

THERAPEUTICAL PURPOSE OF MEDICINAL PLANT AND LOCAL HERBAL PRACTITIONERS BY PITAGUARY'S COMMUNITY FROM MARACANAÚ/CE

FINALIDADE TERAPÊUTICA DE PLANTAS MEDICINAIS E ERVAS LOCAIS PELA COMUNIDADE INDÍGENA PITAGUARY EM MARACANAÚ/CE

FINALIDAD TERAPÉUTICA DE PLANTAS MEDICINALES Y HERBOLARIOS LOCALES DE LA COMUNIDAD DE PITAGUARY DE MARACANAÚ/CE

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ABSTRACT

The therapeutic use of plants throughout history has been based on the intuitive and speculative knowledge of men and women, who, over time, learned to differentiate the beneficial herbs from those toxic to health. This study aimed understand the influence of the medicinal plants in therapeutic treatment in a indigenous community in Maracanaú-CE. An observational and descriptive case with the Pitaguary indigenous group, in the use of natural plants as medicinal treatment, in Maracanaú-CE. The interviews occurred on 09-11/2017 with the use of a questionnaire adapted from the SATIS-BR scale. Our results showed 25 types of medicinal plants used by Pitaguary's communities and 15 kinds of association among natural products useful to treat diverse physiological disorders. The article shows the importance of knowing the treatment with natural products and the influence on traditional treatment.

Descriptors: *Indigenous; Medicinal; Plant.*

RESUMO

O uso terapêutico das plantas ao longo da história baseou-se no conhecimento intuitivo e especulativo de homens e mulheres, que, ao longo do tempo, aprenderam a diferenciar as ervas benéficas daquelas tóxicas à saúde. Este estudo teve como objetivo compreender a influência das plantas medicinais no tratamento terapêutico em uma comunidade indígena de Maracanaú-CE. Um caso observacional e descritivo com o grupo indígena Pitaguary, no uso de plantas naturais como tratamento medicinal, em Maracanaú-CE. As entrevistas ocorreram nos dias 09-11/2017 com a utilização de um questionário adaptado da escala SATIS-BR. Nossos resultados mostraram 25 tipos de plantas medicinais utilizadas pelas comunidades do Pitaguary e 15 tipos de associação entre produtos naturais úteis no tratamento de diversos distúrbios fisiológicos. O artigo mostra a importância de conhecer o tratamento com produtos naturais e a influência no tratamento tradicional.


Descritores: *Indígenas; Medicinal; Planta.*


RESUMEN


O uso terapêutico das plantas ao longo da história baseou-se no conhecimento intuitivo e especulativo de homens e mulheres, que, ao longo do tempo, aprenderam a diferenciar as ervas benéficas daquelas tóxicas à saúde. Este estudo teve como objetivo compreender a influência das plantas medicinais no tratamento terapêutico em uma comunidade indígena de Maracanaú-CE. Um caso observacional e descritivo com o grupo indígena Pitaguary, no uso de plantas naturais como tratamento medicinal, em Maracanaú-CE. As entrevistas ocorreram nos dias 09-11/2017 com a utilização de um questionário adaptado da escala SATIS-BR. Nossos resultados mostraram 25 tipos de plantas medicinais utilizadas pelas comunidades do Pitaguary e 15 tipos de associação entre produtos naturais úteis no tratamento de diversos distúrbios fisiológicos. O artigo mostra a importância de conhecer o tratamento com produtos naturais e a influência no tratamento tradicional.


Descriptores: *Indígena; Medicinal; Planta.*


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INTRODUCTION

Therapeutic purpose from medicinal plants² and natural products obtained from plants have been the effort focus to discover new molecules of pharmacological and biomedical interest³. Several of the bioactive plant molecules, has been used to treat different kinds of disease, such as gastritis⁴, cancer⁵, pain inflammation⁶, diabetes⁷, pancreatitis⁸, acute and chronic wounds⁹.

The World Health Organization (WHO) estimates that 80% of world's populations has been used medicinal plants and phytotherapies represent an approximately \$14 billion/year industry, which is about 5 % of the current \$280 billion/year market. More than 50% of prescribed drugs in the last years, 24 % are derivatives from plant species, 9 % are synthetic products modeled from natural products, 6 % are extracted directly from the plant species, and 5 % are of animal origin¹⁰. In accordance with Bitu et al.², some factors have influenced the community to use medicinal plants such as: low cost, difficulty to access health care systems, the popular idea about don't have side effects, the easy cultivation and access at home or markets. WHO has reported that 80% of the population in under-developed countries depend on natural plants to medicinal uses.

Originally, indigenous has been use natural plants as medicinal treatment since 1770 B.C in Asian countries¹¹. The last decades have reported studies with indigenous medicinal plants and their uses for therapeutic applications at different indigenous populations such as Pakistan¹², Argentina¹³, Iran¹⁴, Guinea-Bissau¹⁵ and Brazil¹⁶.

According to the indigenous tradition, medicinal plants has been used by the population nowadays as a homemade medication. This fact exists based in the difficulties of the access by indigenous to a good system of medication and doctors. Problems such as health clinics, with minimum equipment to treat people, difficulty access by car to the community and do not have a public transportation cause more difficulties to access the clinics and treatment^{1,2}.

For centuries plants have represented the only resource for treatment of disease. Indigenous knowledge about the effect of natural plants is involving to development of new pharmacological targets and drugs. Effects such as antimicrobial activity by plants from indigenous in Brazil¹⁷ and the potent inhibitor of Dengue and Zika virus infection in human cells¹⁸ are examples of importance to understand more about natural products used by this population.

Our research area was the Pitaguary's indigenous group, located in north Ceara State in Northeast Brazil. The group lives in Maracanaú, Maranguape and Pacatuba, has the source name from Potiguara indigenous group since 1603¹⁹.

This study aimed to evaluate to survey the plants used by all families from Pitaguary's group living in Maracanaú/CE for **Therapeutic purpose of medicinal plant and local herbal practitioners reported by Pitaguary's community from Maracanaú/CE** to answer the following question: Which plants the pitaguary's group are using to prevent disease? What is the influence of this plants for traditional treatment in chronic disease? What is the method of preparation and plant parts indicated by leader of indigenous group called "Pajé" for therapeutic use?

METHODS

LOCATION AND CHARACTERIZATION OF THE STUDY AREA

Our study proposes an observational case and descriptive with indigenous living at Pitaguary's village in Maracanaú-CE. The Pitaguary's indigenous land located in Maracanaú and Pacatuba in Ceará (CE) state is compound by four indigenous tribe such as Olho d'agua, Horto, Santo Antônio and Monguba groups¹⁹. Maracanaú is a city located in metropolitan region of Fortaleza-CE and Pitaguary's indigenous is part of their population. Pitaguary's tribe has 2881 indigenous divide in 4 groups according to Special Indigenous Secretary of Health.

DATA COLLECTION PROCEDURES

The research occurred between September 2017 and January 2018, Approved by the ethics committee for human research with the number 1.331.534. Resolution 196/96 was obeyed, informed consent term signed for each family and the personal data of the participants were kept confidential.

The indigenous population interviewed in this study were two hundred and forty-three families living at Pitaguary's communities from four hundred families indexed.

Community health workers and researchers collected data using an adapted questionnaire from scale satisfaction in mental health: SATIS-BR, visiting each family to know the community culture about sociodemographic profile, medicinal plant's use, and lifestyle. The interviewed must be legal adulthood, sign informed consent form and have a family living inside indigenous land. People who did not meet the criteria mentioned did not participate in the research.

DATA ANALYSIS

The results were calculated based on information of population through the questionnaire. Tables were built with information from natural plants, part of the plant, form of preparation and indications of use to analyze the influence of natural products in physiological systems.

RESULTS

SOCIODEMOGRAPHIC PROFILE OF RESPONDENTS

Two hundred and forty-three families living at Pitaguary's communities were interviewed from four hundred families indexed. 81.25% were married and main responsible for their family. 18.75% of interviewed were single and living with their families. 55.51% work at home taking care of their families, 8.09% are employed and 36.4% included people retired or have other way to sustain their families. About schooling, most of them (38.24%) have more than 8 years of study, 27.21% between 4 and 8 years and 34.55% have less than 4 years at school.

When questioned about their life's style, 80.51% is not doing any exercise versus 19.49% do some weekly exercise. This community is predominantly not smoky (87.50%), however consider them with a high level of stress (58.09%). Just 16.91% drink alcohol and 61.76% consider with a good quality of sleep.

DATA RELATING TO MEDICINAL PLANTS USED

The community reported that 33.82% say to change traditional medicine by medicinal plants, 34.56% make an association between medication for chronic disease and medicinal plants and 60.66% justify with no side effects from natural products. Table 01 shows us the number of medicinal plants used by Pitaguarys, some of them associated to another plant, part, form, and indications of this plant. Family suggestion was catalog in Table one as reported by population and the catalog about the plants is necessary in that community.

The Pitaguary's community does not have herbarium with the plants comes from community. 14 associations between natural products were reported by community. Most of the community (65.2%) used leaves as part of plant to prepare as medication and 81.8% prepared as decoction while 13.6% used sauce as form of preparation. In table 2 was reported how many different natural products were suggested to use in the same body system. The system that this community has use more natural product is digestive system and second respiratory system followed by pain and inflammation, nervous system, disorders at epithelial, cardiac, urinary and blood systems (Table 2).

Table 1: List of plants used by Pitaguary's indigenous group in Maracanaú, State of Ceará, Northeast, Brazil.

Family suggestion	Popular name	Herbarium	Voucher N°	Part of plant	Form of preparation	Indications of use
Turneraceae	Xanana	-	-	BA	Immersion	Inflammation
Myrtaceae	Eucalipto	-	-	LE	Infusion	Fever, congestion
Myrtaceae	Olho da goiabeira	-	-	LE	Decoction	Intestinal cramps
Monimiaceae	Boldo	-	-	LE	Decoction	Intestinal cramps
Malvaceae	Malvarisco	-	-	LE	Decoction or sauce	Flu, cold, expectoration
Anacardiaceae	Casca da Arueira	-	-	BA	Decoction	Inflammation
Acanthaceae	Anador	-	-	BA	Decoction	Fever, intestinal cramps
Fabaceae	Casca do Jatóba	-	-	BA	Sauce	Flu, cold
Amaranthaceae	Mastruz	-	-	LE	Decoction	Inflammation
-	Martelo	-	-	-	Decoction	Intestinal cramps
Olacáceas	Ameixa	-	-	BA	Decoction or sauce	Inflammation
Oleáceas	Folha da azeitona	-	-	LE	Decoction	Blood pression
Punicaceae	Romã	-	-	FT	Decoction	Inflmmation and fever
Fabaceae	Folha da mucuna	-	-	LE	Powder	Injury, skin lesion
Lamiaceae	Hortelã	-	-	LE	Sauce or decoction	Asthma and anxiety
Lamiaceae	Cidreira	-	-	LE	Decoction	anxiety
Apiaceae	Erva doce	-	-	LE	Decoction	anxiety
Musaceae	Bananeira	-	-	LE	Decoction	Gastrointestinal cramps and diarrhea
Crassulaceae	Corama	-	-	LE	Decoction	Inflammation
Rutáceas	Casca da Laranja	-	-	FT	Decoction	Intestinal cramps
Asteraceae	Camomila	-	-	LE	Decoction	Anxiety
<i>Gramíneas</i>	Capim santo	-	-	LE	Decoction	Anxiety
Zingiberáceas	Colônia	-	-	LE	Decoction	Heart disease
Polygonaceae	Casca do pajeu	-	-	BA	Decoction	Kidney pain
Oxalidaceae	Folha da carambola	-	-	LE	Decoction	Blood pression
ASSOCIATIONS						
Lamiaceae e Amaranthaceae	Cidreira e Mastruz (AS1)	-	-	LE	Decoction	Intestinal cramps
Lamiaceae e Myrtaceae	Alfavaca e Eucalipto (AS2)	-	-	LE	Decoction	Flu, cold
Pedaliaceae + Asteraceae	Gergelim com Girassol (AS3)	-	-	SE	Mixed in blender	Prevention disease
<i>Lamiaceae + Gramíneas + Monimiaceae + Rutaceae</i>	Hortelã, Capim Santo, Boldo e Casca de Laranja (AS4)	-	-	LE+ LE + LE + FT	Decoction	Intestinal cramps
<i>Amaryllidaceae + Rubiaceae + Rutaceae</i>	Alho + Café + Casca de laranja (AS5)	-	-	SE + SE + FT	Decoction	Flu, cold

Malvaceae + Crassulaceae + Amaranthaceae +Lamiaceae+ Amaryllidaceae + Violaceae	Malvarisco + Corama + Mastruz + Hortelã + Alho + Papaconha (AS6)	-	-	LE+LE+ LE+ LE+ SE+ LE	Sauce and Mash	Cough, expectoration
Lamiaceae + Malvaceae + (-) +Fabaceae + Punicaceae+ Caparidáceas	Hortelã + malvarisco + delegago + fedegoso + romã + mussambé (AS7)	-	-	LE	Sauce	Flu, cold, expectoration
Myrtaceae + Monimiaceae	Olho da goiabeira e boldo (AS8)	-	-	LE	Decoction	Intestinal cramps
Crassulaceae e Malvaceae	Corama e malvarisco (AS9)	-	-	LE	Decoction and sauce	Flu, cold, inflammation
Myrtaceae e Lamiaceae	Olho da goiabeira e hortelã (AS10)	-	-	LE	Decoction	Intestinal cramps
Anacardiaceae + Anacardiaceae + Olacáceas	Arueira + cajueiro + ameixa ^{AS 10}	-	-	BA	Decoction	Injury, skin lesion
Gramíneas + Lamiaceae + Lauraceae	Capim santo + cidreira + canela (AS11)	-	-	LE+ LE+ BA	Decoction	Blood pression
Fabaceae + Fabaceae + Bignoniaceae	Jatóba + angico + pau darque (AS12)	-	-	LE+LE+BA	Decoction	Inflammation
Lamiaceae + Myrtaceae	Hortelã + olho da goiabeira (AS13)	-	-	LE	Decoction	Period cramps
Myrtaceae+ Rutáceas	Eucalipto com limão (AS14)	-	-	LE+FT	Decoction	Flu, cold
Monimiaceae + Rutáceas	Boldo e casca de laranja (AS15)	-	-	LE+ FT	Decoction	Intestinal cramps

Bark (BA), Leaves (LE), Seeds (SE), Fruit (FT), Decoction (DC), Infusion (IF), Sauce (AS), Mash (MA), Mixed in blender (BL). AS(Association of natural product).

Source: own author

Table 2: Physiological disorders categories of use of medicinal plants used by Indigenous from Pitaguary’s community of Maracanaú in the state of Ceará, northeastern Brazil

Physiological disorders	Nº. Of plants and associations
Disorders of the respiratory system	9
Disorders of digestive system	9
Undefined pain and infammation	8
Disorders of the nervous system	5
Disorders of epitelial system	2
Disorders of the blood and hematopoietic organs	1
Disorders in cardiac system	1
Disorders of Genito-urinary system	1

Source: own author

DISCUSSION

Our results showed 25 types of medicinal plants used by Pitaguary's communities in Maracanaú-Ceará and 15 kinds of association among natural products they can use to treat diverse physiological disorders. Medicinal plant to treat disorders of the respiratory system together with digestive system occupy a prominent position among the community. Undefined pain and inflammation rank number two in this community correlated to what we found in the literature. Several indigenous groups around the world have been shown the importance to use medicinal plants to treat disease in their communities such as Bajur in Pakistan reported 79 medicinal plants¹¹, Guinea-Bissau with 238 medicinal plants and¹⁵, indigenous group in south of Kerman, Iran with 115 medicinal plants and Rio Negro community in Amazonas with 46 species^{14,16}.

In the history of civilizations, the use of medicinal plants has always helped in the treatment of diseases or even their cure. The therapeutic use of plants throughout history was based, above all, on the intuitive and speculative knowledge of men and women, who, over time, learned to differentiate the beneficial herbs from those toxic to health¹.

Throughout history the human being has been using plants for different purposes, among which those with medicinal purposes stand out. The uses and importance of these plants narrow the nature-culture relationship from the dissemination of knowledge about this resource, thus promoting the appreciation of the ethnoknowledge of traditional people and populations, indigenous, quilombolas etc²⁰.

Brazil is the country that holds the largest portion of the world's biodiversity, possessing the planet's greatest variety of plants distributed in different ecosystems, in which it holds approximately 24% of the world's biodiversity. Among the elements that make up such biodiversity, plants are the raw material for the manufacture of herbal medicines and other drugs.

Besides their use as substrate for the manufacture of medicines, plants are also used in popular and traditional practices as home and community remedies, a process known as traditional medicine. Brazil has a rich cultural and ethnic diversity that has resulted in a considerable accumulation of traditional knowledge and technologies passed from generation to generation, among which stands out the vast body of knowledge on the management and use of medicinal plants⁴.

Bennet & Prance²¹ assume that the most important plant in a community is the one that is the most versatile, i.e., the plant that is used to treat the widest variety of diseases and is therefore considered a "miracle drug". However, if the goal is the search for new drugs, the concordance of informants' answers about the medicinal use of a given plant is extremely important, since plants used for many purposes would have lower credibility when compared to those with greater fidelity of use.

CONCLUSION

Analyzing the study, the researchers understood the relationship of the productive chain of medicinal plants and herbal medicines, showing that there is a need for more information about the use of these products by the community studied.

It is also observed that the use of medicinal plants is used for the commercialization of products such as teas, as well as to produce seedlings, substrates, and utensils for the cultivation of these plants by the population. The use of medicinal plants and herbal medicines has gained importance in professional practice as a therapeutic form in patient care and the importance of information about the use of medicinal plants.

Medicinal plants and phytotherapy products indicated as slimming and digestive agents are the focus of formal commerce, due to the large-scale demand by the population considered economically active in society. However, there is a need for more information about the use of these products for these purposes.

With the limitation of the data found, it is suggested that other studies be carried out to prove the medicinal effects and associations, so that knowledge can be associated with the use of medicinal plants in indigenous communities, since the rescue of this conception can provide fundamental elements for proper use

in communities. New knowledge enables professionals to broaden their knowledge and practice the use of scientifically based techniques, promoting health and multiplying information.

REFERENCES

1. Ferreira ET O Uso De Plantas Mediciniais E Fitoterápicas: Uma Revisão Integra-cional Sobre O Desempenho Dos Enfermeiros. *Braz. J. Hea. Rev.*, Curitiba, v. 2, n. 3, p. 1511-1523, may./jun. 2019.
2. Bitu VCN, Carvalho NB, MatiasEF F, Lima WP, Costa P, Coutinho HDM, Me-nezes IRA. Ethnopharmacological study of plants sold for therapeutic purposes in public markets in Northeast Brazil. *Journal of Ethnopharmacology*, 172, 265–272; 2015. <https://doi.org/10.1016/j.jep.2015.06.022>
3. Balunas MJ, Kinghorn AD. Descoberta de drogas a partir de plantas medicinais. *Life Sci.* 78:431-441; 2005.
4. Pantoja PS, Assreuy AMS, Silva RO, Damasceno SRB, Mendonça VA, Mendes T. S, Morais JAV, Almeida SL, Teixeira AÉEA, Souza MHL, Pereira MG, Soares P MG. The polysaccharide-rich tea of *Ximenia americana* barks prevents indomethacin-induced gastrointestinal damage via neutrophil inhibition. *Journal of Ethnopharmacology*, 224, 195–201; 2018. <https://doi.org/10.1016/j.jep.2018.05.041>
5. Voss C, Eyol E, Frank M, Lieth C.-W, Berger MR, Voss C, Eyol E, Frank M, Lieth CW, Berger MR. Identification and characterization of riproximin, a new type II ribosome-inactivating protein with antineoplastic activity from *Ximenia americana*. *The FASEB Journal*, 20(8), 1194–1196; 2006. <https://doi.org/10.1096/fj.05-5231fje>
6. Silva-Leite KES, Assreuy AMS, Mendonça LF, Damasceno LEA, Queiroz MGR, Mourão PAS, Pires AF, Pereira MG. Polysaccharide rich fractions from barks of *Ximenia americana* inhibit peripheral inflammatory nociception in mice antinociceptive effect of *Ximenia americana* polysaccharide rich fractions. *Revista Brasileira de Farma-cognosia*, 27(3), 339–345; 2017. <https://doi.org/10.1016/j.bjp.2016.12.001>
7. Vasconcelos CFB, Maranhão HML, Batista TM, Carneiro EM, Ferreira F, Costa J, Soares LAL, Sá MDC, Souza TP, Wanderley AG. Hypoglycaemic activity and mole-cular mechanisms of *Caesalpinia ferrea* Martius bark extract on streptozotocin-induced diabetes in Wistar rats. *Journal of Ethnopharmacology*, 137(3), 1533–1541; 2011. <https://doi.org/10.1016/j.jep.2011.08.059>
8. Silva-Leite KES, Girão DKFB, Freitas PA, Assreuy AMS, Moraes PAF, Cunha AP, Ricardo NMPS, Criddle DN, Souza, MHL, Pereira MG, SoaresPMG.. *Ximenia americana* heteropolysaccharides ameliorate inflammation and visceral hypernociception in murine caerulein-induced acute pancreatitis: Involvement of CB2 receptors. *Biomedicine and Pharmacotherapy*, 106, 1317–1324; 2018. <https://doi.org/10.1016/j.biopha.2018.07.067>
9. Agyare C, Boakye YD, Bekoe EO, Hensel A, Dapaah SO, Appiah T.. Review: African medicinal plants with wound healing properties. In *Journal of Ethnopharmacol-ogy*. Elsevier Ireland Ltd. Vol. 177, pp. 85–100; 2016. <https://doi.org/10.1016/j.jep.2015.11.008>
10. Sen T, Samanta SK. Medicinal plants, human health and biodiversity: A broad review. *Advances in Biochemical Engineering/Biotechnology*, 147, 59–110; 2014. https://doi.org/10.1007/10_2014_273
11. Ishtiaq M, Mahmood A, Maqbool M. Indigenous knowledge of medicinal plants from Sudhanoti district (AJK), Pakistan. *Journal of Ethnopharmacology*, 168, 201–207; 2015. <https://doi.org/10.1016/j.jep.2015.01.054>
12. Aziz MA, Khan AH, Adnan M, Izatullah I. Traditional uses of medicinal plants reported by the indigenous communities and local herbal practitioners of Bajaur Agency, Federally Administrated Tribal Areas, Pakistan. *Journal of Ethnopharmacology*, 198, 268–281; 2017. <https://doi.org/10.1016/j.jep.2017.01.024>
13. Kujawska M, Hilgert NI, Keller HA, & Gil, G. Medicinal plant diversity and inter-cultural interactions between indigenous guarani, criollos and polish migrants in the subtropics of Argentina. *PLoS ONE*, 12(1); 2017. <https://doi.org/10.1371/journal.pone.0169373>
14. Sadat-Hosseini M, Farajpour M, Boroomand N, Solaimani-Sardou F. Eth-nopharmacological studies of indigenous medicinal plants in the south of Kerman, Iran. *Journal of Ethnopharmacology*, 199, 194–204, 2017. <https://doi.org/10.1016/j.jep.2017.02.006>
15. Catarino L, Havik P J, Romeiras MM. Medicinal plants of Guinea-Bissau: Ther-apeutic applications, ethnic diversity and knowledge transfer. *Journal of Ethnopharma-cology*, 183, 71–94, 2016. <https://doi.org/10.1016/j.jep.2016.02.032>
16. Kffuri CW, Lopes MA, Ming LC, Odonne G, Kinupp VF. Antimalarial plants used by indigenous people of the Upper Rio Negro in Amazonas, Brazil. *Journal of Ethnopharmacology*, 178, 188–198; 2016. <https://doi.org/10.1016/j.jep.2015.11.048>
17. Moura-Costa GF, Nocchi SR, Ceole LF, Mello JCPD, Nakamura CV, Dias Filho BP, Temponi LG, Ueda-Nakamura T. Antimicrobial activity of plants used as medici-nals on an indigenous reserve in Rio das Cobras, Paraná, Brazil. *Journal of Ethnophar-macology*, 143(2), 631–638, 2012. <https://doi.org/10.1016/j.jep.2012.07.016>

18. Haddad JG, Koishi AC, Gaudry A, Nunes DSC, Viranaicken W, Desprès P, el Kalamouni C.. *Doratoxylon apetalum*, an Indigenous Medicinal Plant from Mascarene Islands, Is a Potent Inhibitor of Zika and Dengue Virus Infection in Human Cells. *International Journal of Molecular Sciences*, 20(10); 2019. <https://doi.org/10.3390/ijms20102382>
19. Terra Indígena Pitaguary. *Terras Indígenas no Brasil*, 2022. Disponível em: <https://terrasindigenas.org.br/en/terras-indigenas/4057#demografia> Acesso em: 24 de Jan. 2022.
20. Alves ED. *Política de Educação e desenvolvimento para o SUS-Caminhos para a Educação Permanente em Saúde. Gestão e Saúde*. 2017
21. Bennet BC, Prance GT. 2000. Introduziu plantas na farmacopeia indígena do norte da América do Sul. *Botânica econômica* 54: 90-102. Bernard, H.R. 1995. *Métodos de pesquisa em antropologia: abordagens qualitativas e quantitativas*. Walnut Creek, Altamira Press.
22. Tomazzoni MI, Rejane R, Negrelle B M, Centa L. *Fitoterapia Popular: A Busca Instrumental Enquanto Prática Terapêutica 1 Popular Phytotherapy: The Instrumental Search As A Therapy Fitoterapia Popular: La Busca Instrumental Para El Acto De La Practica De La Fitoterapia*. doi.org/10.1590/S0104-07072006000100014