

The use of medicinal plants by an indigenous Pataxó community in NE Brazil

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ABSTRACT: We identified and classified 48 medicinal plants used by the Pataxó Indians in south Bahia, Brazil. The location is an ecologically threatened area designated by UNESCO as a World Heritage Site. The aim of this paper is to document phytotherapeutic practices in the indigenous community of Mata Medonha. We conducted interviews with the 25 families present at the area. Of the 48 medicinal species identified, only 14 (29%) had been examined for mechanism of action or isolation of biochemical compounds, according to bibliographic research. The plants were deposited at the Alexandre Leal Costa Herbarium of the Federal University of Bahia. We gathered information about the preparation and uses of the plants. The species are used for a variety of maladies, including flu, congestion, bronchitis and headaches, pain, snake bites, and some were only used for women's disorders. The Pataxó ethnopharmacological knowledge is under pressure from the economic outmigration of the community and threats to the biodiversity from logging, mining, and tourism. The plants studied here include important drug candidates. Additional research on the molecular aspects of the species cited should be performed.

Key words: medicinal plants, indigenous community, ethnobotany, Pataxó, Bahia

RESUMO: O uso de plantas medicinais por uma comunidade indígena Pataxó no NE do Brasil. Foram identificadas e classificadas 48 plantas medicinais usadas por Índios Pataxós no sul da Bahia. A região é área de risco ecológico designada pela UNESCO como Sítio do Patrimônio Mundial. O objetivo deste estudo foi de documentar as práticas fitoterápicas na comunidade indígena da Mata Medonha. Foram conduzidas entrevistas com as 25 famílias presentes no local. Dentre as 48 espécies identificadas, apenas 14 (29%) foram avaliadas quanto ao mecanismo de ação ou isolamento de compostos químicos, de acordo com levantamento bibliográfico. As plantas foram depositadas no Herbário Alexandre Leal Costa da Universidade Federal da Bahia. Foram registradas informações sobre o preparo e uso das plantas citadas. As espécies são usadas para uma variedade de doenças incluindo gripe, congestão, bronquite, dores em geral, picadas de cobra e algumas apenas para doenças femininas. O conhecimento etnofarmacológico Pataxó está sobre pressão pelas migrações para fora da comunidade e ameaças à biodiversidade por desmatamento, mineração e turismo. As plantas estudadas incluem importantes candidatos a fármacos. Pesquisas adicionais sobre os aspectos moleculares devem ser realizadas.

Palavras-chave: plantas medicinais, comunidade indígena, etnobotânica, Pataxó, Bahia

INTRODUCTION

With over 120,000 species, Brazil is an empire of plants (Ferro, 2006). Brazilian plants have been used since ancient times in traditional medicine

(Almeida, 1999) and native Brazilians possess deep knowledge of the therapeutic properties of local flora. Our studies took place in the rainforests of Bahia

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State, which have been designated a World Heritage Site by United Nations Educational, Scientific and Cultural Organization (UNESCO, 1999). The rainforests of Brazil's Atlantic coast are the world's richest in terms of biodiversity. The site contains a distinct range of species with a high level of endemism and reveals a pattern of evolution that is not only of great scientific interest but is also of importance for conservation.

Many studies were made on the healing flora used in Brazil's traditional medicinal practices, among them are the research of the medicinal plants used by the Pataxós of Monte Pacoal, analyzed by Thomas (2001); the study of Rodrigues & Carlini (2005) who analyzed the 'Krahô tribes' use of plants affecting the central nervous system; Morais et al. (2005) that described the use of medicinal plants by the Tapeba tribe of Ceará; Coutinho et al. (2002) who studied the medicinal use of the flora by Indian Communities from Maranhão; Begossi (1996) and Begossi et al. (2000; 2002) who studied the medicinal plants in the Atlantic Forest, focusing on knowledge of the *caiçaras* (rural inhabitants of the Brazil's Atlantic coast); and Milliken & Albert (1996; 1997) the medicinal plants used by the Yanomami Indians. In a wider study, the medicinal and poisonous plants used in NE region of Brazil were described from Maranhão to the state of Bahia in a recent survey (Agra et al., 2007; 2008).

In southern Bahia, the remaining coastal forests occupy a belt approximately 100-200 km wide along the Atlantic coast. The forests gradually become drier inland, changing from the littoral restinga forest to the southern Bahian moist forest, to semideciduous forest, to the deciduous liana forest ("Mata de Cipó") (Gouvêa, 1976). Each of these forest types occupies a narrow zone up to 50 Km wide within the coastal forest belt and varies in composition depending on elevation, soils, and drainage. Farther inland, the vegetation changes from forest to grassland (Cerrado) or dry thorn scrub (Caatinga). Above 600-700 m elevation, the forests become cooler and more humid. Within the southern Bahian moist forest zone, variation in soils and topography results in a patchwork of diverse micro-habitats within the superficially uniform forest.

The distributions of many species of plants and animals are restricted to areas between the large river systems that drain the Atlantic coastal forest of southern Bahia. These rivers apparently act as barriers to the migration of many species of plants and animals and, consequently, many species may be endemic to one of these inter-fluvial zones (Thomas, 2003).

Brazil has a rich indigenous heritage, including 225 Indian nations, 68 of whom have never

been contacted. Yet only 460,000 natives still live in traditional villages, with 100-190 thousand more in urban areas (FUNAI, 2009). With approximately 2,250 individuals remaining, the Pataxó are a small indigenous group that lives in the extreme southeast of the Brazilian state of Bahia. Their territory covers 8,640 ha of land between the *Mucuri* and *João de Tiba* Rivers, and the Atlantic Ocean.

Pataxós live on subsistence agriculture, small-scale fresh fishing, and the sale of utilitarian artisan products in nearby villages. They are scattered and shrinking due to modern diseases, encroachment tourism and mining (Curi, 2005). The Pataxó are losing both their native language – most speak exclusively Portuguese – and their knowledge of traditional medicine. Their botanical knowledge is in danger of disappearing, as has been seen in other indigenous communities in Brazil.

The Pataxó occupation of the south part of Bahia initiated in 1805. The group was gathered in a village called Barra Velha, at Monte Pacoal (Pascoal Mount), together with many other Indian groups, as the Maxakali, Botocudos, Camakã and Tupiniquim. Monte Pascoal, a peak 586 m high, was the first land sighted when the Portuguese discovered Brazil in 1500. The Park was dedicated in 1961 at which time it covered 22,500 ha; the area was later reduced to 14,000 ha, with most of the excluded territory given to the local Pataxós Indian tribe (Pádua, 1989). The park lies 250 km south of Ilhéus and extends westward from the coast 30 km to Monte Pascoal (16°53'-16°58'S, 39°07'-39°25'W). The area receives approximately 1500-1750 mm per year of rainfall with 1-2 dry months per year. Annual temperatures average 22-24°C (IBAMA, 2009). The vegetation of the eastern part of the Park is restinga and mangrove and of the western part, southern Bahian wet forest over laterite. Many small Indian communities leaved Barra Velha after creation of the Park, and occupied other regions around Monte Pascoal; among them are the villages of Corumbauzinho, Águas Belas and Mata Medonha.

Mata Medonha village was established in 1951 in a region, so far completed isolated, by a family originally from Barra Velha. Other family groups, also from this original community would come later to occupy this region, making, in 1998, 143 individuals. Mata Medonha stands along the Santo Antonio River and is situated at 12 Km from the city of Santa Cruz Cabrália. The village has 549 ha (FUNAI, 2009) with 255 individuals divided among 25 families. The members of the Mata Medonha village still maintain their knowledge of the medicinal plants although the forest has been significantly reduced and members have been spread around other areas. The aim of this paper is to document the use of medicinal plants by the Pataxó community of Mata Medonha.

MATERIAL AND METHOD

Over three months, we interviewed all the 25 families in the village of Mata Medonha nearby settlements. Subjects were the eldest female of each family, aged 17 to 32 years old, and a respected traditional healer of the group. Conducted in Portuguese, the questionnaires gathered information about plant names, frequency of use, plant parts and preparation methods. The interviews employed an open discourse method, which best suited the natives' preferences. Although a great number of plants were cited for spiritual use, they were not included in this study. All the interviews were accompanied by the *Cacique* of the tribe, who took us to the families houses, some accessible only by canoe.

We were not granted permission by FUNAI to collect the plants in Mata Medonha. According to that, the plants were collected at the Botanical Garden of Salvador-BA (which has an ethnobotanic space for the cultivation of native indigenous species), Camaçari and Santo Antônio de Jesus districts, and brought to the Botanic Department of Universidade Federal da Bahia (UFBA) for taxonomical identification. The Classification system used was the APGII (Angiosperm Phylogeny Group). Voucher species were deposited at the Alexandre Leal Costa Herbarium (ALCB) of UFBA.

A bibliographic review was performed through scientific literature sites (Library of Medicine, Scientific Electronic Library Online and Portal Periódicos CAPES) using species and therapeutic properties as search words, with no limit of publication year.

These records were published with the approval of the Council of the Genetic Patrimony (CGEN), and cleared by the Ethics Committee of Research (CEP/MCO/UFBA). The access of any information in this paper for bioprospection or technologic development must be authorized by the CGEN.

RESULT

Forty eight species were described, including vernacular name, voucher number, family, species, indication of treatment and form of use (Table 1). The plant parts used included: leaves (54%), multiple plant parts (19%), stems (8%), branches (6%) and fruit (4%). Isolated flowers, seeds, tubercles, roots and buds were used in less than 2% of medications. The forms of preparation used were: decoction (42%), bath (13%), maceration (8%), raw (4%), and a combination of different forms (16%), including syrup, plaster, wine, smoke or vapor inhalation. The medicinal uses of the plants varied widely: flu, congestion, and bronchitis (21%), pain (19%), stimulant (8%), anesthetic, cicatrization, diabetes and snake bites (less than 6%), and those used only by women *Argeratum conyzoides*

(mentrasto) for premenstrual pain and *Zornia diphylla* (arrozinha) for vaginal itching. Plants referred as for spiritual use were not described.

Preparation methods

Decoction - Plants were added to boiling water in a clay pot, removed from heat, cooled, strained through clothe, then drunk twice per day.

Maceration - Plants were smashed with a pestle and the resulting leaf juice was dropped over the affected area (ear infection) or drunk pure (one spoonful for bronchitis and germs).

Baths - Similar to decoction, but a larger amount of plants were heated in a large basin with water. The water was applied lukewarm to the affected area or the whole body.

Syrup - Plants were cooked in boiling water for five minutes in the same proportion as decoction, with 2 full spoons of sugar cane (called *rapadura*) per cup of the preparation.

Plaster - Plants were crumbled with a pestle until a homogenous paste was obtained and applied directly over the wounds.

Alcolatrura - Plants were crushed, mixed with *cachaça* (a sugar-cane distillate similar to rum), incubated for a few weeks, and then drunk in small doses (1-2 spoons) twice a day.

Stem sieve - Applied directly to the wounds for cicatrization, *Anacardium occidentale* only.

Wine - Tuber roots were shredded and incubated in human saliva for a few weeks until fermentation. The wine was taken one to two spoons a day.

Inhalation - Similar to baths, but vapor inhaled for 30 minutes or until headache relieved.

The plants were well distributed among 28 different families. The most cited were Asteraceae (4), Verbenaceae (3), Fabaceae (3), Anacardiaceae (3) and Lamiaceae (3).

The search for scientific evidence of the plants properties through bibliographic research demonstrated that 31% of them have therapeutic properties confirmed and/or chemical compound (s) related to those properties isolated (Table 2).

DISCUSSION

The majority of the medicinal plants cited by the Pataxós from Mata Medonha community have not been studied as possible therapeutic agents. Due to high effectiveness, according to individuals of the community, several described plants should be considered for pharmacological tests including the *cajueiro* (*Anacardium occidentale* L.) sieve, which has a very fast cicatrization effect for deep wounds; the *juburandi*, (*Piper asimum* (Spr.) Angely) used by the Pataxó as a tooth anesthetic, and the *parreira-do-*

TABLE 1. Plants referred with therapeutic properties according to Pataxós Indians from Mata Medonha, in Bahia, Brazil 2008.

Vernacular name (frequency of reference)	Voucher number	Family	Gender Species author	Indication	Form of use	Part Used
alfavaca-de-cobra (6)	78145	Piperaceae	<i>Peperomia pellucida</i> (DC.) H.B.K.	flu	maceration	leaf and seed
almesca (8)	78146	Burseraceae	<i>Protium heptaphyllum</i> (Aubl.) March.	headache	smoke inhalation	stem (cork)
amendoeira(15)	76096	Combretaceae	<i>Terminalia catappa</i> L.	diabetes	decoction	leaf
andú (18)	76098	Fabaceae	<i>Cajanus cajan</i> (L.) Mill	pneumonia	maceration	leaf
araçá (20)	78144	Myrtaceae	<i>Psidium guajava</i> Raddi	diarrhea and itching	decoction and plaster	leaf and buds
arrozinha(13)	76142	Fabaceae	<i>Zornia diphylla</i> Pers.	vaginal itching	decoction and bath	whole plant
artemisia (7)	76152	Asteraceae	<i>Ambrosia artemisiaefolia</i> L.	diarrhea	decoction	leaves, flowers and roots
arueira (19)	76103	Anacardiaceae	<i>Schinus terebinthifolius</i> Raddi	stimulant	decoction	leaf
babosa (22)	78153	Asphodelaceae	<i>Aloe vera</i> (L.) Burm.f.	back pain and swollen body parts	plaster	leaf
bicuiba (17)	78143	Myristicaceae	<i>Virola gardneri</i> (A.DC) Warb	cicatrisation	plaster	stem (sieve)
cajueiro (23)	76104	Anacardiaceae	<i>Anacardium occidentale</i> L.	cicatrisation	plaster	stem (cork)
cambará (4)	76118	Verbenaceae	<i>Lantana cambara</i> L.	cicatrisation	plaster	leaf
cana-brava (6)	78165	Cannanaceae	<i>Canna</i> sp	ear pain	maceration	leaf
cana-de-macaco (3)	76122	Costaceae	<i>Costus spiralis</i> (Jacq.) Roscoe	kidney pain	decoction	leaf
capim-de-aruaanga (9)	76149	Poaceae	<i>Cymbopogon densiflorus</i> (Steud.) Stapf.	headache	headache	bath whole plant
capim-santo (15)	76150	Poaceae	<i>Cymbopogon citratus</i> Stapf.	stimulant	decoction	whole plant
carqueja ou tiririca						
de babado (21)	76113	Rubiaceae	<i>Borreria verticillata</i> (L.) G. Mey	fever and flu	decoction and alcohol extract	leaf
capéu-de-couro (8)	76138	Alismataceae	<i>Echinodorus grandiflorus</i> (Cham. & Schitdl.) Micheli	rheumatism	decoction and bath	leaf
cordão-de-frade (6)	76148	Lamiaceae	<i>Leonotis nepetaefolia</i> (L.) R.Br.	body pain	bath	leaf
erva-cidreira (20)	76105	Verbenaceae	<i>Lippia alba</i> N. E. Brown	stimulant	decoction	leaf

TABLE 1. Plants referred with therapeutic properties according to Pataxós Indians from Mata Medonha, in Bahia, Brazil 2008.

Vernacular name (frequency of reference)	Voucher number	Family	Gender Species author	Indication	Form of use	Part Used
erva-passarinho (2)	76107	Loranthaceae	<i>Struthanthus flexicaulis</i> Mart.	heart pain	decoction	leaf
genipapo (17)	78147	Rubiaceae	<i>Genipa americana</i> L.	kidney pain	decoction	stem
graviola(13)	76101	Annonaceae	<i>Annona muricata</i> L.	diabetes	decoction	fruit
hortelã-de-pau (24)	76110	Lamiaceae	<i>Plectranthus amboinicus</i> (Lour.) Spreng.	bronchitis	decoction and syrup	leaf
jaca-de-pobre (12)	76154	Annonaceae	<i>Annona montana</i> Macfad	snake bite	maceration	leaf
jasmim (11)	78151	Zingiberaceae	<i>Hedychium coronarium</i> Koen.	headache	decoction	branch
juburandi (23)	76144	Piperaceae	<i>Piper asimum</i> (Spr.) Angely	anesthetic for toothache	raw	root
laranjeira (20)	76097	Rutaceae	<i>Citrus aurantium</i> L.	flu	decoction	leaf and fruit
levante (7)	76123	Zingiberaceae	<i>Alpinia nutans</i> Roscoe	heart pain	decoction	leaf
lírio (9)	76189	Liliaceae	<i>Lilium</i> sp	body pain	bath	leaf
malva-branca (17)	76147	Malvaceae	<i>Sida cordifolia</i> L.	pneumonia	decoction	leaf
mamoeiro (13)	76102	Caricaceae	<i>Carica papaya</i> L.	verms	syrup	fruits and flowers
mamona (8)	76141	Euphorbiaceae	<i>Ricinus communis</i> L.	indigestion	raw	fruit
mandioca (12)	78164	Euphorbiaceae	<i>Manihot</i>	weak blood	wine	tubercles
mangueira (18)	78149	Anacardiaceae	<i>Mangifera indica</i> L.	fever and flu	bath	leaf
mastruz (20)	76129	Amaranthaceae	<i>Chenopodium ambrosioides</i> L.	verms	decoction	leaf
mata-pasto (5)	76136	Fabaceae	<i>Indigofera hirsuta</i> L.	childhood infection	decoction	leaf
melissa (17)	76120	Verbenaceae	<i>Lippia alba</i> L.	headache, flu	Bath and decoction	leaf
mentrasto (12)	76151	Asteraceae	<i>Ageratum conyzoides</i> L.	pre-menstrual pain	decoction	whole plant
pitangueira (24)	76163	Myrtaceae	<i>Eugenia uniflora</i> L.	flu	bath	leaf
pulga-do-campo (3)	76155	Violaceae	<i>Hybanthus calceolaria</i> (L.) Okem	weak blood	syrup	leaf
quiôdô-cravo (6)	76112	Lamiaceae	<i>Ocimum gratissimum</i> L.	cold and body-pain	decoction	branch
quitoqui (12)	76146	Asteraceae	<i>Pluchea sagittalis</i> (Lam.) Cabrera	swollen body parts	bath	leaf
sabugueiro (18)	76145	Caprifoliaceae	<i>Sambucus australis</i> Cham.	measles and cough	decoction	flowers
suspiro-celosa (4)	76117	Amaranthaceae	<i>Celosia</i> sp.	indigestion	decoction	leaf
urucum (15)	76100	Bixaceae	<i>Bixa orellana</i> L.	bronchitis and asthma	decoction and inhalation	seed
vence-tudo (16)	76153	Asteraceae	<i>Rolandra fruticosa</i> (L.) Kuntze	stimulant	decoction and bath	branch
vassourinha-relógio (7)	76114	Plantaginaceae	<i>Scoparia dulcis</i> L.	diarrhea	decoction	leaf

TABLE 2. Plants referred by Mata Medonha community that had therapeutic properties confirmed or related chemical compound(s) isolated/identified.

Species	Indications	Therapeutic properties and chemical compounds related	Authors
<i>Peperomia pellucida</i> (DC.) H.B.K.	flu	aqueous extract of the aerial part of the plant showed anti-inflammatory and analgesic activity in rats and mice	Arrigoni-Blank et al. (2004)
<i>Protium heptaphyllum</i> (Aubl.) March.	headache	phytochemical investigation of the resin, fruits, leaves, and trunk led to the isolation of the monoterpene <i>p</i> -menth-3-ene-1,2,8-triol	Bandeira et al. (2002)
<i>Terminalia catappa</i> L.	diabetes	the leaves are rich in tannins that are reported to be antidiabetic	Nagappa et al. (2003)
<i>Aloe vera</i> (L.) Burm.f.	back pain and swollen body	shows increased bioavailability of vitamins C and E, two antioxidants with possible effects on pain and swelling	Vinson et al. (2005)
<i>Anacardium occidentale</i> L.	cicatrisation	proved to cause cicatrisation in patients with wounds caused by leishmaniasis	Vera et al. (2001)
<i>Lantana cambara</i> L.	head wounds	The extract produced an inhibition of anti-inflammatory and analgesic effect in rats	Uzcátegui et al. (2004)
<i>Mangifera indica</i> L.	fever and flu	different polyphenols found in Vimang could account for the antinociceptive and anti-inflammatory actions	Garrido et al. (2001)
<i>Leonotis nepetaefolia</i> (L.) R.Br.	body pain	hydroalcoholic and tea extracts of stems showed relaxant effect in guinea pig muscle	Calixto et al. (1991)
<i>Plectranthus amboinicus</i> (Lour.) Spreng.	bronchitis	Essential oil contains thimol and carvacrol with anti-microbial properties, possibly contributing to treating lung pathologies	Torres et al. (2005)
<i>Annona montana</i> Macfad	snake bite	phenanthrene-1,4-quinone, annoquinone-A, along with parietin (phycion) and beta -sitostenone were isolated from the stem bark and demonstrated potent antimicrobial activity and cytotoxicity in human tissue culture assay	Wu et al. (1987)
<i>Sida cordifolia</i> L.	pneumonia	when tested against <i>Staphylococcus aureus</i> , <i>Staphylococcus epidermidis</i> , <i>Candida guilliermondii</i> and <i>Trichosporon inkin</i> the essential oil showed significant antimicrobial activity	Nunes et al. (2006); Franzotti et al. (2000)
<i>Carica papaya</i> L.	verms	plant extracts exhibited an anti-amoebic activity. The highest activity was obtained from root bark	Tona et al. (1998)
<i>Chenopodium ambrosioides</i> L.	verms	infusions of <i>Chenopodium ambrosioides</i> contain a nematocide(s) that is(are) not toxic to mammalian smooth muscle	MacDonald et al. (2004)

mato, applied for cancer treatment (not collected nor identified at the request of the healers).

The medicinal plants used by the Pataxós of Monte Pacoal, were analyzed by Thomas (2001). Since Monte Pacoal is the original land of the people from the village of Mata Medonha, we compared information obtained at this work with our data. 92 plants, belonging to 48 botanic families were used for treatment of 31 diseases by the inhabitants of Monte Pascoal. Although the Indians from Mata Medonha moved from the mainland around 48 years ago, 98 % of all species cited in our work were referred by the people of Barra Velha. This indicates that the information about the medicinal plants is still maintained by their descendents who moved out to nearby villages. In another hand, 42% of the botanic families cited by them were not found in our work, probably because they are not available anymore or because the knowledge was not passed to the new generations' members that moved out.

According to an ethnobotanical study of medicinal plant use in Salvador, Bahia, the Lamiaceae family is also widely applied for treatment of metabolic disorders and heart diseases (Cunha Lima et al., 2008). This suggests the importance of this botanic family to pathologies that are typical of urban areas.

The forests of eastern coastal Brazil are considered among the most endangered habitats on earth and have been given highest priority for biodiversity conservation (Thomas et al., 2003). The plants from this forest have been the source of food and medication to Pataxós for many years, and now, with only 3.5% of the vegetation (compared to 1912) little are left for the native communities of the region. The tribe is small and shrinking and the youngest generation is being lured to the cities. In a developing country like Brazil, traditional medicine is very important because the plants are cheaper than pharmaceutical drugs. According to that, further study of these traditional medicines is necessary, not only for pharmaceutical purposes, but to maintain Brazil's rich and ancient traditions of healing.

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