 2021).

Table 1- Sociodemographic Respondents Data.

Sociodemographic Data		Frequency	(N = 36)
Sex	Female	31	86.1%*
	Male	5	13.9%
Age	20 a 39	6	16.7%
	40 a 59	10	27.8%*
	60 a 79*	15	41.7%*
	> = 80	5	13.9%

Schooling	Elementary and middle school*	15	41.7%*
	High school	10	27.8%*
	Higher education	2	5.6%
	No schooling	4	11.1%
	Did not declare	5	13.9%*

G Adherence Tests p<0.05.

CATALOGED SPECIES RECORDS

There was a greater specimen's number used to treat infectious and/or parasitic diseases, corresponding to 31.8% of the study sample, followed by Digestive system, Circulatory system, Respiratory system, Endocrine, nutritional and metabolic, Indefinite pain or illness, Genitourinary system. The smallest amount referring to plants being used to treat skin and subcutaneous diseases, in addition to the ear and mastoid process, both corresponding to 1.5% of the samples (Table 2).

Table 2: Table with the cataloged species records.

Disease Category	Disease	Citation number	%
Infectious and parasitic diseases	Amoeba, Antibiotic, Bacteria, Urinary Infection, Malaria, Inflammation, Parasites, Measles, Syphilis, Cough, Tuberculosis, Worm, Viruses, Dengue Fever, Infection, Diarrhea, Fever, Women's Inflammations	64	31.8%
Digestive system	Abdominal pain, Stomach pain, Gas, Gastritis, Hemorrhoid, Purgative, Ulcer, Vomiting	32	15.9%
Circulatory system	Anemia, High blood pressure, Cardiovascular, Erysipelas, Bleeding, Varicose veins	25	12.4%
Respiratory system	Bronchitis, Sore throat, Influenza, Pneumonia, Lung problem, Catarrh, Hoarseness	22	10.9%
Endocrine, nutritional and metabolic	Calming, Cancer, Cholesterol, Menopause, Diabetes	20	10.0%
Indefinite pain or illness	Cramps, Headache, Injury, Pain	18	9.0%
Genitourinary system	Discharge, Diuretic, Uterus Inflammation, Kidneys	14	7.0%
Ear and mastoid process	Ear pain	3	1.5%
Skin and subcutaneous tissue	Chickenpox, redness	3	1.5%

Regarding the cataloged species records, 38 species have been identified (Table 3). Given the following analyses, it was noticed that the plant family with the highest citation number by popular names and UV was Lamiaceae (Table 3). Still, on the indications for treatment, 21 species were mentioned for the treatment of infectious and parasitic diseases 38 times, which generated as data for the study, an 0.46 FIC and an FL of 100% Tables 4 and 5). The great xpression in citations related to infectious and parasitic diseases agrees with the great applicability of medicinal plants for these purposes (KONÉ, VARGAS and KEISER, 2012; TARIQ et al., 2016; COCK, SELESHO and VAN VUUREN, 2018). Infections and Parasitic diseases continue to represent a threat on a global scale, particularly among the poorest and developing countries. This is particularly because of the absence of vaccines, medicines cost, and in some cases, resistance to available drugs (SIMOBEN et al., 2018). The control of the prescription of agents applied to infections and less access of populations of these regions to specialized health service also contributes to the great applicability of traditional medicine for these purposes.

Table 3: Mentioned plants Cataloging

Family	Cientific name	Brazilian popular name	UV	Citation number	%	IAN reference
Lamiaceae	*Zingiber officinale Roscoe*	Gervrão	0.056	8	22.2%	IAN 194428

	Citrus aurantium L.	Malva grossa				IAN 187089
	Ocimum basilicum L.	Manjericão				IAN182653
Myrtaceae	*Syzygium cumini (L.) Skeels*	Ameixa	0.028	4	11.1%	IAN 196673
	Psidium guajava L.	Goiabinha				IAN 194175
	Eugenia uniflora L.	Pitanga				IAN 192840
Amaranthaceae	*Chenopodium ambrosioides L.*	Matruz	0.021	3	8.3%	IAN 171762
Asteraceae	*Vernonia condensata Backer*	Boldo	0.021	3	8.3%	IAN 182462
	Acmella oleracea	Jambú				IAN 164099
Piperaceae	*Peperomia pellucida L.*	Erva de jabuti	0.021	3	8.3%	IAN 182656
	Piper umbellatum L.	Pariparoba				IAN 193475
Apiaceae	*Eryngium foetidum L.*	Chicória	0.014	2	5.6%	IAN 195375
	Pimpinella anisum L.	Erva-doce				Sem IAN
Bignoniaceae	*Tabebuia* sp.	Ipê-roxo	0.014	2	5.6%	IAN 109826
	Friderichia chica (Bonpl.) L.G.Lohmann	Pariri				IAN 194488
Leguminosae-Caesalpinioideae	*Campsiandra laurifolia Benth.*	Capoeirana	0.014	2	5.6%	IAN 196671
	Hymenaea courbaril L.	Jatobá				IANXILO5633X.
Malvaceae	*Gossypium arboreum L.*	Algodão-roxo	0.014	2	5.6%	IAN 192977
	Hibiscus acetosella Welw. ex Hiern	Vinagreira-rosa				IAN 192974
Rubiaceae	*Uncaria tomentosa*	Unha-de-gato	0.007	1	2.8%	IAN 194906
Verbenaceae	Stachytarpheta cayennensis **(Rich.) Vahl**	Gervrão	0.007	1	2.8%	IAN 196747
Zingiberaceae	*Zingiber officinale Roscoe*	Gengibre	0.014	2	5.6%	IAN 194428
Acanthaceae	*Justicia pectoralis Jacq.*	Cumaruzinho	0.007	1	2.8%	IAN 186267
Anacardiaceae	*Anacardium occidentale L.*	Caju	0.007	1	2.8%	IAN 199380
Annonaceae	*Annona muricata*	Graviola	0.007	1	2.8%	IAN 188179
Bixaceae	*Bixa orellana L.*	Urucum	0.007	1	2.8%	IAN 197436
Costaceae	*Costus spicatus (Jacq.) Sw*	Canarana	0.007	1	2.8%	IAN 185942
Cucurbitaceae	*Momordica charantia L.*	Melão-São-Caetano	0.007	1	2.8%	IAN 194437
Lauraceae	*Cinnamomum verum*	Canela	0.007	1	2.8%	IAN 198229
Loranthaceae	*Struthanthus flexicaulis (Mart. ex Schult. f.) Mart.*	Erva de passarinho	0.007	1	2.8%	IAN 129605
Lythraceae	*Punica granatum*	Romã	0.007	1	2.8%	IAN 198965
Phyllanthaceae	*Phyllanthus niruri L.*	Quebra-pedra	0.007	1	2.8%	IAN 185164
Plantaginaceae	*Scoparia dulcis L.*	Vassurinha	0.007	1	2.8%	IAN 182534
Portulacaceae	*Portulaca pilosa L.*	Amor-crescido	0.007	1	2.8%	IAN 193442
Rutaceae	*Citrus aurantium L.*	Laranja	0.007	1	2.8%	IAN 187089
Solanaceae	*Solanum lycocarpum*	Jurubeba	0.007	1	2.8%	IAN 100754
Urticaceae	*Urtica dioica L.*	Urtiga	0.007	1	2.8%	IAN 60741
Vitaceae	*Cissus verticillata (L.) Nicolson & C.E. Jarvis*	Insulina	0.007	1	2.8%	IAN 174689

Table 4: Disease treated with the mentioned plants

Desease Category	Species number	Citation nunber	FIC
Infectious and parasitic diseases	21	38	0.46
Digestive system	14	27	0.50
Circulatory system	11	13	0.17
Respiratory system	8	13	0.42

Genitourinary system	7	8	0.14
Endocrine, nutritional and metabolic	3	13	0.83
Indefinite pain or illness	2	14	0.92
Ear and mastoid process	1	2	1.00
Skin and subcutaneous tissue	2	2	0.50

Table 5: Treatment indication according to the family class

Desease Category	Family	FL%
Infectious and parasitic diseases	Acanthaceae	100
	Annonaceae	100
	Bignoniaceae	100
	Costaceae	100
	Crassulaceae	100
	Cucurbitaceae	100
	Lecythidaceae	100
	Plantaginaceae	100
	Portulacaceae	100
	Rubiaceae	100
	Smilacaceae	100
	Solanaceae	100
	Urticaceae	100
	Vitaceae	100
	Zingiberaceae	100
	Lamiaceae	100
	Piperaceae	67
	Apiaceae	50
	Myrtaceae	50
	Verbenaceae	50
	Amaranthaceae	33
Circulatory system	Apiaceae	100
	Bixaceae	100
	Brassicaceae	100
	Cupressaceae	100
	Lauraceae	100
	Lecythidaceae	100
	Petiveriaceae	100
	Turneraceae	100
	Piperaceae	67
	Bignoniaceae	50
	Myrtaceae	25
Digestive system	Acanthaceae	100
	Apiaceae	100
	Brassicaceae	100
	Cucurbitaceae	100
	Petiveriaceae	100
	Rutaceae	100
	Smilacaceae	100
	Solanaceae	100
	Lamiaceae	100
	Asteraceae	67
	Myrtaceae	50
	Verbenaceae	50
	Amaranthaceae	33
	Piperaceae	33
Respiratory system	Acanthaceae	100
	Bixaceae	100
	Crassulaceae	100
	Lythraceae	100
	Plantaginaceae	100
	Lamiaceae	100
	Apiaceae	50
	Myrtaceae	25
	Lythraceae	100
	Brassicaceae	100
Genitourinary system	Costaceae	100
	Phyllanthaceae	100
	Rubiaceae	100
	Zingiberaceae	50
	Piperaceae	33
Endocrine, nutritional and metabolic	Amaranthaceae	100
	Portulacaceae	100
	Vitaceae	100
	Amaranthaceae	100
	Portulacaceae	100
Skin and subcutaneous tissue	Portulacaceae	100
	Zingiberaceae	50
Ear and mastoid process	Amaranthaceae	67

It was observed in the research that many of these specimens are historically cultivated in residences, whose use

has been reproduced over time. The Lamiaceae plant family consists of a plant species variety with economic and medicinal value (GRAS et al., 2021). According to the Missouri Botanical Garden (2016), this family currently contains about 258 genera and 7.193 species, with an average of 23 genera and 232 native species present in Brazil. It is a family of cosmopolitan plants, originating in the Mediterranean, Middle East, and subtropical mountains. Khajuria et al. (2021) concluded in their research that Lamiaceae is one of the most used families in ethnopharmacological studies in recent times. Several expressive citations (FL 100) demonstrate the role of the Lamiaceae and Asteraceae families in infectious and parasitic diseases, as well as digestive and nutritional diseases (NGEZAHAYO et al., 2015; DKHIL et al., 2021; GRAS et al., 2021). In addition, studies reveal that Lamiaceae was used in the treatment of respiratory infections - FL 100 as well as the antiallergic potential of plants belonging to this family (YORK, DE WET and VAN VUUREN, 2011; SIM, ABD RANI, and HUSAIN, 2019). It is also worth mentioning that the predominance of Lamiaceae, followed by Asteraceae, was also recorded by Zank and Hanazaki (2012) on the coast of Santa Catarina and by Almeida et al. (2012) in northeastern Brazil. In these works, the extracts were made from the aerial parts (leaves and flowers) of the plants, being made in the form of a decoction for oral administration.

As shown in Table 5, the other families with 100% LF for Infectious and Parasitic Diseases also have their use associated with this purpose, such as Acanthaceae; Annonaceae; Bignoniaceae and Costaceae[37]; Crassulaceae and Cucurbitaceae; Lecythidaceae; Plantaginaceae, Portulacaceae and Rubiaceae; Smilacaceae and Solanaceae; Urticaceae, Vitaceae and Zingiberaceae (NAMS, MANDAL and TANGIANG, 2011; LORENZO et al., 2020; ONANUGA and OLOVEDE, 2021; FAROOQ et al., 2008; OLIVEIRA et al., 2015; SINGH and SHARMA, 2020; AWADH ALI et al., 2017; ELSHAMY et al., 2019). Regarding the endocrine, nutritional and metabolic systems, the most cited families were Amaranthaceae and Portulacaceae and Vitaceae (FL 100%) (CUSTÓDIO et al., 2021). For studies involving skin and subcutaneous tissue, the Portulacaceae family proved to be relevant due to its analgesic and anti-inflammatory effects (CHAN et al., 2000).

Among the species most related to local knowledge, Plectranthus neochilus Schlechter - Lamiaceae; Syzygium cumini (L.) Skeels - Myrtaceae; Chenopodium ambrosioides L - Amaranthaceae; Vernonia condensata Backer - Asteraceae; results that are in agreement with the identified and most cited families.

The prevailing report in the interviews was the great need to transfer this traditional knowledge, as well as the development of actions in the environment of environmental preservation. Different methods used in ethnobotanical and ecological studies to record plant biodiversity are being developed in Brazil (SILVA et al., 2014), a fact that has expanded the knowledge of agrobiodiversity preserved in riverside communities (and other traditional communities) and, thus, helped in the conservation of regional agrobiota (QUE et al., 2016; CUNNINGHAM et al., 2019). Brazil has one of the greatest biodiversity of species in the world, and most of them are used as a source of medicines to cure diseases. However, the strong anthropic pressure that ecosystems have been suffering is currently observed, due to the growth of industries, extractivism, and fires, resulting in the loss of a large part of the green areas, which sustain the culture and traditions of the communities. Traditions that depend on nature's biodiversity resources to survive. Studies carried out in Brazil already state that strategies are needed to promote the best use and conservation of this rich heritage offered by Brazilian biodiversity (BRANDÃO et al., 2013).

Environmental changes in this region, such as the construction of dams on the Xingu River, could have a long-term impact on the decline of the region's native flora closely associated with users of traditional medicines. It is also worth mentioning that the exploitation of natural environments by traditional peoples provides us with subsidies for sustainable management and exploitation strategies in the long term. Currently, the concern with the environmental issue is the focus of great debates, as well as discussions about the importance of the survival of the global ecosystem and our own species. Such debates ratify the importance of the soil and its influences on the climate, vegetation and, consequently, the preservation of medicinal plants in the regions of traditional peoples.

Through the analysis of this research, it is extremely important to point out that the information provided in this article is limited and there is always room to initiate more ethnopharmacological studies in the Middle Xingu region, as much as possible. It is important to highlight the issue of preserving popular knowledge in these traditional peoples of the region, as well as the proposal of health education based on the use of this traditional medicine in a rational and exemplary way.

CONCLUSION

The findings of this study showed that traditional healers from the Middle Xingu Amazon have some knowledge about the main applications for the treatment of infections and parasitic diseases. However, scientific investigations are needed regarding the effects and toxicity of herbal preparations used by local healers of their local flora. The findings of this study showed that traditional healers from the Middle Xingu Amazon have some knowledge about the main applications for the treatment of infections and parasitic diseases. However, scientific investigations are needed regarding the effects and toxicity of herbal preparations used by local healers of their local flora.

Despite the great diversity of native medicinal plants used in Brazil, and the current scenario of degradation of Brazilian plant formations, few studies establish priority species for conservation. These studies, involving biological, economic, cultural and social aspects, become necessary at the national, regional and local levels. In this way, the valorization of ethnoknowledge in relation to the therapeutic properties of plants and popular knowledge have proved to be a strong support of technical-scientific knowledge. It can also be seen

that the recovery of degraded environments will allow for the improvement of water quality, reduction of erosion, food for fauna and flora, as well as a refuge for the biodiversity of medicinal plants and conservation of traditional knowledge derived from nature. In addition, it will record and value the medicinal therapeutic culture of the traditional peoples of the Amazon region, recognizing the diverse natural habitats existing in this region.

ACKNOWLEDGMENTS

We are most grateful to the wonderful people in the study communities for their hospitality during fieldwork and permission to publish the data. Special thanks to Mr. **Orlando Santa Brigida Lisboa** of Botany Laboratory, Embrapa Amazônia Oriental Brazilian Agricultural Research Corporation (Embrapa) Belém-Pará, Brazil for assistance with the identification of plants. PROEX - Federal University of Pará, Belém, Pará, Brazil for granting scholarships to undergraduate students

CONFLICTS OF INTERESTS

The authors declare that they have no conflicts of interests.

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Submissão: 06/03/2023
Aprovado para publicação: 16/05/2023