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Ethnoknowledge of medicinal and mystical plants used by healers in Juazeiro do Norte, Ceará, Northeast Brazil

P Sousa, E Aparecida[a]; Mendonça, Ana Cleide Alcântara Morais[b]; Garcia, Í Rodrigues[a]; N Lisboa, M Amanda[c]; Kamdem, J Paul[c]; Cruz, G Venâncio[c]; Silva, Maria Arlene Pessoa da[a,b]; Fernandes, G Pimentel[a]; C Júnior, J Tavares[a,c]*

[a] Regional University of Cariri, Crato, Ceará, Brazil, 63105-000

[b] Herbarium Caririense Dárdano de Andrade-Lima (HCDAL), Regional University of Cariri, Crato Ceará, Brazil. 63105-000

[c] Laboratory of Studies of the Regional Flora of the Cariri (LEFLORE), Regional University of Cariri Crato, Ceará, Brazil, 63105-000

E-mail: †joao.calixto@urca.br

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The aim of this study was to investigate the use of medicinal plants by healers in Juazeiro do Norte, Northeast Brazil, as well as to understand their role in prayer/healing practices. 30 residents from 20 neighborhoods, 18 urban neighborhoods and 2 randomly selected rural locations, were interviewed using a sample method known as "snowball", with two pilot interviews being initially conducted, where for greater method reliability and for the analysis of the importance attributed to the plants by the respondents, a calculation to determine their Relative Importance (RI) index was used. The results indicate the use of 60 species distributed across 34 families. The most representative families were: Fabaceae (7), Lamiaceae (6) and Asteraceae (5), where 10 species (eight exotic and two native) obtained a Relative Importance (RI>1): *Ruta graveolens* L. (1.47), *Vernonia condensata* Baker (1.47), *Piper aduncun* L. (1.44), *Mentha spicata* L. (1.33), *Myracrodruon urundeuva* Allemão (1.3), *Psidium guajava* L (1.19), *Hymenaea stignocarpa* Mart. ex. Hayne (1.15), *Lippia alba* (Mil.) (1.11), *Leonotis nepetaefolia* (L.) R. Br. (1.08) and *Cymbopogon citratus* (D.C.) stapf (1.01). The aforementioned species are acquired from backyards (50%), open markets (33.3%) or from surrounding scrubs (16.6%). Indications included usage for 11 body systems, with 36 species (60%) being indicated for the treatment of the digestive system and 15 (25%) for the treatment of diseases of the female reproductive system. Nine species (15%) were indicated for ritualistic purposes (prayer/healing). With this, the importance of the Healer figure in several municipal districts was observed, a tradition that remains alive, despite the need for greater transmission and assimilation to upcoming generations.

Keywords: Ethnobotany, Medicinal plants, Juazeiro do Norte

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Since the earliest days of civilization, mankind has used plant resources to treat his illnesses. The medicinal plants mentioned in this study are strongly present in the community's traditional culture, which uphold the traditional knowledge of the healing properties of plants as well as of prayers and petitions. This knowledge is usually found in traditional populations which tend to reduce or even disappear when they undergo the inexorable action of modernity[1]

According to Albuquerque[2], ethnobotany is understood as the study of the interrelations between primitive populations and plants, adding a cultural element to its interpretation, due to the commitment of anthropologists. Thus, the importance of this study for the community, carried out through an ethnobotanical survey of the plant species used in curative practices is emphasized. Such a study does not refer only to records of plant resources; rather it encompasses the whole culture present in the environment, where this knowledge is transmitted from generation to generation in various communities.

As for the importance of therapeutic resources, these studies are fundamental given they serve as instruments for the production of new medicines through the pharmaceutical industry[3]. In this way, ethnobotany can be regarded as a study of plants and how different social groups use them.

However, traditional medicine goes beyond properties, chemical formulas and pharmacological analyzes since plants are used as ritualistic instruments in the search for the cure of various diseases[4]. It is thus understood a great relevance for studies both in the areas of religion and medicinal plant ethnobotany exist.

*Corresponding author

To understand the historical context of healing practices and the use of medicinal plants, it is necessary to understand the history of mankind. According to history, over centuries, the role of the woman was exclusively directed towards the care of the house, the children and the husband. In this sense, their concern with diseases and their cures awakened a need for women's knowledge, thus giving rise to healers[5].

Along the course of history, the role of women in ethnobotany, even though they have undergone several persecutions, has turned to the practice of healing and blessing[6].

With men performing the roles of doctors and scientists in the fifteenth century, thus began what is considered as the witch-hunt. These acts were financed by the Church and the State[7,8], where a woman could not be the protagonist of healing and treatment procedures using plants associated with magical rituals.

In Brazil, it is not easy to point out how healing practices started; however, it is noteworthy that native Indians already possessed knowledge regarding plants while the colonizer possessed science, in which sense the emergence of healers may have occurred with the conjunction of the two cultures[9].

Healers are individuals endowed with faith and religiosity, usually Catholic; however they may also be adherents of other beliefs, and other religions. According to Azevedo[9], healers normally possess knowledge of medicinal plants, using them in teas, as cataplasms, syrups and massages. It follows that the acts of praying and blessing are manifestations of popular culture, which seek to treat body and soul afflictions of those who believe in their practice through faith and healing with plants.

In the middle of the seventeenth century in Brazil, records of the use of plant resources, manipulated by healers and midwives, are observed between human beings and the sacred, conserving prayer, crosses and formula rituals[5].

In the following decades, in the 50s through to the 70s, several movements took place in order to combat illicit practices, which sought to end healers, among others. Healers continued their cults clandestinely, in their temples, in prayer rooms in their homes and in Umbanda and Candomblé land, a fact that still exists today due to prejudice.

Today, Family Health Program Teams recognize the act of blessing is a cultural aspect of the Brazilian people and that they contain a great level of biodiversity and flora knowledge[10]. In certain basic health units in the municipality of Juazeiro do Norte, plant gardens with medicinal plants exist, which are distributed to people, often by the indication of doctors and health agents, a fact that was verified through informal conversations with people from the community (2017).

This research had as a general objective to perform an ethnobotanical survey of medicinal plants indicated by healers in Juazeiro do Norte, Northeast of Brazil. This study also sought to analyze the use of plants herein indicated, which contribute to the importance of this popular knowledge for future phytochemical and pharmacological studies, as well as to understand the role of healers in the local community and the importance of rescuing this culture in the Cariri region of Ceará.

Material and Methods

Research area

The research presented the indication of cultivated or native medicinal plants used by healers from 18 neighborhoods (Limoeiro, Timbaúba, Socorro, Santa Tereza, Tiradentes, Pirajá, Romeirão, Novo Juazeiro, Triângulo, José Geraldo da Cruz, Franciscanos, Vila Nova, Centro, Socorro, Horto, João Cabral, Pedrinhas and Betolândia) and two rural communities (Gavião and São Gonçalo) in the municipality of Juazeiro do Norte, south of the State of Ceará, in a period from August 2016 to October 2017.

The municipality of Juazeiro do Norte – Ceará State (Fig. 1) is located in the Metropolitan Region of Cariri in the south of the state, with an area of 249 km². The predominant vegetation is typical of the semiarid, more specifically a thorny deciduous forest. At certain points, transitional forests exist. The land presents reliefs formed by the Araripe plateau (Chapada do Araripe) and backlands depression with alluvial soils, bathed by the Salgado river basin, with a climate that varies between hot tropical semiarid and hot mild tropical semiarid. Its average temperature varies between 24°C and 26°C, with the rainy season occurring between January and May, according to IPECE (2017)[11].

The municipality's population reaches 271,926 inhabitants, according to IBGE data (2018)[12], being the third most populous municipality in Ceará, with an urbanization rate of 96.07% and a rural area of 3.93%. The Human Development Index (HDI) is

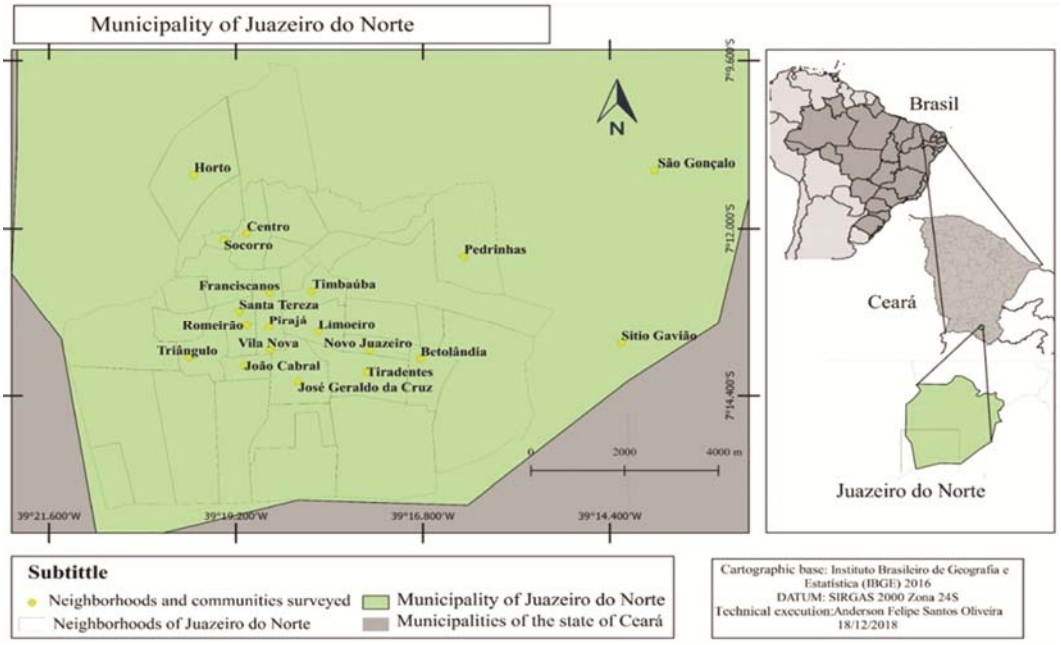

Fig. 1 — Geographical location of the municipality of Juazeiro do Norte, Northeast of Brazil

0.694, corresponding to the 5th place in the State of Ceará[13].

The city is considered one of the three major centers of popular religiosity and pilgrimage of the Country for its religious tourism, due to the historical and religious figure, Father Cícero Romão Batista, which in turn recognizes the city as "The Capital of Faith", falling behind, in terms of visitors numbers, only to the pilgrimages of Nossa Senhora Aparecida, in Aparecida do Norte, São Paulo and Círio de Nazaré, in the city of Belém, Pará. Juazeiro do Norte has one of the largest handicraft centers and Northeastern cord, presenting itself as one of the largest centers for commerce and services in the interior of the state of Ceará[14].

Data collection

Two pilot interviews were conducted with healing residents at the Gavião and São Gonçalo sites (rural area), corroborating with Albuquerque[15], in which the author intended to enhance the quality, clarity and reliability of the methods later described. Informants from these localities, because they are geographically located in a rural zone, may represent more strongly the cultivation practices and the use of plants for the treatment and prevention of diseases allied to the culture of praying/blessing.

During the visits, data were collected through the use of semi-structured questionnaires, direct observation, botanical material collection and small tours guided by the neighborhoods. Data collection occurred three times a week, at Tuesdays, Wednesdays and Thursdays during business hours, with the exceptions of interviews which were scheduled.

The sampling method used employed the snowball technique, which consists of the indication of an informant from a member of the community, which indicates another and so forth. This method obtains good results, since it is applied in a randomized manner, favoring the use of plants as well as the practices adopted by healers[3].

The questionnaires employed consisted initially of basic questions regarding the sex, age, schooling and occupation of the informants, with other questions relating to the frequency of the community's search for healers; what types of plants are used to treat or cure diseases; which parts of the plants and the form of application used by the studied population.

Data analysis

During the interviews, voice recorders as well as photos of the healers were used, when allowed with prior consent, as well as photos and recordings of some of the attendees during the prayers. During the visits and interviews, the participants were asked to sign the Informed Consent Form (TCLE) and Post Informed Consent documents where the participant voluntarily agrees with the terms of the research, which is presented to him in accordance with

Resolution 466 of the Ministry of Health, which regulates research involving human beings.

For the analysis of the importance attributed by healers for the indicated plants, the technique by Bennett and Prance (2000)[16] was used, where the Relative Importance Index (RI) is calculated, with the plant being considered of greater importance the more versatile it is and the greater the number of indications as well as body systems it obtains. The calculation is carried out according to the formula:

RI = NSC + NP

With RI= Relative Importance;

NSC = Number of Body Systems and

NP = Number of Properties.

The two factors are calculated by the formula:

NSC = NSCE/NSCEV and NP = NPE/NPEV,

Where: NSCE = Number of body systems treated by a given species;

NSCEV = Total number of body systems treated by the most versatile plant; NPE = Number of properties attributed to a given species;

NPEV = Total number of properties attributed to the most versatile species[2].

Collection and Botanical material identification

Similarly, to the interviews, some of the indicated species were collected, with these being harvested from fertile branches or the whole plant, in the case of small herbaceous species. The collections were made from the backyards of the houses and from the surrounding vegetation, with the help and collaboration of the interviewees themselves. The plants were deposited in the Herbarium Caririense Dárdano de Andrade Lima, HCDAL, of the Regional University of Cariri - URCA. For the identification of the scientific names the Flora of Brazil 2020 and The Plant List databases as well as the APG IV classification system were used.

Results

Of the 30 informants interviewed, 37% were male and 63% female, which may be explained by the fact the majority of women stay in their residences for a longer time, while the men leave for work, corroborating with Mosca and Loiola[17], which in a study carried out in the interior of Rio Grande do Norte, pointed to similar results as a function of the time the interviews were conducted (during the morning).

The religious formation of the informants in this study is predominantly Catholic (80%), while 10% are Umbanda supporters and the other 10% Candomblé.

The informants' ages ranged from 27 to 88 years, with 36.67% of them being aged 27 to 49 years and 63.33% ranging from 50 to 88 years, and 33.3% with a range between 76 and 88 years of age.

Data on schooling levels indicate the functional illiterate rate as predominant (33.33%). Those with incomplete primary education comprise 17% and those with complete tertiary education correspond to 7% of informants.

Regarding family structure, thirteen (43%) stated they live with their spouses, five are widowers (17%), three are divorced (10%) and seven are single (23%), most of whom are already of age.

As for source of income, when questioned, 73% of the informants (20%) were retired, exercising domestic activities, in addition to the praying/blessing practice. Only two informants (6%) indicated healing practices as their main source of income, in addition to donations, while eight informants (25%) reported having fixed jobs.

During the interviews, the informants were also able to report personal stories about their experiences, as well as historical information from the municipality of Juazeiro do Norte, since some were pilgrims from Father Cicero and from the Mother of Sorrows, originating from various Northeastern states, especially Alagoas, Pernambuco and Bahia, where guided by faith and in search of better living conditions for their families, they came to fixed living in the municipality of Juazeiro do Norte, Ceará.

As for how they acquired the practice of healing, most informants (46.6%) said they learned from God and 53.4% said they inherited it from relatives, other healers, neighbors and even alone (Fig. 2), which

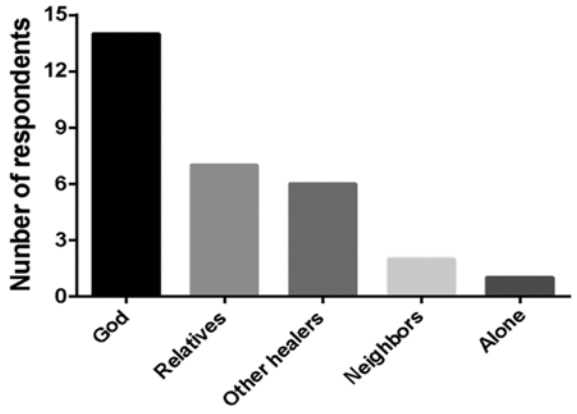

Fig. 2 — Acquisition form of blessing practices by informants in Juazeiro do Norte, Northeast Brazil

corroborates with results by Gomes *et al.*[18], who pointed out a greater number of informants claiming to have acquired the teaching of the blessing techniques through God.

In this study, 60 plant species, distributed across 34 botanical families, with Fabaceae (8 species), Lamiaceae (6) and Asteraceae (5) being the most representative species, were mentioned by the informants. The most cited species for medicinal and praying/blessing purposes by the healers were: *Menta spicata L.* and *Lippia alba* (Mill.), both with ten citations and *Cymbopogon citratus* (D.C.) stapf. with nine citations (Table 1).

Nine species were cited as used in blessing rituals, these being: *Ocimum cf. americanum* (RI=0.95), *Jatropha gossypifolia* (RI=0.8), *Hyptis cf. suaveolens* (L.) (RI=0.7), *Dieffenbachia amoe*na (RI=0.6), *Mimosa teuniflora* (RI=0.4), *Ruta graveolens* (RI=0.4), *Ricinus communis, Sansevieria trifasciata* and *Rosmarinus officinalis* (RI=0.2 each).

Table 1 — Ethnobotanical survey of plants for medicinal and ritual use and their respective uses/Indications by healers in Juazeiro do Norte, Ceará, Northeast Brazil.

Family / Taxon	Popular Name	Hab.	Used Part	Method of preparation	Medicinal and / or ritualistic therapeutic indications	Body Systems	Voucher DALHC	IR
AMARANTHACEAE								
Dysphania ambrosioides (L.) Mosyakin & Clemants	Mastruz	Er	Leaves	Juices with milk or water	Verminose, fungal or bacterial infections, digestive problems, inflammation and rheumatism.	S.D./ S.I./ S.Es./ S.M.	13.174	0,74
Achyranthes bettizickiana	Terramicina	Er.	Leaves	Infusion	Inflammations, headaches, migraines, diuretic and digestive.	S.N/S.E./S.D	13.178	0,3
ANACARDIACEAE								
Myracrodruon urundeuva Allemão	Aroeira	Ar	Bark, dried leaves and fruits	Decoction and bathing	Vaginal infections, wounds, rheumatism, gastric ulcers, sore throats and acne.	S.R. / S.I./ S.L/ S.T./ S.Es./ S.M/ S.D./ S.Resp./ S.E.	-	1,3
Anacardium occidentale L	Cajueiro	Ar	Bark, fruit and leaves	Peeling oil, Decoction, infusion and in natura.	Diuretic, diarrhea, hypoglycemia, flu, diabetes, wounds, throat infection, scarring, thrush, rheumatism, coughs, bronchitis, intestinal cramps, anti-inflammatory, anti-hemorrhagic, malaria.	S.Ex./ S.D./ S.I./ S.T./ S.Resp./ S.C.	-	0,6
Mangifera indica L.	Mangueira	Ar	Leaves, fruits.	Infusion, juices and in natura.	Fever, digestive problems, bronchitis and other respiratory conditions.	S.I./ S.E./ S.D./ S.N.	-	0,1
ANNONACEAE								
Annona muricata L.	Graviola	Ar	Leaves and fruits	Infusion, juices and in natura	Bronquite, gripe, reumatismo, artrite, e coadjuvante no combate ao câncer.	S.M./ S.Resp.	-	0,43
APIACEAE								
Pimpinella anisum L	Erva doce	Er.	Leaves and flowers	Infusion, baths	Baths of purification and cleansing, to "heal the evils of body and soul".	S.N.	-	0,3
APOCYNACEAE								
Himatanthus drasticus (Mart.) Plumel	Janaguba	Ar.	Dilute stem latex in water	'Garrafada'	Muscle pain, inflammation, elimination of boils and wounds, arthritis, digestive system problems; elimination of worms and bacteria.	S.M./ S.I./ S.T./ S.Es. / S. Resp.	13.349	0,65

(*contd.*)

Table 2 — Ethnobotanical survey of plants for medicinal and ritual use and their respective uses/Indications by healers in Juazeiro do Norte, Ceará, Northeast Brazil. (*contd.*)

Family / Taxon	Popular Name	Hab.	Used Part	Method of preparation	Medicinal and / or ritualistic therapeutic indications	Body Systems	Voucher DALHC	IR
ARACEAE								
Dieffenbachia amoena Bull	Comigo-ninguém-pode.	Arb.	The whole plant	Envy, evil eye, breakdown.	Rit	S.N.		
ASTERACEAE								
*Acmella oleracea (*L.) R.K.Jansen.	Agrião	Er.	Leaves and flowers.	Salads, juices, soups, maceration.	Flus, fevers, coughs	S. Resp	13.137	0,31
Vernonia condensata Baker	Boldo do Chile	Arb.	Leaves	Infusion	Insomnia, rheumatism, cold, constipation, gallstones, earaches, diuretic, liver problems.	S.N./ S.Es.S.M./ S.R./ S.D./ S.Ex./	13.176	1,47
Calendula offinales L	Calêndula	Er	Flower	Infusion, poultice, baths	Skin lesions, acne, warts, rashes, burns, scarring, skin inflammations, nose infections, ear aches and hemorrhoids.	S.T./ S.E./ S.R./ S.R./ S.S.	-	0,75
Matricaria chamomilla L.	Camomila	Er.	Flowers	Infusion	Soothing, insomnia, in the fight against stress and anxiety, digestion.	S.N/S.D.	-	0,81
Helianthus annuus L	Girassol	Arb	Seeds and flowers	Infusion, salads, snacks, granolas, other yogurts.	Good for reducing cholesterol, detoxifying, relieves menopausal symptoms, soothing, migraine relief, rheumatoid arthritis	S.E./ S.I./ S.N./ S.Es./ S.M.	-	0,75
ASPARAGACEAE								
Sansevieria trifasciata Prain	Espada-de-são Jorge	Arb.	Leaves and flowers	Teas, baths and blessing	Rit.	S.N.	-	0,2
CANNABACEAE								
Cannabis sativa	Maconha	Er	Leaves / Powder or shavings and seeds	Infusions	Chronic pain, Alzheimer's, epilepsy, multiple sclerosis, nausea and vomiting, anorexia, fatigue.	S.N./ S.D	-	0,6
CRASSULACEAE								
Kalanchoe cf. pinnata (Lam.) Pers.	Malva courama	Er.	Fresh leaves	'Lambedor' and maceration with water	Treatment of gastritis, ulcers, cystitis, gonorrhea, diarrhea, throat inflammations, thrush, respiratory diseases, for skin conditions	S.D./ S.T./ S.R./ S. Ex./ S.I./ S. Resp./	13.777	0,4
CUCURBITACEAE								
Momordica charantia L.	Melão de São Caetano	Arb.	Fruits, leaves, roots	Cataplasma, decoction and infusion	Varicose veins, gastric problems, biliary disorders, scabies, skin lesions, malaria, colds, hemorrhoids	S.C./ S.D./ S.E./ S.T./ S.I./ S. Resp.	13.132	0,87
EUPHORBIACEAE								
Ricinus communis L.	Mamona	Arb	Seeds and flowers	External use and oil.	Intestinal parasites, herpes baldness, burn, vermifuge.	S.D/ S.R./ S.I./ S.C/ S.T/ S.E./	-	0,2

(*contd.*)

Table 3 — Ethnobotanical survey of plants for medicinal and ritual use and their respective uses/Indications by healers in Juazeiro do Norte, Ceará, Northeast Brazil. (*contd.*)

Family / Taxon	Popular Name	Hab.	Used Part	Method of preparation	Medicinal and / or ritualistic therapeutic indications	Body Systems	Voucher DALHC	IR
Jatropha gossypifolia	Pinhão-roxo	Arb	Leaves and flowers	Infusion, baths, benzing	Rit./T.M. Hypertension, diabetes, burns, rheumatism and gastrointestinal problems.	S.D.	-	0,8
FABACEAE								
Anadenanthera colubrina (Vell.) Brenan	Angico	Ar.	Barks	Lambedor', 'garrafadas'	Coughs, uterine problems, rheumatism	S. Resp./ S.R./ S.E./ S. Es./	-	1,00
Cajanus cajan (L.) Huth	Andú	Arb	Leaves, roots, flowers, fruit	Infusion and stew	Diuretic, anti-inflammatory	S.U./ S.Ex./ S.Resp./ S.I./ S.N./ S.D.	13.134	0,87
Libidibia ferrea (Mart. ex Tul.) L.P. Queiroz	Pau ferro	Ar.	Barks	Infusion and baths.	Diabetes, anti-inflammatory, respiratory problems, rheumatism, hemorrhages, hemorrhoids, heart problems	S.D./ S.E./ S. I./ S.Resp. / S.Es./ S.M./ S.C./ S.T.	13.133 - - - -	0,2
Hymenaea stigonocarpa Hayne	Jatobá	Ar	Bark and fruit	Infusion, 'garrafada' and in natura use	Respiratory, gastrointestinal, urinary, colic and bleeding problems	S.Resp./ S.D./ S.Ex./ S.R./ S.E./ S.C.		1,15
Erythrina velutina Vell.	Mulungu	Ar.	Barks	Infusion	Insomnia, anxiety, depression, sclerosis, hypertension, cystitis, epilepsy, urinary insufficiency, gingivitis and asthmatic bronchitis.	S.N./S.C./ S.Ex./ S.I./ S.Resp.	-	0,75
Pterodon emarginatus Vog.		Ar.	Seeds	Infusion	Sore throat (laryngitis, pharyngitis and cough)	S.I./S.Resp./ S.D./ S.E./ S.T.	-	0,1
Tamarindus indica L.		Ar.	Fruit and leave	Juices and Infusion	Laxative, obesity, anemia, blood circulation, diabetes, anti-inflammatory and antioxidant	S.Ex./ S.D./ S. Resp./ S.E./ S.Es./ S.M./ S.I./ S.C.	13.125	0,2
LAMIACEAE								
Mentha spicata L	Hortelã	Er	Leaves	Infusion	Soothing action; against colds and flu, digestive problems and fighting headaches.	S.N./ S.Resp./ S.D./	-	1,33
Leonotis nepetaefolia (L.) R. Br	Cordão de São Francisco	Er	Leaves	Infusion	Against asthma, fever, gastric problems, diarrhea, seizures, epilepsy, worms, depression, cysts and fibroids.	S.Resp./ S.I./ S.D./ S.N./S.R./ S.T./S.E.	-	1,08
Ocimum cf. americanum L	Manjericão	Er	Leaves	Rituals, baths and cleansing of body and soul	Rit.	-	13.175	0,95
Plectranthus amboinicus (Lour.)Spreng.	Malva do reino	Er	Leaves	'Lambedores'	Asthma, peptic ulcer; treatment of skin conditions	-	-	0,40

(*contd.*)

Table 4 — Ethnobotanical survey of plants for medicinal and ritual use and their respective uses/Indications by healers in Juazeiro do Norte, Ceará, Northeast Brazil. (*contd.*)

Family / Taxon	Popular Name	Hab.	Used Part	Method of preparation	Medicinal and / or ritualistic therapeutic indications	Body Systems	Voucher DALHC	IR
Hyptis cf. suaveolens (L.) Poit.	Alfazema de caboclo	Arb.	Dry flowers	Infusion, maceration baths.	Sinusitis, depression and insomnia.	S.D./ S.T./ S. Resp./ S.N.	13.140	0,7
Rosmarinus officinalis L.	Alecrim	Er.	Leaves and flowers	Infusion, baths	Diuretic, muscle aches and aids digestion.	S.Es./S.M/S.D. S.Ex.	-	0,1
MALVACEAE								
Gossypium herbaceum L.	*Algodão*	Arb.	Leaves	Infusion	Antiabortion, irregular menstruation.	S.R. / S. E	-	0,32
MYRTACEAE								
Eucalyptus globulus Labill.	Eucalipto	Ar	Leaves	Infusion	Nasal decongestant and clearing of the respiratory tract.	S. Resp	-	0,41
Psidium guajava L.	Goiabeira	Ar	Leaves, barks	Infusion and decoction	Analgesic, in the treatment of candidiasis, digestive problems, inflammations, soothing, diuretic, menstrual dysfunctions, bad breath, skin lesions.	S.N./ S.R./ S.D. / S.E./ S.C./ S.I./ S.Ex./ S.T.	13.126	1,19
NYCTAGINACEAE								
B*oerhavia difusa* L.	Pega pinto	Er.	Roots	Infusion	Cysts in the ovary, urinary retention.	S.R./ S.E./ S.Ex.	13.138	0,53
OLEACEAE								
Ximenia americana L	Ameixa	Ar	Fruit	Juices, *in natura*	Natural laxative. Regulates blood cholesterol levels	S.D./ S.C.	-	0,77
PASSIFLORACEAE								
Passiflora cincinnata	Maracujá do mato	Lia	Folhas		Relaxing, in the fight against stress, anxiety and insomnia	S.N	-	0,41
PIPERACEAE								
Piper aduncum L.	Pimenta de macaco	Arb		Infusão, banhos, cataplasma	Bad breath, liver and intestinal disorders, bleeding. Use of baths for wounds and skin infections.	S. D./ S. E./ S. C./ S. T.	-	1,44
POACEAE								
Cymbopogon citratus (D.C.) stapf	Capim santo	Er	Folhas	Infusion	Anxiety, insomnia, antidepressant, tranquilizer	S. N	-	1,01
PUNICACEAE								
Punica granatum L.	Romã	Ar.	Fruits, seeds and bark	Infusion and gargling	Sore throat and fever	S.Resp./ S.I.	-	0,52
PHYLLANTACEAE								
Phyllanthus niruri L.	Quebra-pedra	Ar.	Leaves	Infusion	Kidney pains, eliminate kidney stones.	S.N./ S.D./ S.Ex./ S.E./ S.R.	13.131	0,63
PLANTAGINACEAE								
Plantago major L.	Tanchagem	Er	Leaves	Infusion, poultices, baths	Healing, digestive problems, anti-inflammatory, hemorrhoids, liver and skin conditions, rhinitis, sinusitis, flus	S.C./ S.D./ S.I./ S.T./ S.E./	-	0,67

(*contd.*)

Table 5 — Ethnobotanical survey of plants for medicinal and ritual use and their respective uses/Indications by healers in Juazeiro do Norte, Ceará, Northeast Brazil. (*contd.*)

Family / Taxon	Popular Name	Hab.	Used Part	Method of preparation	Medicinal and / or ritualistic therapeutic indications	Body Systems	Voucher DALHC	IR
Scoparia dulcis L.	Vassourinha	Er	All parts of the plant	Infusions, decoction baths and tinctures.	Asthma, bronchitis, flus, coughs; skin disorders, gastrointestinal problems, leukorrhea, urinary tract infections, malaria, earaches and varicose veins	S. Resp. S. Resp./ S.T./ S. Ex./ S.I./ S. C.	13.139	0,85
RHAMNACEAE								
Ziziphus joazeiro Mart.	Juazeiro	Ar.	Leaves and barks	Infusion	It has detergent activity, cleaning for oral and hair hygiene, with anticary actions	S.D./ S.I.	13.129	0,72
RUBIACEAE								
Morinda citrifolia L.	Noni	Ar.	Fruit	Fruit juice with honey wine and honey	Ulcers, gastrites, arthritis, rheumatism, cancers (such as cervical, prostate, etc.)	S.D./ S.Es./ S.M./ S.R./ S.E	-	0,95
*Coutarea hexandra (*Jacq.) K.Schum	Quina-quina	Ar.	Leaves and barks	Infusion	Anemia, urinary problems, measles, malaria, dysentery, sore throat, heart problems, hemorrhoids,	S.C./ S. E./ S.N./ S. I./ S.T.	-	0,1
Tocoyena formosa Cham. Schultdl.	Jenipapo	Ar.	Fruits	Infusion, juices and 'lambedores'	Anemia, bronchitis, kidney problems, liver, diarrhea, ulcer, pharyngitis and blood circulation	S. C./ S. Resp./ S.Ex./ S.D.	-	0,64
RUTACEAE								
Ruta graveolens L.	Arruda	Er	Leaves and flowers	Infusion, maceration	Wounds, bruises, rheumatism, thromboses and hemorrhoids, and analgesic.	S.T./ S.M./ S.C./	-	1,47
Citrus sinenses L.	Laranjeira	Ar	Leaves, bark, fruit	Infusion, juices and *in natura*.	Soothing and digestive action	S. Es./ S.S./ S.N	-	0,5
Citrus cf. aurantifolia (Christm.) Swingle Osbeck	Limão galego	Ar	Fruit	Juices and infusion	It fights diseases like heartburn, gastritis, stomach ulcers, effective in treating obesity.	S.N./ S.D. S.D./ S.E./ S.L.	13.130	0,3
SAPOTACEAE								
Sideroxylon obtusifolium (Roem. & Schult.) T.D.Penn.	Quixaba	Ar.	Barks	Infusion, maceration	Pains in the spine, Diabetes, Inflammation of the uterus and ovary, and skin lesions, anti-inflammatory and healing	S.N./ S.D./ S.C./ S.E./ S.R./ S.T./ S.I.	-	0,88
SCHISANDRACEAE								
Illicium verum Hook. f.	Anis estrelado	Ar.	Fruit and seeds	Infusion or "dry stars" as chewing gum.	Distúrbios do trato gastrintestinal, cólicas e mau hálito.	S.D./ S.E./ S.R.	-	0,63
SOLANACEAE								
Solanum paniculatum L.	Jurubeba	Arb.	Leaves	Infusion	Heartburn, bronchitis, cystitis; peptic ulcer; coughs; hepatitis; anemia, flu, malária.	S.D./ S.Resp./ S.I./ S.T./ S.R./	-	0,99
URTICACEAE								
Cecropia glaziovii Sneth	Embaúba	Ar.	Leaves	Teas	Diuretic and antihypertensive action	S.Ex./ S.C.	-	0,1

(*contd.*)

Table 6 — Ethnobotanical survey of plants for medicinal and ritual use and their respective uses/Indications by healers in Juazeiro do Norte, Ceará, Northeast Brazil. (*contd.*)

Family / Taxon	Popular Name	Hab.	Used Part	Method of preparation	Medicinal and / or ritualistic therapeutic indications	Body Systems	Voucher DALHC	IR
VERBENACEAE								
Lippia alba (Mill.) N.E. Br.	Erva Cidreira	Er.	Leaves	Infusion and essential oil	Anxiety, depression, insomnia	S.N	13.128	1,11
XANTHORRHOEACEAE								
Aloe vera (L.) Burm. F.	Babosa	Arb.	Leaves (pulp)	Poultice.	Hair and skin health and burns, uterine inflammation, hemorrhoids, bladder stones, varicose veins, appendicitis, prostatitis, dysentery, nephritis and in the treatment of some types of cancer	S.T./ S.R./ S.E./ S.C./ S.Ex./ S.U./ S.N.	-	0,4
ZINGIBERACEAE								
Alpinia zerumbet (Pers.) B.L.Burtt & R.M. Sm.	Colônia	Arb.	Leaves	Infusion	Control of hypertension	S.C.	13.135	0,3

*Subtitle: Er.: herb; Ar.: tree; Arb.: bush; DALHC: Dárdano de Andra de Lima Caririense Herbary. S.N.: nervous system; S.R.: respiratory system;

However, 14 healers (46.6%) indicate they do not use a specific plant during praying/healing rituals, as these practices can be performed with any plant.

With respect to botanical material collection places for healing rituals, 15 informants (50%) affirmed they collect plants from their own backyards since, according to reports, they are organic (free of pesticides and chemicals) and must be harvested, sanitized and stored appropriately in order to maintain their medicinal and healing properties. Ten informants (33.3%) said they bought the plants in open markets or other local shops. Five informants (16.6%) responded they collect plants from the brushwood near their homes.

Figure 3 shows the diseases, their signs and the main motives for searching for a healer.

Thirty-six species (60%) were cited for the treatment of digestive system diseases, fifteen (25%) for treatment of female reproductive system diseases, such as uterine and ovarian cysts, thirteen (21.6%) for the treatment of respiratory system diseases, eleven (18.3%) for the treatment of infectious and parasitic diseases, ten (16.6%) for healing, body and soul purification rituals, eight (13.3%) for muscular and skeletal system diseases and six (10%) for the treatment of nervous system diseases. The other diseases received citation indices equal to or less than 5%. It should also be noted that in some cases the same species are indicated for the cure of various diseases.

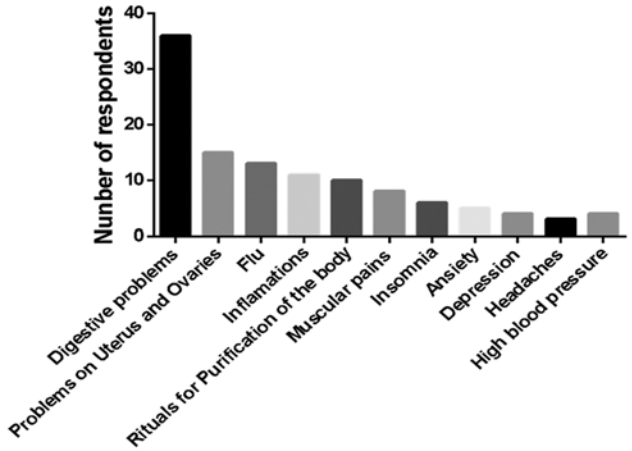

Fig. 3 — Main diseases or signs whose cures using a healer are sought by in Juazeiro do Norte, Ceará, Northeast Brazil

The plants indicated in this study are often ingested in teas (usually by infusion or decoction), macerated (juice or pulp), syrups, poultice, baths, bottled and even *in natura* (Fig. 4).

For most informants (54%), a daily demand by the population exists due to the non-existence of "cures" for many diseases in pharmacies, where such a cure exists only in their small prayer rooms. With regards to guidelines, many healers say the population which seeks them often does not correctly follow their recommendations for the use of medicinal plants, since the plants indicated by them have the power of healing, however there must be a sequence in the

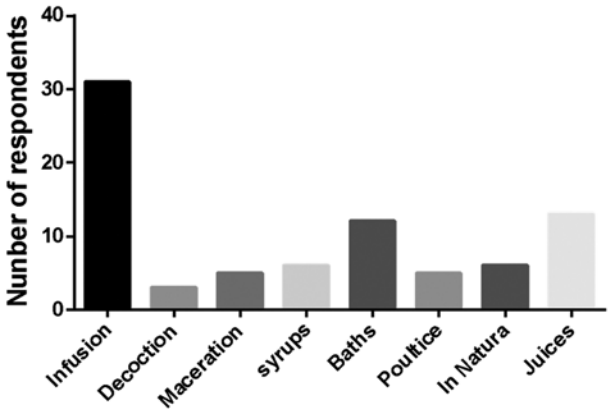

Fig. 4 — Main preparation forms of medicinal plants according to healers in Juazeiro do Norte, Ceará, Northeast Brazil

"treatment" to be performed, in addition to the patient needing to return several times to obtain the expected result and cure in some cases.

Discussion

These results also corroborate with those of Carvalho *et al.* (1982)[19], in Araraquara, São Paulo, Santos and Guarim Neto[20], in Alta Floresta, Mato Grosso, Aguiar[21], in Rio das Contas, Bahia, Almeida & Albuquerque[22,6], Barboza da Silva *et al.* (2012)[23], in the Barra II quilombola community, municipality of Morro do Chapéu, State of Bahia, Silva *et al.* (2015)[24] in Luiz Correia, State of Piauí, who also affirm that women are the main knowledge holders of the praying act and/or the use of plants for medicinal purposes.

Among the Catholics, many affirmed to use blessings as a way of allying the healing power of the plant and faith by the word, using prayers from this religion such as the Our Father, the Hail Mary and the Creed, always accompanied by the sign of the cross, as also observed by Câmara *et al.*[8] and Carvalho *et al.* (2017).

These results corroborate with Zank[25], where the author states regional healers are elderly people. Lima[26], argue that in the traditional strategy of learning, two factors are worrying: the advanced age of its holders and the "globalization" of customs, which encourages the younger generation to ignore ethnoknowledge, attracted by urban values.

Oral tradition is of great importance where this is stated in the interviews as a frequent way of passing knowledge (Câmara *et al.*, 2016) when it comes to the uses and functions of medicinal plants[27].

The fact that this knowledge is concentrated among older healers, may demonstrate that in the form of maintaining traditional knowledge, old age is a crucial factor. Oliveira and Trovão[28] affirm that possible life experiences within praying practices and the knowledge acquired by the cultural use of some plant species, makes older people respected figures in their communities and perhaps, therefore, the community itself perceives them as keepers of the knowledge of healing rituals through the use of plants.

Câmara *et al.*[8] affirm the demand for healers occurs not only because the regions are poorer, which may not be in agreement with the results in this study, since healers from different socioeconomic neighborhoods exist in the municipality of Juazeiro do Norte, but also because they are people who live closer to their consultants, or because some diseases, such as the evil eye or "broken", for example, are not cured or have prescribed drugs by doctors. Carvalho *et al.* (2017) corroborate with this study when publishing research with healers in the municipalities of Anhembi and Mogi das Cruzes, in the state of São Paulo, a region with a good HDI index.

These results corroborate in part with Oliveira & Trovão[28], where Lamiaceae appears with the largest number cited species in a survey carried out in the neighboring State of Paraíba. Fabaceae and Lamiaceae were also the families with the highest medicinal species represerntative by Silva *et al.* (2015), when studying the use of medicinal plants in the interior of the State of Piauí.

A result similar to those from Sales *et al.*[29] in the Senhor do Bonfim quilombola community, in the city of Areia, Paraíba, where the same three species were the most cited.

The use of the leaves corresponded to 63% of citations for used plant parts, which corroborates with several studies carried out in other regions of the country[25,30,31,32]

Three species, *R. officinalis*, *R. graveolens* and *J. gossypifolia*, were recognized as important for the healing of body and spiritual diseases, which reveals a strong identity of the healers with the plants they use, a result similar to Oliveira and Trovão[28].

The most cited plants indicated for the treatment of diseases as well as for ritualistic purposes were: *Ruta graveolens* and *Lippia alba*, with the plants being reported capable of absorbing what is negative or withering, preventing this problem from being passed onto others, corroborating with Santos and Guarim Neto (2005)[20] and Araújo (2011)[33].

These results are similar to those from most studies developed in the Northeast of Brazil, as well as those found by Santos *et al*. (2010)[34], in a survey conducted with Kambiwá Indians in the State of Pernambuco, where the majority of informants pointed to teas (infusion) as their main form of use (32%).

Conclusion

This study points to a cultural and ethnobotanical dynamism associated with the use of plants by healers for the indication of physical, emotional and spiritual healing aspects.

In Juazeiro do Norte, Brazil's second largest religious pilgrimage site, the practice of using plants for medicinal and blessing purposes continues to be transmitted, on a small scale, considering that these practices need to be experienced, transmitted and assimilated by observers.

The forms of plant use vary from ingestion through infusions, to praying practices through the acts of blessing, which may act in the healing process through faith, as reported.

Plant access by informants is easy, since most are grown in their own yards.

The knowledge emphasized by informants, especially regarding management and the association of species with diseases, may help with the construction of new scientific knowledge surrounding active principles from cited species, thus subsidizing phytochemical, microbiological and pharmacological studies.

Taking into account the healers' distribution across various municipality districts, the use of plants for curing diseases is still a socially and culturally expressive practice, making those who practice it, people of great respectability in the communities and "doctors of traditional medicine".

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Conflict of Interest

The authors have no conflict of interest

Author Contributions

EAPS: projection and execution of activities; ACAMM: botany identificacion; IRG: manuscript organization; MANL: manuscript organization; JPK: statistical analysis; GVC: manuscript organization; MAPS: botany identificacion; GPF: project coordination; JTCJ: supervision and project coordination

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