



Use of Medicinal Plants in Urban Areas in the Municipality of Aliança of Tocantins

**Jaqueline Cibene Moreira Borges¹, Cristiane Mendes Lourenço¹,
Livia Zanatta¹, Vanderson Ramos Mafra¹, Saulo José Lima Júnior¹,
Taciano Peres Ferreira², Natallia Moreira Lopes Leão¹, Andreisa Prieb¹,
Yara Silveira¹, Christiane Rodrigues de Paula Marques¹,
Nayanne Deusdará Escobar¹, Marco Túlio Borges Sousa¹,
Thalita Melo França Costa¹ and Sara Falcão de Sousa^{1*}**

¹University of Gurupi, (UNIRG) Tocantins, Brazil.

²Department of Environmental Chemistry, Federal University of Tocantins (UFT), Brazil.

Authors' contributions

This work was carried out in collaboration among all authors. Authors JCMB, CML and SFS designed the study and performed the statistical analysis. Authors VRM, SJLJ and TPF wrote the protocol and wrote the first draft of the manuscript. Authors NMLL, AP, YS and CRPM managed the study analyzes. Finally, authors NDE, MTBS, TMFC and LZ managed the bibliographic searches. All authors read and approved the final manuscript.

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ABSTRACT

Research that takes account of popular uses of medicinal plants, also in urban areas, is important records to subsidize health actions more effectively and safely and maintain the local cultural heritage, as advocated by the national policy of medicinal plants. This study aimed to survey the use of medicinal plants by residents of the municipality of Aliança the Tocantins. In 2011, semi-structured interviews were conducted with 70 informants in the urban environment, Aliança of Tocantins. Most claimed to have acquired knowledge about medicinal plants with parents and

*Corresponding author: E-mail: sarafalcao@unirg.edu.br, normatizaequipe@gmail.com;

grandparents, 60% and 25.7%, respectively. 62.9% of the interviewees obtained the plants in their backyard and 30% in the backyard of neighbors or relatives. The families with the highest number of species were Lamiaceae with 4 species (40%), Asteraceae and Malvaceae with 2 species each (20%). There were 82 therapeutic properties about the species mentioned, with a higher number of citations for "other indications" (25.6%), such as pain in general, back pain, malaise, dizziness, among others. The most used form of preparation was tea (81.4%) and the leaf was the most used organ (81.4%). Of the informants, 61.4% prefer to use home remedies instead of industrialized medicines. The informants, even living in the urban environment (82.8%), still know and frequently use the local medicinal flora, this being an indication of strong local cultural appeal and feasibility of encouraging green backyards.

Keywords: Green backyards; ethnobotany; ethnopharmacology; Tocantins; Cerrado Brazilian.

1. INTRODUCTION

A popular tradition is the origin of valuable knowledge about plants, but the misuse of certain medicinal is very dangerous and can cause mild effects on the death of the individual. Because of these facts, it is important to discriminate against the relations between science and empiricism, and wide research in medicinal plants is indispensable, involving various sciences, such as botany, anthropology, chemistry, and pharmacology [1].

In Brazil, the number of people who use plants is not known exactly, but certainly, this worldwide trend is also followed, from the consumption of the fresh plant to extemporaneous preparations, to herbal medicine [2].

In the urban environment of many Brazilian cities, the use of medicinal plants is common, and it is in this context that the farms stand out for reconciling access and collection, constituting systems adapted to local needs [3], evidencing the strong link of the population to their beliefs and values. On the other hand, even in cities and with more access to information, the use of unsafe and not assisted by health units can persist.

The World Health Organization (WHO) encourages the introduction of medicinal plants and herbal medicines in health units, thus reinforcing the importance of these plants in bringing benefits to the health of the population.

The study of medicinal plants, based on their use by the communities, can provide useful information for the elaboration of pharmacological, phytochemical, and agronomic studies on these plants, with a great saving of time and money [4].

Regarding the State of Tocantins, the use of medicinal plants in public health services is unfortunately not yet a reality when considering the vast number of species located in this state. It is believed to be due to the lack of scientific data on native species or even the lack of systematization of data that may exist.

The main objective of this work was to verify the use of medicinal plants by the urban community from the municipality of Aliança of Tocantins, in addition to describing the socioeconomic profile of the residents who make use of these plants for therapeutic purposes. It contributes to the improvement of health actions, public policies, and incentives to green backyards in cities as a possible alternative since the Brazilian urban community still makes daily use of medicinal plants.

2. MATERIALS AND METHODS

The research was carried out in the municipality of Aliança of the Tocantins located in the Southern region of the State of Tocantins - Brazil, in the second half of 2011. Ethnobotanical and ethnopharmacological data were obtained by structured [5] with the application of standardized forms, with open questions and closed to 70 residents of the region, aged over 18 years, both sexes and living in urban centers. It is worth mentioning that in the community of Aliança of Tocantins many of them are of rural origin and therefore continue to work in rural activities, but have residences in the urban nucleus.

The questionnaire consisted of 15 questions and the variables analyzed were: Socioeconomic level, the origin of knowledge about medicinal plants, level of education, age of users, practitioners or not of folk medicine, place of rural or urban residence, known plants, obtaining,

preparation, part of the plant used, therapeutic indications, reasons for use and of the interviewees for home remedies and/or industrialized medicines.

The medicinal plants cited during the research were related to the literature to scientific names (family and species).

The data obtained from open questions from the semi-structured interview were analyzed through a qualitative approach, allowing to identify some aspects about the importance, for the interviewees, of medicinal plants. Quantitative analysis [6] of the data was performed by

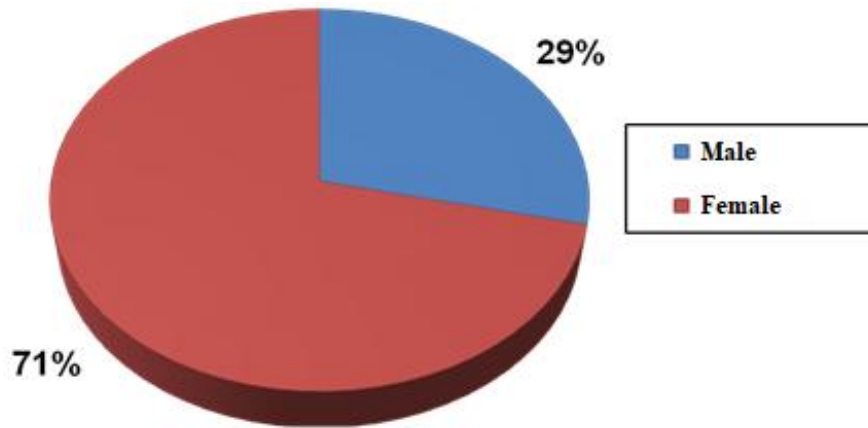
frequency distributions and mean calculations that were obtained by population groups.

3. RESULTS

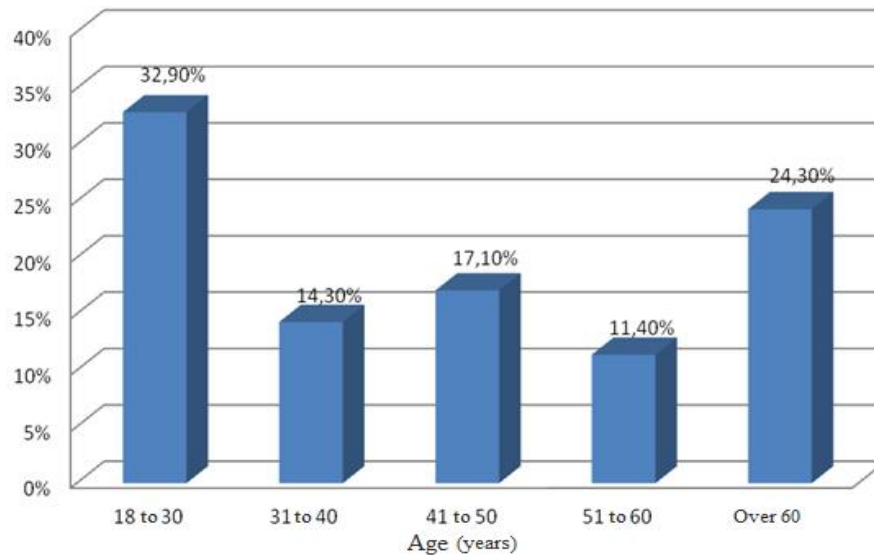
Of the 70 from the municipality of Aliança of Tocantins respondents, the majority (71.4%) are women (Graph 1).

The most frequent age class among the interviewees was 18 to 30 years (32.9%) and then over 60 years (24.3%) (Graph 2).

The majority (28.6%) of the interviewees, she had completed high school, followed by 14.3% with complete elementary school and 15.7% with



Graph 1. Percentage distribution of respondents by gender, in the municipality of Aliança of Tocantins



Graph 2. Age distribution of the people interviewed on the use of medicinal plants by the community of the municipality of Aliança of Tocantins

complete higher education, and only 3 illiterates (4.3) were considered to be illiterate (4.3) (Table 1).

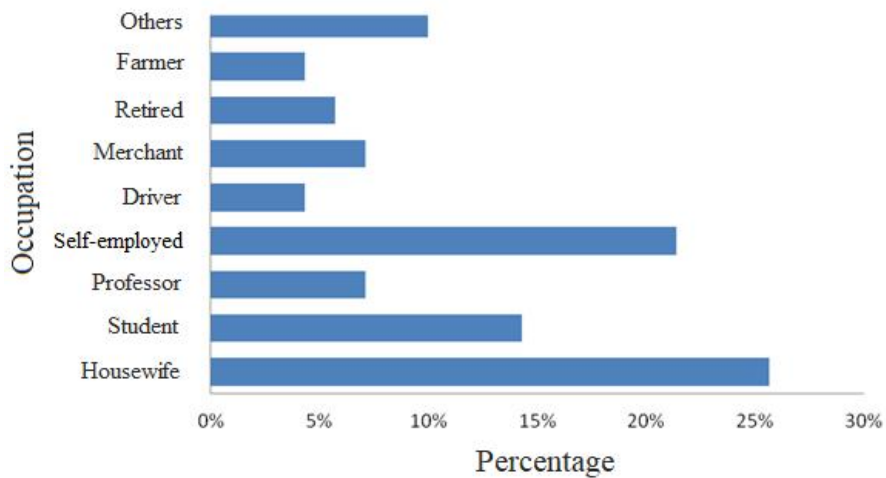
The most frequent professions of the interviewees were housewives (25.7%), self-employed (21.4%) and students (14.3%) (Graph 3).

Regarding the origin of the interviewees (urban or rural area), there was a prevalence of urban residents (82.8%) (Graph 4).

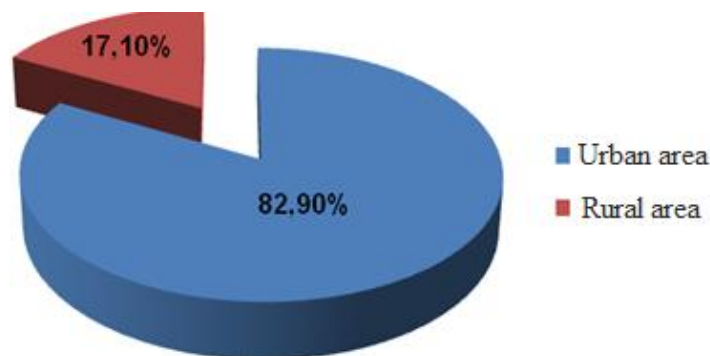
When the interviewees were asked about the use of medicinal plants, 98.6% reported using medicinal plants for various types of diseases and only 1.4% did not.

Table 1. Percentage distribution of respondents according to the level of education

Degree of education	Frequency (n)	Percentage (%)
Incomplete elementary school	15	21,4%
Complete elementary school	10	14,3%
Incomplete high school	3	4,3%
Complete high school	20	28,6%
Incomplete higher education	8	11,4%
Complete higher education	11	15,7%
Illiterate	3	4,3%
Total	70	100%



Graph 3. Percentage distribution of the most frequent occupations among the interviewees of the municipality of Aliança of Tocantins



Graph 4. Percentage distribution regarding the origin (urban and rural area) of the interviewees of the municipality of Aliança of Tocantins

Through semi-structured interviews, 18 medicinal plants used by residents from the municipality of Aliança the Tocantins were surveyed. The scientific names of the species and their families, cited by the informants of the municipality of Aliança, are listed in Table 2.

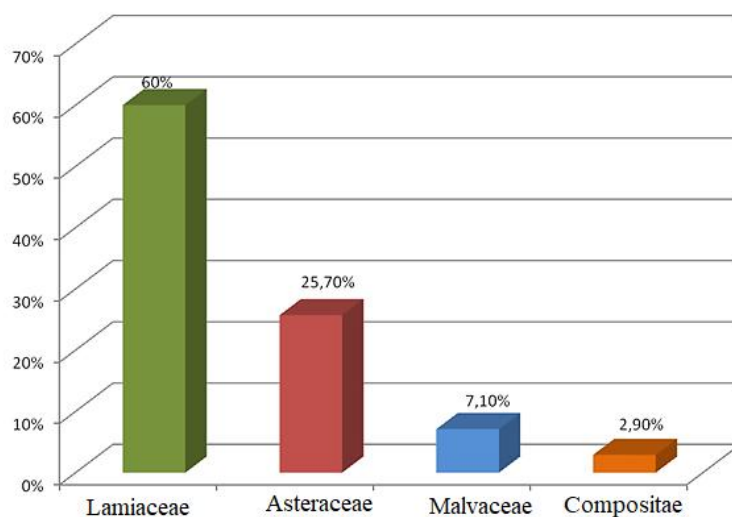
Of the species raised most are belonging to the families Lamiaceae and, Asteraceae (Graph 5).

Graph 6 shows the percentage distribution of the 6 plants most cited by the interviewees from the municipality of Aliança of Tocantins. In total, 18 plants with therapeutic purposes were mentioned, including Lemonbalm herb (24.4%), Boldo (22.2%) and Lemongrass (20%) stand out

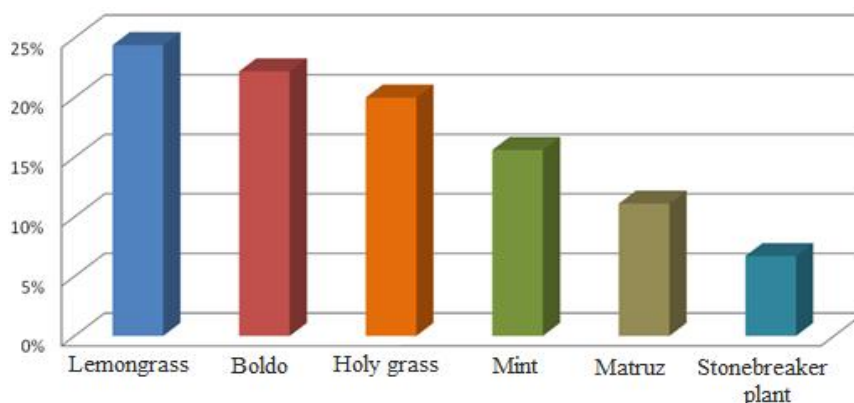
as the most cited, followed by Mint (15.6%), Matruz (11.1%) and Stonebreaker plant (6,7%).

Regarding the frequency of use of medicinal plants, the results show that the interviewees use frequently (Graph 7), and the majority (48.6%) uses when needed (in the case of diseases); 21.4% use it sometimes; 12.9% used rarely; 8.6% always use and only 1.4% never use it.

When asked about the motivation for the use of medicinal plants, 50% of the respondents stated that they use medicinal plants because they do not harm their health, 34% use it for other reasons, such as family tradition, and 16% use it because it is cheaper (Graph 8).



Graph 5. Percentage distribution of the most representative families of medicinal species cited by the interviewees of the municipality of Aliança the Tocantins



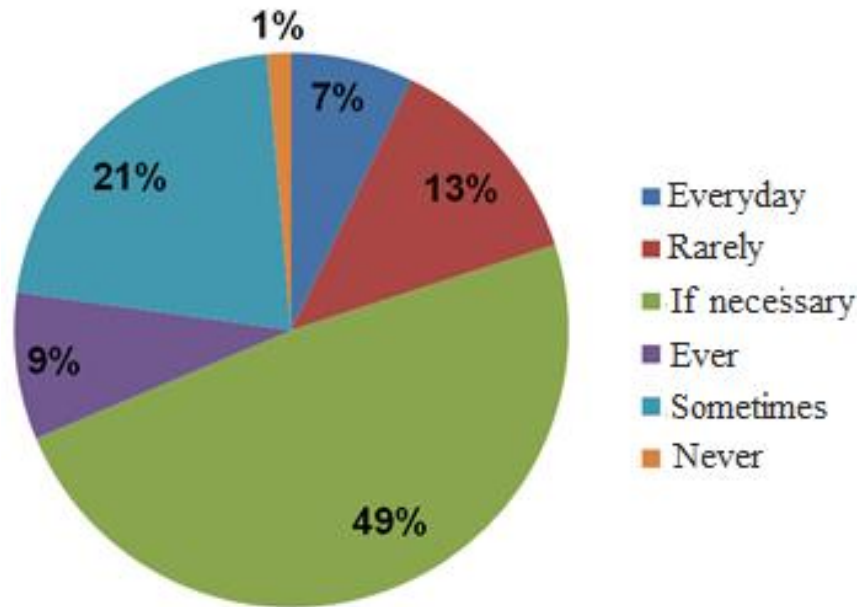
Graph 6. Percentage distribution of the most used medicinal species by the community of the municipality of Aliança the Tocantins

Table 2. Pharmacological and ethnopharmacological profile of plant species cited by interviewees from the municipality of Aliança of Tocantins

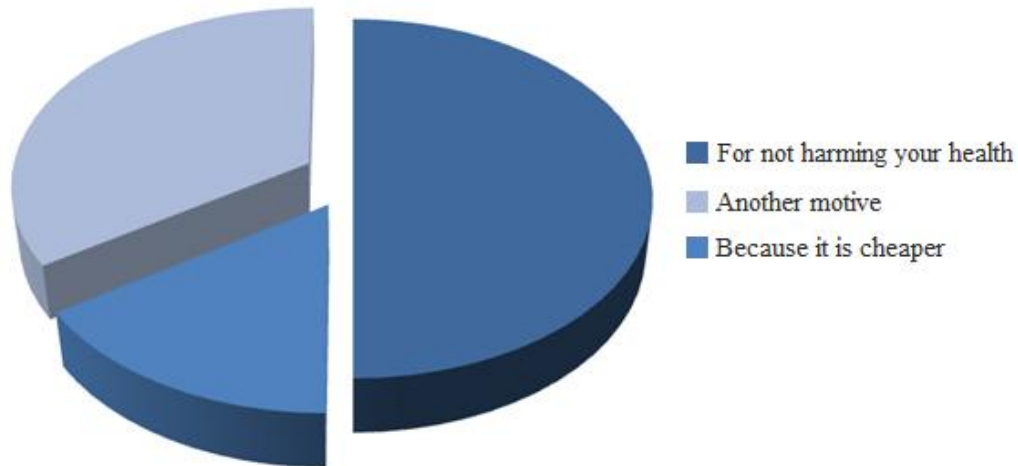
Family	Scientific name	Brazilian popular name	Pharmacological action	Ethnopharmacological indications	Part used
Verbenaceae	<i>Lippia alba</i> (Mill.) N.E. Br. ex Britton & P. Wilson	Erva-cidreira	Regular menstruation, cramps, nervous insomnia, functional gastrointestinal problems, digestive, antispasmodic, anti-vomiting.	Soothing, cold, and virus.	Leaves
Monimiaceae	<i>Peumus boldus</i> Molina	Boldo, Boldo do Chile	Liver and stomach disorders, liver cramps, hepatitis, dyspepsia, dizziness, insomnia, constipation, rheumatism, gonorrhea.	Stomach pain, liver problems, poor digestion, malaise, feeling sick, and dizzy.	Leaves
Poaceae	<i>Cymbopogon citratus</i> (DC.) Stapf	Capim-limão	It presents soothing and spasmodic action. The infusion is useful in intestinal and uterine cramps, as well as in states of nervousness and restlessness.	Soothing, sore throat, cold.	Leaves
Lamiaceae	<i>Mentha piperita</i> L.	Hortelã	Exerts tonic and stimulating action on the digestive tract. Antispasmodic and calming effects. Pains from the lower abdomen, cramps, and constipation.	Cold, fever, colic, sore throat, high blood pressure.	Leaves
Amaranthaceae	<i>Chenopodium ambrosioides</i> L.	Erva- de – Santa-Maria ou mastruz ou mastruço	Menstrual irregularity, healing, varicose veins, homemade insects (flea, bedbug, louse), hemorrhoids, cough.	Inflammation in the uterus, stomach pain, vermifuge, healing, infection.	Leaves
Phyllanthaceae	<i>Phyllanthus niruri</i> L.	Quebra-pedra	Diuretic, anti-infectious urinary tract (diuretic). The analgesic and muscle relaxant action of your alkaloids helps in the expulsion of kidney stones.	Renal inflammation, pain, uric acid,	Leaves
Lamiaceae	<i>Rosmarinus officinalis</i>	Alecrim	Antispasmodic in the bile passage and small intestine increased blood flow from the coronary artery.	Intestinal gas, dizziness, malaise.	Leaves
Zingiberaceae	<i>Zingiber officinale</i> Roscoe	Gengibre	Fights intestinal gas, vomiting, hoarseness, rhinitis, pharyngitis,	Sore throat, flu.	Root

Family	Scientific name	Brazilian popular name	Pharmacological action	Ethnopharmacological indications	Part used
			laryngitis, cholesterol-lowering, respiratory allergies, diabetes, asthma, bronchitis, tonsillitis, cough.		
Malvaceae	<i>Malva sylvestris</i> L.	Malva do Reino	Emollient, antitussive, and anti-inflammatory activity.	Healing, flu, cough, and fever.	Leaves
Rubiaceae	<i>Morinda citrifolia</i> var. <i>bracteata</i> (Roxb.) Kurz	Noni	It has astringent, analgesic property, treatment of external inflammations, treatment of eye inflammations, reduces blood pressure, laxatives; antibactericide, analgesic, blood purifier, immunostimulant, and tonic.	Weight loss, back pain, anemia	Fruits
Anacardiaceae	<i>Spondias purpurea</i> L.I.M. Johnst.	cajá	Antimicrobial, antiviral, anthelmintic	Virose	Leaves
Asteraceae	<i>Artemisia</i> sect. <i>Absinthium</i> (Mill.) DC.	Artemísia	Digestive, vermifuge, antimicrobial, hypnotic, and spasmolytic. Anti-inflammatory and antifebrile activity.	Stomach pain	Leaves
Cannaceae	<i>Canna indica</i> L.	Cana-índica, Cana do brejo	Molluscicidal activity, antioxidante, citotóxica, antibacteriana	Kidney problems	Leaves
Acanthaceae	<i>Justicia pectoralis</i> Jacq.	Chambá	Cuts, nervous disorders, phlegm.	Pain in general.	Leaves
Asteraceae	<i>Arnica montana</i> L.	Arnica	Bruises fall, bruises, internal bloodshed, bleeding.	Genitourinary tract infection.	Leaves
Lamiaceae	<i>Plectranthus barbatus</i> Andrews	Boldo nacional or Boldo of Brasileiro	Tonic, treat liver disorders, fight hepatitis.	Pain in general	Leaves
Asteraceae	<i>Baccharis trimera</i> (Less.) DC.	carqueja	Flu, diseases of the liver, stomach, and intestines, anemia, gallstones, diarrhea, diseases of the spleen, bladder, and liver.	Liver problems and poor digestion.	Leaves
Moraceae	<i>Brosimum gaudichaudii</i> Trécul .	Mama-cadela ou Inharé	Vitiligo	Blood infections	Roots

Family	Scientific name	Brazilian popular name	Pharmacological action	Ethnopharmacological indications	Part used
Malvaceae	<i>Gossypium barbadense</i> L.	Algodão	Antioxidant, hepatotoxic.	Infections and inflammations.	Leaves
Loganiaceae	<i>Strychnos pseudoquina</i> A. St.-Hil.	Quina ou Quina-do-cerrado	Antiulcer, antileishmanial, hypoglycaemic and genotoxic potential	Diabetes and stomach pain.	Peels
Lythraceae	<i>Lafoensia pacari</i> A. St.-Hil.	Pacari ou Mangava-brava	Control of diabetes, cholesterol, and hypertension	High blood pressure and diabetes.	Leaves
Fabaceae	<i>Pterodon emarginatus</i> Vogel	Sucupira	Used for rheumatism and diabetes.	Sore throat	Seeds
Lythraceae	<i>Punica granatum</i> L.	Romã	Inflammations and infections of the mucosa of the mouth and pharynx. Anti-inflammatory and antiseptic.	Throat infection	Seeds
Euphorbiaceae	<i>Croton urucurana</i> Baill.	Sague-da-água, Sangue-de-drago e Urucurana	Antifungal, antimicrobial, antioxidant, anti-hemorrhagic, and analgesic.	Gastritis	Dye
Asteraceae	<i>Tanacetum vulgare</i> L.	Catinga-de-mulata	Anti-inflammatory, antioxidant, antimalarial, vasorelaxant, hypoglycemic, and gastric ulcer treatment.	Pain	Leaves



Graph 7. Percentage distribution of the frequency of use of medicinal plants by the interviewees of the municipality of Aliança the Tocantins



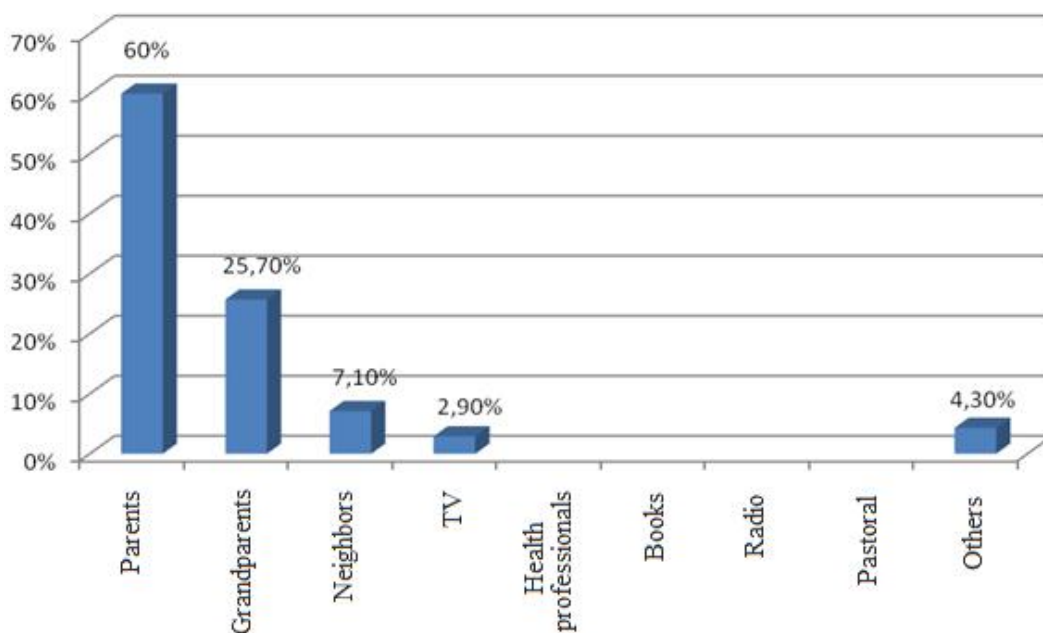
Graph 8. Motivation for the use of medicinal plants by the interviewees in the municipality of Aliança the Tocantins

Regarding the forms of learning for the use of medicinal plants, the majority claimed to have acquired knowledge from parents and grandparents, 60% and 25.7%, respectively (Graph 9).

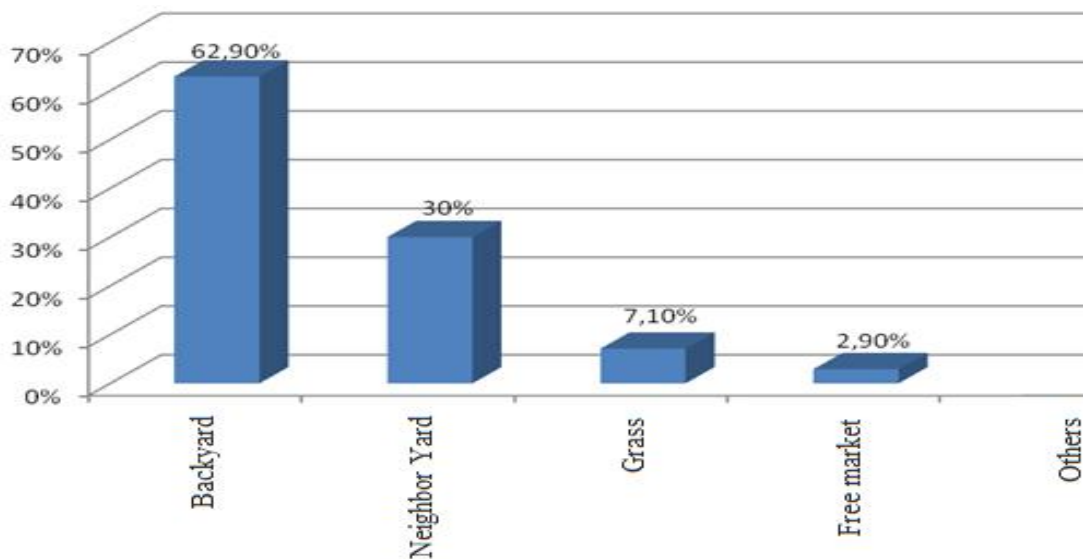
A significant number of mentions of diseases were for the group of diseases related to the digestive system (18.3%), respiratory system (18.3%), and nervous system (17.1%) (Graph 11).

Regarding the origin of obtaining plants for therapeutic purposes, 62.9% of the interviewees obtained the plants in their backyards and 30% in the backyard of neighbors/relatives (Graph 10).

Regarding the percentage distribution by parts of plant species used for medicinal purposes, there was a predominance of leaves (81.4%), followed by bark (7.1%), roots (5.7%), fruits (2.9%) and seeds (2.9%) (Graph 12).



Graph 9. Ways of learning for the use of medicinal plants by respondents from the municipality of Aliança do Tocantins



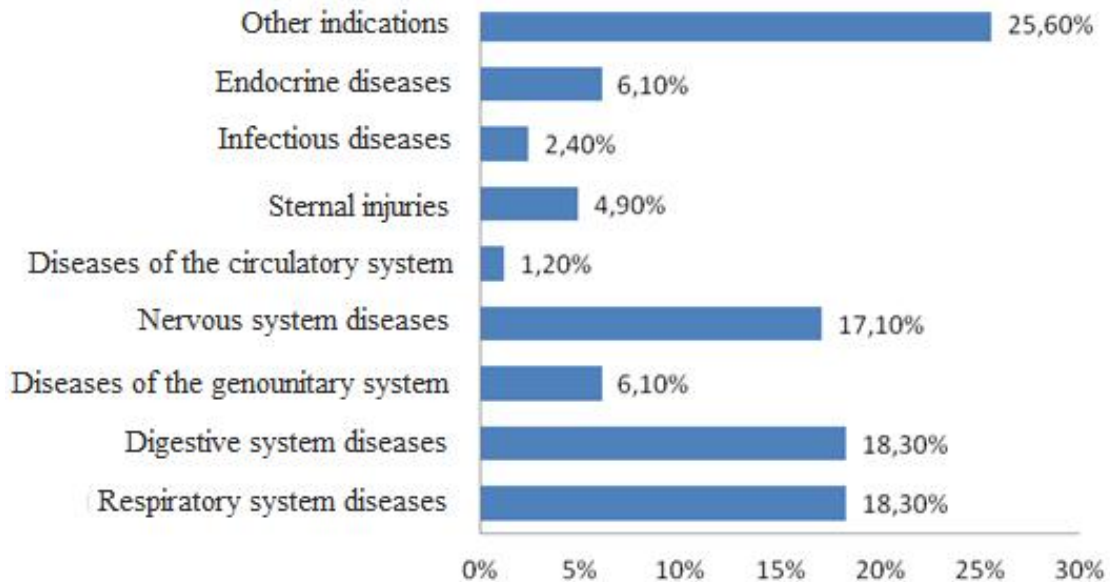
Graph 10. Origin of obtaining plants for therapeutic purposes by the interviewees

Considering the ways of using plants for therapeutic purposes, most interviewees use the intake through tea as a method of preparation of the drug (81.4%), followed by tincture (8.6%) and, bath (1.4%) (Graph 13).

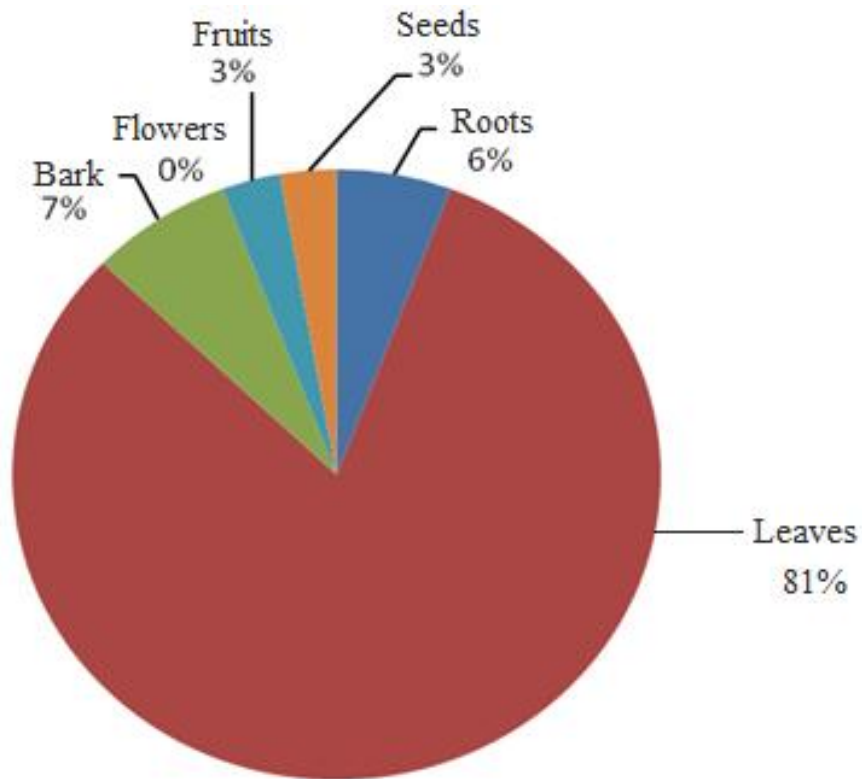
When asked about the preference to use home remedies or industrialized drugs, the majority of

respondents (61.4%) prefers to use home remedies and justify the preference with less elaborate arguments of origin the popular culture it self-induced by unfounded information of the type "medicinal plant does not contain chemistry" or "has no contraindication" or even "does not harm health". Still, others claim that they prefer home remedies for the sake of "family tradition".

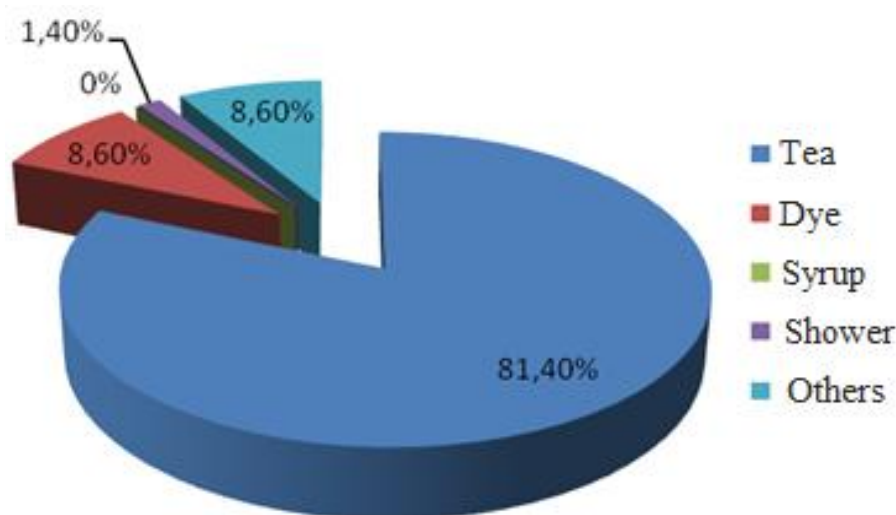
Another part of the interviewees prefers industrialized drugs (38.6%) and explain this preference by the fact that these are indicated by the doctor or are safer and more effective.



Graph 11. Distribution of the most representative therapeutic indications several species



Graph 12. Percentage distribution by parts of plant species used for medicinal purposes in the municipality of Aliança the Tocantins



Graph 13. Percentage distribution of the forms of use of plants for medicinal purposes by the community of the municipality of Aliança do Tocantins

4. DISCUSSION

In studies with medicinal plants, ethnobotany, and ethnopharmacology, the predominance of females is common [7]. In an ethnopharmaceutical survey study in the state of Pará, it proved that the universe sampled was predominantly female (90%) [8]. Other studies have shown that in general the woman better dominates the knowledge of plants that grow near her residence, in the backyard and the site, while the man knows more about the plants of the bush. However, this ambivalence is not constant, some women know the natural remedies as well as their husbands [9].

The level of education of the interviewees did not differ with information found in the literature [10] where it was verified that knowledge about health care, through the use of medicinal plants, is in the hands of people with a low level of education or when not incomplete elementary school. On the other hand, Ribeiro et al. [11] state that studies at the international level has shown that among the main characteristics of herbal medicine users and other complementary therapies are those with higher levels of education, that is, schooling equal to or higher than complete high school.

In general, the level of education was not a factor influencing the use of medicinal plants, because the different informants demonstrated similar knowledge regarding the use of traditional medicine.

Regarding the occupation of the interviewees, the most frequent professions were housewives, freelancers, and, students. This predominance of housewives' in relation to the occupations of the interviewees in ethnobotanical survey scan also is verified [10,12].

Regarding the origin of the interviewees (urban or rural area), in which there was a prevalence of residents of the urban area, it is noted that most of the interviewees living in the urban area have a rural origin, having direct contact with the medicinal plants because they have farms to the region of the municipality.

Most of the residents when asked about the use of medicinal plants, claimed to use medicinal plants for various types of diseases. Each society or community has its principle of classification, beliefs, and popular methods capable of generating the cure of its evils [13].

Among the plants most cited by the interviewees of the municipality from the Aliança, we highlight Lemon Balm Herb, boldo and, holy Lemongrass Herb, also observed in the work of Oliveira et al. [7] in the community of the Surroundings from the Tinguá Biological Reserve, Rio de Janeiro, where 72 medicinal species were raised, with emphasis on Lemongrass Herb, with 12 citations, and the boldo, with 11 citations.

Pessoa and Cartágenes [14] observed that in the Residential communities Ana Jansen and New Angelin, from the State Maranhão, users of

medicinal plants reached average values above 75% of the interviewees (51 residents in the residential Ana Jansen and 47 residents in the New Angelin neighborhood). This result is compatible with the study by Rizzo et al. [15] in the State of Goiás, in which the use of medicinal plants reached values above 80%.

The results of the present study, regarding the most representative species, disagree with the results obtained by Sales et al. [16] who conducted an ethnobotanical survey from the Brazilian quilombo community Senhor do Bonfim - Areia, Paraíba, and observed that Lemon Balm Herb (70.8%) and Lemongrass Herb (70.8%) stand out as the most-cited.

Regarding the frequency of use of medicinal plants, the results most (48.6%) use when it needs (in the case of diseases) disagree with other studies those obtained [17]. On the other hand, in another study it was found that about 63% of the interviewees use medicinal plants whenever there is some type of indisposition or health problem, and only 12.6% of them see the use of medicinal plants with some caveat, preferring to use them only in the simplest cases, such as flu and small infections [18]. Most respondents stated that they use medicinal plants because they do not harm their health, which demonstrates the lack of knowledge of people about the use of plants for therapeutic purposes and the need for guidance by trained professionals [9]. Knowledge about medicinal plants was acquired with parents and grandparents, similar to other studies [19] where 60% of the sample universe claimed to have learned to use medicinal plants through parents, thus showing that knowledge is transmitted predominantly in the family environment and that oral transmission is the main way in which knowledge about medicinal plants is transmitted.

Also, in the present study, it was observed that more than half of the interviewees obtain the plants in their backyard, followed by the backyard of neighbors/relatives (Graph 10), coinciding with other data [17,18]. Thus, it is verified that when the need for a plant that does not exist in a resident's yard, it can be supplied by the neighbor who cultivates it in his backyard, revealing the exchange of information between residents who contribute to enlarge the aspect of plants used medicinally.

In the city are common houses with a landless backyard. Several people use pots, cans, pots,

old tires, bidets, bowls, masonry, or wood beds to grow ornamental plants, medicinal plants, seasonings, and other vegetables that do not need much space [20].

For the preparation of home remedies, according to the data analysis, about medicinal species, there was a predominance of leaves. Research shows that the leaf is usually the most cited organ for these studies and, also more used [8].

Teas are the most appreciated use by the population because, in addition to the specific medicinal value, they contribute to other purposes, such as hydration, elimination of toxins, control of body temperature, and aid in food digestion [17].

The combined use of different plants is quite frequent from the municipality of Aliança, as well as the use of other ingredients in the preparation of home remedies, which makes this practice dangerous because the most indicated preparation process is not always the same for different plants and the combination can result in unpredictable effects [21].

The fact that most interviewees prefer to use medicinal plants for the maintenance or recovery of health is a positive aspect because, also, to strengthening traditional practices regarding the use and traditional knowledge of medicinal plants, it is an activity that provides direct contact with local plants [22]. On the other hand, the idea that medicinal plants do not harm health is an issue that should be analyzed more carefully in the community itself, since certain chemical compounds, when ingested in exaggeration or when combined, can cause damage to health [23].

5. CONCLUSION

The accomplishment of this research allowed identifying some relevant aspects about the use and knowledge of medicinal plants from the municipality of Aliança of Tocantins: in the urban environment it is still very common to use medicinal plants as a therapeutic resource, made possible through green backyards; the diversity of medicinal plants known and used is quite high and the production of plants in the community itself suggests a relationship between use/knowledge of medicinal plants and their availability; the transmission of traditional knowledge done locally and orally demonstrates a rich cultural heritage in the municipality. It is

also worth noting that all medicinal species surveyed are commonly used in the region, obtained in the users' backyard, in the vicinity of homes, and the forest.

The use of medicinal plants can significantly improve the quality of life of families, because, in addition to their use, cultivation, and commercialization, it may be an alternative income for family farming. It is important to increase support for scientific research in this area and invest more in the cultivation and domestication of possible cultivation plants in the urban environment, taking into account the increasingly reduced space in cities and, on the other hand, the various possibilities of implementing green backyards in these conditions. This contributes to the maintenance of cultural heritage, however, with more efficacy and safety, as recommended by the national policy of medicinal plants.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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