



Ethnobotanical Survey and Identification of Potential Interactions of Plants Used in a City in Northeastern Brazil

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Abstract

The study of medicinal plants is currently one of the alternative sources of allopathic medicine for therapeutic purposes. Given the high consumption of medicinal plants and the risks of indiscriminate use, the objective of the study was the identification of potential plant-drug interactions in the pharmacotherapy of the Public Health System users in a Brazilian Northeastern city, from 2015 to 2017 regarding the plant species used, as well as their therapeutic properties. An ethnobotanical study was conducted with a questionnaire. For this purpose, 46 types of plants were used by the 402 interviewees, where 297 were women, with 279 adult participants, and 269 medicinal plants used. Only 199 people out of the total interviewed used some medication, of which 55 associated the use of the drug with medicinal plants. We analyzed associations between the use of 13 plants and 27 drugs, totaling 42 potential interactions. Lemon balm was the vegetal species that presented the most common interactions among the interviewees. Thus, it was possible to conclude that medicinal plants are quite used for therapeutic purposes. However, one must be cautious about its use since they can interact with drugs, reducing or potentiating their effects.

Keywords: Empirical knowledge; Interactions; Medicinal plants

Introduction

The use of medicinal plants (MPs) has been noted since the beginning of the civilization and this practice has been passed down through generations, drawing popular taste and leading to their planting in the houses, trade in free markets and popular market, as well as their use as a medicine [1]. According to the World Health Organization, almost 80% of the worldwide population uses medicinal plants to treat minor health problems and for several patients this is often the only available health resource [2]. In Brazil, it is estimated that there are between 350,000 and 550,000 plant species, where only 55,000 are cataloged and are distributed among different regions of the country. However, some of these species do

not have studies about their therapeutic potential, although this is a process that has been evolving significantly [3]. In addition, Brazil also has a long tradition of using medicinal plants linked to popular knowledge transmitted through generation [4].

Because of their pharmacological properties, the use of MPs has been encouraged by health regulatory agencies in order to develop integrative/complementary methods for resolving health problems [5]. Besides, in 2009, the Ministry of Health made available a list of 71 medicinal plants, including the National Relation of Medicinal Plants of Interest to the Unified Health System (RENISUS), aiming at the development of herbal medicines and use in the Public Health

System. Brazilians are also increasingly interested in “natural” ways to promote a healthier life. Approximately 82% of the population uses medicinal herbal products [6]. For many patients, the use of a single drug is not sufficient, and when two or more drugs are prescribed, the desired benefit is not always achieved, since they may interact negatively, increasing or reducing the therapeutic effect or the toxic effect of one or the other [7]. It should be noted that these interactions do not reduce to the universe of the synthesized chemical substances, but they can occur between those present in plants used in the form of teas, homemade syrups and phytotherapies [8]. Thus, this study aims to evaluate the use of medicinal plants by patients from a community in the Northeast of Brazil, aiming at tracing the profile of the plant species used, as well as its therapeutic properties and the risk of possible plant-drug interactions.

Methods

This is an ethnobotanical study with a questionnaire interview and collection of botanical material (when necessary). It was carried out in the municipality of Lagarto, comprising an area of approximately 968,921 km² situated in the southern portion of the state of Sergipe, Northeastern region of Brazil Figure 1, 78 km away from the capital, Aracaju. It presents a semi-arid transition climate dominating most of its lands on the western part of the

municipality, where a local vegetative variety can be found [9]. It has about 103,188 inhabitants, with basically half of them residing in the rural area and the other half in the urban zone [10]. This research was carried out at the Maria do Carmo Nascimento Alves Health Center located in the municipality of Lagarto-SE. This unit targets 6 micro-regions comprising different neighborhoods and accompanied by 6 different community agents. Data collection was carried out in the region comprised by the Ademar de Carvalho neighborhood, which consists of 1,282 families accompanied by home visits of community health agents, in addition to consultations with physicians and nurses of the unit (Figure 1). In order to obtain the number of users to be interviewed, the sample calculation was performed considering a tolerable error of 5% (95% confidence), where after the calculation the minimum sample size was 296, but it was possible to apply the questionnaire to 406 users. For the calculation, the following equation was used:

$$\text{Sample size} = \frac{\frac{Z^2 xp(1-p)}{e^2}}{1 + \left[\frac{Z^2 xp(1-p)}{e^2 N} \right]}$$

N = population size

e = margin of error (percentage in decimal format)

z = z score



Figure 1: Map of the study area Lagarto-Sergipe, Brazil.

It is worth mentioning that the collection was initiated after the approval of the project by the Ethics Committee in Research with Human Beings of the Universidade Federal de Sergipe (protocol number 47369315.2.0000.5546). The collected material was pressed in the field, according to [11] and identified through specialized literature, specialist assistance and comparisons with pre-existing specimens in the ASE Herbarium-Federal University of Sergipe. All procedures for access to genetic patrimony and associated traditional knowledge were carried out and the project was registered in SISGEN (Sistema Nacional de Gestão do Patrimônio Genético e do Conhecimento Tradicional Associado) in accordance with Brazilian Law nº 13.123/2015 under registration number A894E5C.

Some inclusion criteria were selected in this research: be a user of the Maria do Carmo Nascimento Alves Health Center; be older than 18 years and sign the TCLE - Free and Informed Consent Form specific to this research. A brief questionnaire was applied to the users of the Maria do Carmo Nascimento Alves Health Center regarding their purpose, frequency, conservation, obtaining and form of use. In addition, information was collected on the morbidities and socio-demographic profile of the interviewees. Some plant samples were collected in this community and submitted to identification of the species by a botanist of the Biology Department of the Federal University of Sergipe. Fidelity level was calculated to quantify their importance in treating a major disease, using the following

formula: $FL = (Ip/Iu) \times 100$

where I_p = Number of informants who suggested the use of a species for the same main objective (therapeutic use),

(I_u) = Total number of informants who mentioned plant species for any use [2].

The identification of potential drug-plant interactions was carried out by means of a bibliographical survey of the plants

used, in scientific articles indexed in national and international bases, being the bases used: Pubmed, Scielo, Lilacs, Science direct. In addition, it was consulted through the site, the Plant-Drug Interaction Observatory of the Faculty of Pharmacy of the University of Coimbra. Subsequently, interactions were classified on the pharmacodynamic or pharmacokinetic mechanism and on the risk: mild, moderate and severe. After the questionnaires were applied, the data were tabulated on the Microsoft Office Excel® 2007 spreadsheets, submitted to descriptive statistical analysis.

Results and Discussion

Table 1: Socio-epidemiological profile of volunteers.

Variable	n (%)	Women n (%)	Men n (%)
Sex			
Male	109 (73%)	-	-
Female	297 (27%)	-	-
Age group			
18-19 years	34 (8%)	21 (62%)	13 (38%)
20 -59 years	279 (69%)	215 (77%)	64 (23%)
Over 60 years	93 (23%)	61 (66%)	32 (34%)
Ethnicity			
White	79 (19%)	61 (77%)	18 (23%)
Brown	222 (55%)	152 (68%)	70 (32%)
Black	105 (26%)	84 (80%)	21 (20%)
Income of the interviewee			
0 minimum salaries	173 (43%)	145 (84%)	28 (16%)
<0.5 minimum wages	4 (1%)	2 (50%)	2 (50%)
0.5 minimum wages	18 (4%)	14 (78%)	4 (22%)
1 minimum salary	181 (45%)	114 (63%)	67 (37%)
1.5 minimum wages	6 (1%)	4 (67%)	2 (33%)
2-4 minimum wages	24 (6%)	15 (62%)	9 (38%)
Level of schooling			
Illiterate	53 (13%)	40 (75%)	13 (25%)
Elementary incomplete	220 (54%)	164 (75%)	56 (25%)
Elementary Complete	19 (5%)	12 (63%)	7 (37%)
Middle Incomplete	48 (12%)	34 (71%)	14 (29%)
Middle Complete	49 (13%)	34 (70%)	15 (30%)
High Incomplete	9 (2%)	5 (55%)	4 (45%)
Graduated	8 (2%)	6 (75 %)	2 (25%)
Marital status			
Married	181 (45%)	128 (71%)	53 (29%)
Divorced	28 (7%)	25 (89%)	3 (11%)
Ladies	164 (40%)	115 (70%)	49 (30%)
Widower	33 (8%)	29 (88%)	4 (12%)

In this study, 406 people were interviewed, mostly women, all users of the Basic Health Unit in the study. The predominance of women can be justified because they are generally responsible for home and childcare, seeking knowledge about medicinal plants in order to obtain home treatments to cure or prevent

diseases of family members (Lobler et al. 2013) (Table 1). Among those interviewed, the most prevalent level of schooling was the incomplete elementary school with 54%. This factor is associated with low income, which makes the use of plants a way of prevention and treatment of complications more accessible to these people.

The origin of a considerable part of the plants is their own residences (Lobler et al. 2013). Socio-epidemiological profile of volunteers (Table 1) and of all the interviewees, 262 of them did not present any type of morbidity. The other 144 had morbidities such as hypertension (33%), cardiovascular problems (19%), diabetes (14%), psychological disorders (7%), respiratory problems (5%) and gastrointestinal problems (5%). In 2000, the prevalence of arterial hypertension in the world population was 25% and the estimate for the year 2025 is 29% [12].

The increase among individuals with blood pressure matches an increasing risk factor for cardiovascular diseases [13]. Of the 406 interviewees, 66% (269) stated that they used medicinal plants (MP) for therapeutic purposes, being 210 (78%) women and 59 (22%) men. Most of the interviewees use the plant species as tea. Besides, other forms of use were reported such as bath, inhalation, chewing, topical use, oral intake of the plant made as juice and syrup. The use of medicinal plants occurs over generations and the technique of preparation and conservation of these products, as well as their therapeutic purposes, are empirically passed on and generally by people who have a certain conviviality and affinity, usually relatives, friends and neighbors [14]. In fact, family members prevail with the highest number of indications, it was identified that 64% of the indications are made by one of the family (parents, grandparents, daughter-in-law and mother-in-law), 13% by self-knowledge, 8% by acquaintances, 4% by health professionals and 1% indicated by the media.

According to culture of medicinal plants was brought by the inhabitants of Brazil to be acquired by the Health System, with the purpose of providing a therapeutic alternative to the users of the system. However, for this idea to materialize, it will be necessary to implant this culture to the health professionals since the beginning of their academic formation, so that the prejudice of

the use of medicinal plants for the treatment of medicinal plants can be demystified. This statement can be proven with the data obtained in this research, since only 4% of the indication of the use of medicinal plants was made by health professionals. On the other hand, 64 interviewees reported that they had already received guidance on the use of MP by health professionals, who are doctors (84%), nurses (11%), health workers (2%), nutritionists (2%) and social workers (1%). Many factors have contributed to increased use of plants as a medicinal resource, among them the high cost of industrialized medicines, the difficult access of the population to medical care, as well as the trend to use natural products. It is believed that care taken through medicinal plants is favorable to human health, provided the user has prior knowledge of its purpose, risks and benefits [15].

Participants who reported the use of medicinal plants mentioned 46 plant species (Table 2), whereby the 5 mostly used are lemon balm (213), boldo (130), holy grass (112), chamomile (58) and fennel (41). These plants are the most frequently used because they are the most popularly known and also because of their various pharmacological actions. Several studies conducted in Sergipe as well as in other northeastern regions report the use of these plants by the population. One instance is the research [15], where it is stated that the plants most frequently used by the participants were holy grass, boldo and lemon balm, corroborating with the data of this study. It made a survey of the medicinal plants used in the caatinga, where among the plants used for medicinal purposes are the ones cited in this work. Besides, it was verified that 93% of the medicinal plants reported used the leaves, 2% the stem, 3% the seed, 2% the fruit and bark and 1% the root. The predominance of leaf use can be attributed to the greater ease of collection and availability throughout the year, or also, depending on the species, due to the fact that the leaf is the organ of the plant with the highest amount of the desired metabolites [16].

Table 2: Relation between the use of the most frequent medicinal plants by the interviewees and the literature.

Scientific Name	Popular Name used by Interviewers	Purpose (User)	Purpose in Accordance with the Literature	Number of users using	FI%
<i>Melissa officinalis L.</i>	"Lemon balm"	Bellyache, soothing, gas	Anxiolytic, light sedative, antispasmodic and anti-dyspeptic ^E	213 (29.8%)	53.52%
<i>Peumus boldus</i>	"Boldo"	Bellyache, soothing, gas	Antidyspeptic, cholagogue and choleric ^E .	130 (18.2%)	93.12%
<i>Cymbopogon citratus</i>	"Holy grass"	Belly pain, decrease pressure, indigestion, soothing	Antispasmodic, anxiolytic and mild sedative ^E .	112 (15.7%)	70.53%
<i>Chamomilla recutita</i>	"Chamomile"	Soothing	Antispasmodic, anxiolytic and mild sedative, anti-inflammatory in affections of the oral cavity ^{H,I} .	58 (8.1%)	81.03%
<i>Pimpinella anisum L.</i>	"Fennel"	Soothing, tummy ache	antidyspeptic and antispasmodic ^E .	41 (5.7%)	63.41%
<i>Equisetum arvense L.</i>	"Horsetail"	Anti-inflammatory, gastritis	Remineralizing, potassium-sparing, hypotensive, hemostatic, anti-inflammatory and healing diuretic ^F	33 (4.6%)	87.87%

<i>Mentha suaveolens L.</i>	"Mint"	The flu	Symptoms of influenza (catarrh and cough) ^D	11 (1.5%)	63.63%
<i>Camellia sinensis</i>	"Green tea"	Slimming and calming	Antioxidant, stimulant, metabolic ^G	9 (1.2%)	77.77%
<i>Schinus terebinthifolia Raddi</i>	"Aroeira"	Inflammation, gas, inflammation in the liver, reduction of cholesterol levels	Antiulcerous, antirheumatic, antidiarrheal and astringent, healing, anti-inflammatory ^D .	8 (1.1%)	62.50%
<i>Stryphnodendron adstringens</i>	"Barbatimão"	Anti-inflammatory	Healing and antimicrobial ^I .	7 (1%)	75%
<i>Zingiber officinale</i>	"Ginger"	Anti-inflammatory	Anti-inflammatory, Anti-emetic, anti-dyspeptic, expectorant and in cases of kinesis ^E	7 (1%)	57.14%
<i>Bidens alba</i>	"Picão"	Anti-inflammatory	Anti-inflammatory ^F	7 (1%)	85.71%
<i>Malva sylvestris L.</i>	"white mauve"	Anti-inflammatory	Anti-inflammatory and antiseptic of the oral cavity ^E .	5 (0.7%)	100%
<i>Ocimum basilicum L.</i>	"Basil"	The flu	Stimulating properties, anti-influenza, diuretic and anti-spasmodic ^P	5 (0.7%)	100%
<i>Celosia argentea</i>	"Gallo crest"	Migraine	Cephalgias ^L	5 (0.7%)	60%
<i>Maytenus ilicifolia</i>	"Holy Thorn"	Gastritis	Reduction of pain and wound healing ^F	5 (0.7%)	80%
<i>Hibiscus sabdariffa</i>	"Hibiscus"	Weight Loss	Antioxidants, aid in the process of weight loss ^N	5 (0.7%)	100%
<i>Chenopodium ambrosioides</i>	"Mastruz"	Anti-inflammatory, pain, worm	Paralyzing worms, wound treatment and digestion ^F	4 (0.5%)	40%
<i>Vernonia bahiensis</i>	"Alumã"	Malaise, stomach ache	Aid in digestion and elimination of gas, liver diseases, food and alcohol excesses ^D	4 (0.5%)	100%
<i>Ocimum gratissimum</i>	"Alfavaca"	Flu, wound	Digestive problems, flatulence, flu, cough, pruritus, stress, headache, fatigue, sedative and expectorant ^F	4 (0.5%)	100%
<i>Bauhinia forficata</i>	"Cow leg"	Diabetes and anti-inflammatory	Diabetes, kidney disorders and other urinary problems ^F	4 (0.5%)	75%
<i>Solanum melongena L.</i>	"Eggplant"	Reducing Cholesterol Levels	Reduction of dyslipidemia ^K	3 (0.4%)	6 6.66%
<i>Ilex paraguariensis</i>	"Mate tea"	Bellyache	Activities on cardiovascular, renal and digestive systems ^M	3 (0.4%)	6 6.66%
<i>Citrus limon.</i>	"Lemon"	The flu	Bactericidal, antiseptic, febrifuge, tonic for the nervous system, cardiogenic, antirheumatic, ancient, soothing, diuretic, antiscorbutic, carminative and vermifuge ^D	3 (0.4%)	100%
<i>Ruta graveolens</i>	"Rue"	Anti-inflammatory	Vermifuge, abortifacient, ear-aches and teeth ^F	2 (0.3%)	50%
<i>Cinnamomum verum</i>	"Cinnamon"	Indigestion, soothing	Aperient, anti-dyspeptic, anti-flatulent and antispasmodic ^E	2 (0.3%)	100%
<i>Baccharis trimera</i>	"Carqueja"	Stomachache	Anti-dyspeptic ^E	2 (0.3%)	100%
<i>Eucalyptus globulus</i>	"Eucalyptus"	Nasal decongestant	Respiratory ailments ^D	2 (0.3%)	50%
<i>Persea americana Mill.</i>	"Avocado"	Inflammation in the kidney	Digestive, emenagogas, antioxidant, antibacterial, antifungal, pectoral, stomach, anti-helminthic, anti-periodic and antidiarrheal properties ^F	2 (0.3%)	100%
<i>Syzygium cumini</i>	"Jamelão"	Reducing Cholesterol Levels, Diabetes	Anti-inflammatory, anticarcinogenic and function as medication for diabetes, cardiovascular control ^O	2 (0.3%)	100%

<i>Solanum paniculatum L.</i>	"Jurubeba"	The flu	Anti-inflammatory, healing, cholagogues, blood purifiers, decongestants, digestive, diuretics, emenagogues, stimulants, hepatoprotectors, laxatives and tonics ^F	2 (0.3%)	100%
<i>Citrus aurantium L.</i>	"Orange"	Soothing	Anxiolytic and mild sedative ^E	2 (0.3%)	50%
<i>Leonurus sibiricus L.</i>	"kills grass"	Anti-inflammatory and discharge	Antigripal, stomach, digestive, still healing febrile, hemorrhages and trauma ^L	2 (0.3%)	50%
<i>Punica granatum L.</i>	"Pomegranate"	Sore throat and anti-inflammatory	Anti-inflammatory and antiseptic of the oral cavity ^E	2 (0.3%)	100%
<i>Sambucus nigra L.</i>	"Elder"	Itch and flu	Diaphoretic ^E	2 (0.3%)	0%
<i>Morinda citrifolia L.</i>	"Noni"	Reducing Cholesterol Levels, Weight Loss, Flu	Antibacterial, antiviral, antifungal, antitumor, anthelmintic, analgesic, anti-inflammatory, hypotensive and immune stimulant ^Q	2 (0.3%)	50%
<i>Malpighia emarginata</i>	"Acerola"	The flu	Source of vitamin ^{CA}	1 (0.15%)	100%
<i>Rosmarinus officinalis L.</i>	"Rosemary"	Rejuvenate	Antioxidants, digestive stimulant, against heartburn; in respiratory problems and cardiac weakness, hepatic protector, anti-tumoral, natural anti-depressant ^B	1 (0.15%)	100%
<i>Allium sativum</i>	"Garlic"	Reducing Cholesterol Levels	Treatment of hyperlipidemia, mild arterial hypertension, symptoms of flu and colds and aid in the prevention of atherosclerosis ^E	1 (0.15%)	100%
<i>Morus nigra L.</i>	"Blackberry"	Diabetes	Treatment of liver and kidney disease, fever, headache, stomach pain and treatment of hypertension and diabetes ^C	1 (0.15%)	100%
<i>Kalanchoe brasiliensis</i>	"coast sheet"	Anti-inflammatory and pain	Chilblains, wounds, burns, insect bites, trauma and twisting ^E	1 (0.15%)	75%
<i>Annona cherimola Mill.</i>	"Graviola"	Anti-inflammatory	Anti-inflammatory and anticancer effects ^S	1 (0.15%)	100%
<i>Passiflora incarnata L.</i>	"Passion fruit"	Soothing	Anxiolytic and mild sedative E	1 (0.15%)	100%
<i>Caesalpinia ferrea</i>	"Iron dick"	Diabetes	Hepatic, gastric inflammations and diabetes ^{ET}	1 (0.15%)	100%
<i>Eugenia pitanga</i>	"Pitanga"	Decrease pressure	Treatment of diarrhea, inflammation, hyperglycemia and hypertension ^R	1 (0.15%)	100%
<i>Senna alexandrina Miller</i>	"Sene"	Regulate the intestine	Laxatives ^L	1 (0.15%)	100%

The samples of 21 plants were collected and submitted to botanical identification by a biologist. The plants were confirmed through the identification of the genus. It was not possible to identify the species because specific parts of the plants, such as roots and flowers, were needed and that was not possible at the time of collection. As it can be seen in Table 2, the popular use does not depart much from the literature, since 45 have shown use compatible with the pharmacological properties described in the literature. However, divergence or lack of scientific evidence was found. The interviewees reported that green tea *Camellia sinensis* has a sedative effect. However, this plant is rich in methylxanthines, such as caffeine, presenting SNC-stimulating effect [17]. Besides,

this tea also has anti-inflammatory and immunomodulatory properties, which aid in the treatment of various atherosclerotic, dietetic and even carcinogenic diseases [4].

Similarly, eggplant (*Solanum melongena L.*) has been reported to lower cholesterol. Despite this, the literature shows that a deeper understanding of this therapeutic activity is necessary since it has not been fully elucidated [18]. Another plant that was also used with divergent purposes of the literature was the elderberry (*Sambucus nigra L.*) since in the literature there is still no scientific evidence to prove its action as anti-flu and to stop pruritus (Table 2) Relation between the use of the most frequent medicinal plants by the interviewees and the literature. The level of fidelity (FL) was

calculated based on the number of users of a particular species of plant to treat a serious disease. The fidelity level (FL) shows the percentage of informants who use a plant species for the same disease, which is important for the total number of informants who mention the plant for any use (Table 2). Fidelity levels higher than 50% are considered as reliable for use, which was observed for most plant species, showing the importance of the use of these species in the treatment of the diseases mentioned in the study area. *Peumus boldus* and *Equisetum* sp were highly utilized plants that had the highest fidelity levels of 93.12% and 87.87% in the treatment of gastrointestinal discomforts and inflammations, respectively. Some plants had 100% fidelity level, yet these plants were little used by the interviewees, which accounts for the great index of level.

However, 55% (148) of the interviewees also use drugs and medicinal plants, presenting potential risks of interaction between MP and drugs. Therefore, we evaluated the potential interactions as shown in Table 3 and identified 42 potential interactions between MP and drugs. Of these, 90.5% (n = 38) were identified as pharmacodynamic interactions and modifications of the effector organ responses may occur, giving rise to synergistic, antagonistic, and potentiating events. Besides, 9.5% (n=4) were considered as pharmacokinetic interactions, since they are caused by a triggering drug on the absorption, distribution, biotransformation and excretion procedures of another drug, whose effect is modified (Table 3) Potential plant-drug interaction.

Table 3: Potential plant-drug interaction.

Medicinal Plant	Medicine	Mechanism	Effect	Frequency of occurrence
Garlic <i>Allium sativum</i>	Glyburide	Pharmacokinetics	Inhibition of CYP2C9 ^N	1
Garlic <i>Allium sativum</i>	Enalapril	Pharmacokinetics	Inhibition of CYP2C9 ^N	1
Garlic <i>Allium sativum</i>	Simvastatin	Pharmacokinetics	Inhibition of CYP3A4 ^N	1
Boldo <i>Peumus boldus</i>	Vitamin c	Pharmacokinetics	Daily consumption of 1g alters the bioavailability of some drugs metabolized by Isoenzymes of the CYP3A4 family ^L	1
Chamomile <i>Matricaria chamomilla</i>	Diazepam	Pharmacodynamics	Potiation of the drug effect ^E	1
Chamomile <i>Matricaria chamomilla</i>	Clonazepam	Pharmacodynamics	Potiation of the drug effect ^E	2
Chamomile <i>Matricaria chamomilla</i>	Phenobarbital	Pharmacodynamics	Intensification or prolonging of the depressant action of the central nervous system ^A	1
Chamomile <i>Matricaria chamomilla</i>	Carbamazepine	Pharmacodynamics	Increased sedation ^{A,B,C}	1
Chamomile <i>Matricaria chamomilla</i>	Amitriptyline	Pharmacodynamics	Intensification or prolonging of the depressant action of the central nervous system ^E	1
Mate tea <i>Ilex paraguariensis</i>	Phenobarbital	Pharmacodynamics	Stimulation of the central nervous system ^O	1
Green tea <i>Camellia sinensis</i>	Ethinylestradiol+ Levonorgestrel	Pharmacodynamics	Antagonist effect ^K	1
Green tea <i>Camellia sinensis</i>	Simvastatin	Pharmacodynamics	Decreased drug potential ^K	1
Green tea <i>Camellia sinensis</i>	Metamizole	Pharmacodynamics	Synergism ^K	1
Green tea <i>Camellia sinensis</i>	Paracetamol	Pharmacodynamics	Synergism ^K	1
Lemon balm <i>Melissa officinalis</i>	Phenobarbital	Pharmacodynamics	Increased sedative activity ^K	1

Lemon balm <i>Melissa officinalis</i>	Fluoxetine	Pharmacodynamics	Antagonist ^K	4
Lemon balm <i>Melissa officinalis</i>	Clonazepam	Pharmacodynamics	Increased sedative activity ^K	5
Lemon balm <i>Melissa officinalis</i>	Amitriptyline	Pharmacodynamics	Increased sedative activity ^K	3
Lemon balm <i>Melissa officinalis</i>	Diazepam	Pharmacodynamics	Increased sedative activity ^K	2
Lemon balm <i>Melissa officinalis</i>	Levothyroxine	Pharmacodynamics	Reduction of thyroid hormone function ^C	1
Lemon balm <i>Melissa officinalis</i>	Carbamazepine	Pharmacodynamics	Increased sedation ^{B,C}	1
Lemon balm <i>Melissa officinalis</i>	imipramine	Pharmacodynamics	Increase in central nervous system depression ^D	1
Lemon balm <i>Melissa officinalis</i>	chlorpromazine	Pharmacodynamics	Increase in central nervous system depression ^D	1
Lemon balm <i>Melissa officinalis</i>	Haloperidol	Pharmacodynamics	Increase in central nervous system depression ^D	1
Lemon balm <i>Melissa officinalis</i>	Pregabalin	Pharmacodynamics	Increase in central nervous system depression ^H	1
Lemon balm <i>Melissa officinalis</i>	Sertraline	Pharmacodynamics	Increase in central nervous system depression ^K	1
Lemon balm <i>Melissa officinalis</i>	Vitamin c	Pharmacokinetics	Daily consumption of 1g alters the bioavailability of some drugs metabolized by the isoenzymes of the cyp family ^L	1
Fennel <i>Pimpinella anisum</i>	Phenobarbital	Pharmacodynamics	Prolonging of the effect of the drug ^{A,B,C}	1
Fennel <i>Pimpinella anisum</i>	Amitriptyline	Pharmacodynamics	Prolonging of the effect of the drug ^M	1
Fennel <i>Pimpinella anisum</i>	Vitamin c	Pharmacokinetics	Daily consumption of 1g alters the bioavailability of some drugs metabolized by CYP3A4 isoenzymes ^L	1
Holy Thorn <i>Maytenus illicifolia</i>	Contraceptive	Pharmacokinetics	Estrogenic property affecting the drug ^I	1
Graviola leaf <i>Annona muricata</i>	Methyl dopa	Pharmacodynamics	Potential of the effect of the drug ^H	1
Graviola leaf <i>Annona muricata</i>	Amitriptyline	Pharmacodynamics	Potential of the effect of the drug ^H	1
Graviola leaf <i>Annona muricata</i>	Metformin	Pharmacodynamics	Hypoglycemic ^I	2
Ginger <i>Zingiber officinale</i>	Omeprazole	Pharmacodynamics	Ginger may decrease the efficacy of antacid and antiulcer drugs because of its stimulatory properties of gastric secretions ^I	1
Insulin <i>Cissus sicyoides</i>	Metformin	Pharmacodynamics	Potential of the hypoglycemic effects of these drugs ^G	1
Insulin <i>Cissus sicyoides</i>	Insulin	Pharmacodynamics	Potential of the hypoglycemic effects of these drugs ^G	1

Basil <i>Ocimum basilicum</i>	Methylodopa	Pharmacodynam- ics	Potentialiation of the effect of the drug ^h	1
Cow leg <i>Bauhinia forficata</i>	Gliclazide	Pharmacodynam- ics	Potentialiation of the effect of the drug ^h	1
Cow leg <i>Bauhinia forficata</i>	Metformin	Pharmacodynam- ics	Potentialiation of the effect of the drug ^h	1
Cow leg <i>Bauhinia forficata</i>	Insulin	Pharmacodynam- ics	Potentialiation of the action of hypoglycemic agents ^{A,B,C}	1
Picão <i>Bidens pilosa</i>	Metformin	Pharmacokinetics	The presence of coumarins reduces the efficacy of the drug ^f	1

Captions: a: Nicoletti 35; b: Nicoletti 34; c: Paixão 39; d: Cordeiro 9; e: Abebe 1; f: Araujo 3; g: Itf 23; h: Medscape 30; i: Mendes, Herdeiro e Pimentel 31; j: Montanari 32; k: Posadzki 45; l: Slain 50; m: Vale 53; n: Foster 15; o: Fasinu 11.

The lemon balm was the plant that presented the most common interactions among the interviewees since it was the most used by them. Their interaction with sedative and anxiolytic drugs such as fluoxetine, amitriptyline, clonazepam (medicines that the respondents reported use), cause increased sedative activity, and this may occur because the lemon balm exerts an additive effect when simultaneously with central nervous system depressant drugs due to their neurocognitive properties [19]. The clinical significance of drug interactions is related to their type (mechanism) and magnitude (severity). In fact, this information is useful to support the need and intensity of patient monitoring or changes in therapy to avoid possible adverse consequences [20-25], since of the 66 respondents who were advised by a health professional, 15 of these could have had potential plant-drug interactions. However, there are no data about the severity degree of plant-drug interactions, as well as the lack of a source that deals with plant-plant interactions.

In fact, plant-plant interactions are also important for their safe use. In our study, of the 406 interviewees, 67 mixed different medicinal plants in the same preparation, such as: sacred grass with lemon balm, lemongrass with chamomile, boldo with lemon balm, barberry with barbatimão, but studies on these interactions are scarce and there is no scientific evidence among these plants. However, it is worth mentioning that of the 406 participants, none reported intoxication or adverse effect related to the use of medicinal plants alone or in a mixture. In addition, 34 (8.3%) participants reported the use of phytotherapies, among whom 31 (91%) were female and 4 (9%) started use due to medical indication [26-31]. Among the phytotherapies used daily are *Calmam*[®] (*Passiflora incarnata* L., Propolis extract (tree resin, beeswax, flower pollen, essential oils), Vitro Naturals Noni Juice[®] *Morinda citrifolia*, Herbarium "Unha de gato"[®] *Uncaria tomentosa*, *Seakalm*[®] (*Passiflora Incarnata*), *Calmix*[®] (*Passiflora Incarnata*, *Melissa officinalis*, *Valeriana officinalis*, *Erythrina verna*, *Cymbopogon citratus*, *Hypericum perforatum*, *Matricaria chamomilla*), *Valeriane*[®] (*Valeriana officinalis* L.). Thus, the numbers of informants that make use of these phytotherapies are 16, 8, 2, 2, 2, 2, respectively.

The low consumption of phytotherapies can be strained to the little knowledge of the population since they have been recently inserted in the market because the National Policy on Integrative and Complementary Practices in the Public Health System was approved in 2006. Besides, since a great part of the interviewees is of low class, many are not able to acquire these medicines [32-38].

Conclusion

In summary, when tracing the epidemiological profile and the medicinal plants used, it was possible to conclude that the use of MPs is part of the popular culture of a city of Sergipe, a state of northeastern Brazil, and is frequently used to aid in the relief and/or cure of symptoms or diseases, as it is also observed in other regions of the country [39-43]. It was also observed that despite advances in the production of medicines, people still use medicinal plants for therapeutic purposes, where the sociocultural aspect has a strong influence [44-47]. However, medicinal plants are not exempt from causing any harm to human health, since, in addition to toxicity, they may interact with some medicinal products [48-52], if used concomitantly with the plant, reducing or potentiating its effects, as presented in this study. In view of this, there is a need for a rational and safe use of alternative medicines and therapies, as well as the orientation of qualified health professionals and the awareness of the risks and benefits of the concomitant use of the therapies under study in order to prevent health problems [53-57].

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Authors' Contributions

LCN-contributed data collection and article writing.

JCN (Master's Degree student)-contributed article writing.

VSSG-contributed data collection and article writing.

BRSS- contributed data collection and article writing.

KFSS- contributed data collection and article writing.

JMVA- contributed data collection and article writing.

BMRC (Master's Degree student)- contributed article writing.

JPS-contributed analysis of species.

AGG- contributed guidance and article elaboration.

All the authors have read the final manuscript and approved the submission.

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