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Ethnomedicinal plants for veterinary use in gypsy communities of the northeast of Brazil

[Plantas etnomedicinales para uso veterinario en comunidades gitanas del noreste de Brasil]

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Abstract: Gypsies have been in Brazil since the 16th century and today they are more than 800,000 in the country. This article describes the veterinary use of plants by Calon gypsies living in Pernambuco, Northeastern Brazil. The research was carried out with 23 people (> 40 years old), using semi-structured forms and the snowball technique. The cited species were collected during guided tours, identified and deposited at the IPA and UFP herbaria. Ten plants were indicated for veterinary use: *Agave sisalana* (Asparagaceae), *Aspidosperma pyrifolium* (Apocynaceae), *Apodanthera congestiflora* (Cucurbitaceae), *Heliotropium indicum* (Boraginaceae), *Lippia alba* (Verbenaceae), *Momordica charantia* (Cucurbitaceae), *Nicotiana tabacum* (Solanaceae), *Passiflora cincinnata* (Passifloraceae), *Phaseolus lunatus* (Fabaceae), and *Solanum paniculatum* (Solanaceae). The participants cited various methods of preparation and therapeutic indications for ectoparasitic infections, digestive disorders, and eye and respiratory infections in farm animals. *Apodanthera congestiflora* and *H. indicum* stood out for prophylaxis and treatment of Newcastle disease in fowl.

Keywords: Traditional community; Ethnopharmaology; *Apodanthera congestiflora*; *Heliotropium indicum*; Newcastle disease

Resumen: Los gitanos están en Brasil desde el siglo XVI y hoy, son más de 800.000 en el país. Este artículo describe el uso veterinario de plantas por gitanos Calon que viven en Pernambuco, Noreste de Brasil. La encuesta fue realizada con 23 personas (> 40 años), utilizando formularios semi-estructurados y la técnica bola de nieve. Las especies citadas fueron recolectadas en giras guiadas, identificadas y depositadas en los herbarios IPA y UFP. Diez plantas fueron citadas para uso veterinario: *Agave sisalana* (Asparagaceae), *Aspidosperma pyrifolium* (Apocynaceae), *Apodanthera congestiflora* (Cucurbitaceae), *Heliotropium indicum* (Boraginaceae), *Lippia alba* (Verbenaceae), *Momordica charantia* (Cucurbitaceae), *Nicotiana tabacum* (Solanaceae), *Passiflora cincinnata* (Passifloraceae), *Phaseolus lunatus* (Fabaceae) y *Solanum paniculatum* (Solanaceae). Los participantes citaron varios modos de preparación e indicaciones terapéuticas para infecciones ectoparasitarias, disturbios digestivos, infecciones oculares y respiratorias en animales domésticos. *Apodanthera congestiflora* y *H. indicum* se destacaron en la profilaxis y tratamiento de la enfermedad de Newcastle en aves.

Palabras clave: Comunidad tradicional; Etnofarmacología; *Apodanthera congestiflora*; *Heliotropium indicum*; Enfermedad de Newcastle

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INTRODUCTION

Gypsies form a people with a distinct culture based on their own language (chib or romani), a patriarchal social system, and adaptability to the places they go (Moonen, 2011; Ramanush, 2011). Research in the area of linguistics and genetics argue that gypsies originated in the northwest region of present-day India and that migration from this region occurred around the 10th century (Coelho, 1892; Mendizabal *et al*., 2012). Early reports of the presence of gypsies in Europe occurred in the first half of the 14th century, in a part of Greece known as "Little Egypt". The various names by which they are known - ciganos (Portuguese), gitanos (Spanish), and tsiganes (French) - derive from the erroneous idea of the time that their origin was Egypt (Moonen, 2011).

According to Cunha (2018), there are approximately one million gypsies living across the five regions of Brazil. They are distributed in three ethnic groups: Rom or Roma, Sinti and Calon. Until the 19th century, there were records of the arrival only of the Calon people in Brazil, but immigrants of the Rom group arrived at the end of that century, and of the Sinti group in the 20th century (Moonen, 2011; Teixeira, 2008). The Brazilian Institute of Geography and Statistics (Brasil, 2011) shows that about 800,000 gypsies are currently distributed in 291 camps throughout 20 Brazilian states. Studies in some states such as Pernambuco and Paraíba have shown that these figures may be underestimated and that the number of people and camps is likely higher. This numerical discrepancy may be related to the tendency, on the part of the gypsy community, to avoid exposure in view of the ethnic discrimination that it still suffers today. They may thus be called cryptogypsies (Mota, 2004).

The need to migrate to other regions in search of better business opportunities has influenced the gypsy culture in general. Examples of this adaptation are in their language, which now incorporates words from several others, in their dressing style that has changed to resemble gadjés (non-gypsies), and in the acceptance of the religion of the places where they settle. This adaptation has also affected their knowledge of nature, which has been enriched by the contact with other peoples (Andrade Júnior, 2013).

Gypsies use the natural resources available to them for food, medicinal, ritualistic, technological, and veterinary purposes, among others (Derlon, 1979). The gypsy community uses teas, syrups and ointments from local plants where they reside to cure the ills that afflict people and their farm animals (Goldfarb *et al*., 2012; Seraj *et al*., 2013). The gradual loss of traditional knowledge is occurring mainly due to sedentarization and lack of interest of the youth, who are preoccupied with adapting to the urban society (Hossain *et al*., 2010, Moonen, 2011).

This article aims to discuss the ethnoveterinary knowledge of two Calon gypsy families living in municipalities of the state of Pernambuco. Two species were identified as effective in the prophylaxis and treatment of Newcastle disease (arbovirus), a medicinal application not reported to date.

MATERIALS AND METHODS

The research was developed with the authorization of the Ethics Committee of the Federal University of Pernambuco (process 57999516.2.0000.5208) and the Genetic Heritage Management Council (CGen) of the Ministry of the Environment (register A9CB221).

Two families of the Calon ethnic group, the largest in Brazil, were located with help of the president of the Association of Gypsies of Pernambuco (ACIPE), Mr. Enildo Kalon. The Dantas and Alves families have almost completely left the nomadic life and settled for about 25 years in different municipalities of Pernambuco state, seeking better life conditions and the possibility of educating their children in public schools. The first contacts were made with the heads of the families, for presentation of the objectives of the research and of the Consent Term for participation in the study. Interviews (23) were conducted with semi-structured forms and the snowball technique was used, starting with the family heads (Albuquerque *et al*., 2010).

The Dantas family (17 people) lives in the municipality of Itambé, located in the region known as Zona da Mata of the state of Pernambuco and presenting a Municipal Human Development Index (MHDI) of 0.575. The Alves, a larger family, is concentrated in the municipality of Altinho in the Brejo microregion (MHDI = 0.598), with 41 people residing there, but they are also in the municipalities of Caruaru (10 people) in the Vale do Ipojuca microregion (MHDI = 0.677), and Feira Nova (15 people) in the Médio Capibaribe microregion (MHDI = 0.600). The main source of income of the two families is informal commerce of any kind,

complemented with government assistance. The men, for the most part, declared themselves tradesmen or artisans; the women, besides the domestic tasks, dedicate themselves to the making of embroideries, declaring themselves as artisans.

Interviews were conducted between December 2016 and November 2017 at the residence of the interviewees, who were 11 men and 12 women aged 40 years or older, corresponding to 85.2% of the target population in this age group. Guided tours were conducted with some of the interviewees, observing and collecting the plants for analysis and identification of the species by taxonomists of the IPA herbarium, where voucher specimens were deposited. The plants cited by the interviewees were classified into categories of use, according Prance *et al*. (1987). As stated in the objectives of the present study, special attention was given to plants cited for treatment or prevention of diseases in farm animals.

RESULTS

General data

In our study, members from the two studied families were not easily recognized as gypsies in terms of physical appearance or behavior. Most had brown skin, brown eyes and straight black hair. Men were usually wearing long pants and short-sleeved shirts, while women wore long dresses or skirts, but nothing considered extravagant or characteristic of the gypsy culture.

At the moment of signing the consent form for the interviews, it was noticed that 70% of the interviewees were illiterate or semi-illiterate, without formal schooling. Most of the interviewees (70%) were adults up to 60 years of age, and a smaller percentage (30%) were elderly, of whom the oldest was aged 102 years.

Language is the strongest feature that unites Gypsies. During the interviews, several times they communicated using their language, which they called chib. The language is spoken in front of gadjés, interspersed with Portuguese, so that it is not perceived or understood in daily negotiations. Teaching a non-gypsy language is not allowed, and young Calon people learn this form of encrypted communication early on. The Alves family members mentioned that the very way of speaking is something that gypsies use to distinguish between true gypsies and those who pretend to have this identity.

Of the 23 people interviewed, six cited species for veterinary use. Despite the low percentage of interviewees making this mention, the veterinary use was cited with great emphasis, probably due to the importance that gypsies give to farm animals like horses, dogs and fowls, being the latter two found in all houses visited.

The ten species listed and commented below were cited by five men and one woman and indicated for prevention and treatment of diseases in farm animals.

Cited species

Agave sisalana Perrine (Asparagaceae, sisal)

Veterinary use indicated by interviewees (3): Leaf juice is used to treat skin infections in animals caused by mites (scabies), lice and ticks.

Other uses indicated by interviewees (2): The leaves are dried and shredded to make ropes with a hand-operated motorized device.

Comments

Veríssimo & Katiki (2014) cites the use of *A. sisalana* as acaricide in oxen. The species is also used for ruminant feeding (Brandão *et al*., 2011), as an insecticide (Pizarro *et al*., 1999), and in the production of ropes, baskets and handicrafts (Nascimento *et al*., 2016).

Aspidosperma pyrifolium Mart. & Zucc. (Apocynaceae, pereiro da caatinga)

Veterinary use indicated by interviewees (2): The bark of the stem is used to treat skin infections in animals caused by mites (scabies), lice and ticks.

Other uses indicated by interviewees (1): The bark of the stem is used to make a tea to treat back pain in humans, to be ingested once a day.

Comments

Freitas *et al*. (2015) cite the use of *A. pyrifolium* in the treatment of animal lice. The wood is used for furniture production (Roque & Loiola, 2013). Its leaves are considered to be toxic and may cause abortions in sheep, cattle and goats (Silva *et al*., 2006).

Apodanthera congestiflora Cogn. (Cucurbitaceae, cabeça-de-negro)

Veterinary use indicated by interviewees (1): The root is used in the prevention and treatment of Newcastle disease. According to the interviewees, the tuber must be cut into small pieces and put in the

drinking water of the poultry breeding place. This practice is used both in the treatment of sick fowl and in the prophylaxis of the healthy animals.

Other uses indicated by the interviewees (0): No other uses indicated.

Comments

This species is endemic to Brazil and typical of the Caatinga biome, with records throughout the Northeast region of the country. The use of *A. congestiflora* roots in the traditional medicine of non-gypsy northeastern communities was reported by Costa & Marinho (2016), indicating it for general pain, by Silva *et al*. (2015a) and Roque *et al*. (2010) for spine pain, and by Silva (2014) for tooth pain. There is no record in the literature of its use for veterinary purposes.

Heliotropium indicum L. (Boraginaceae, fedegoso)

Veterinary use indicated by interviewees (2): The whole plants, except for the roots, are used in the prevention and treatment of Newcastle disease. The juice extracted from the parts of the plant, except the root, is placed on a plate and offered to birds to drink at intervals of 6 months as a preventive treatment against the virus.

Other uses indicated by the interviewees (3): Leaves and flowers are harvested, dried and cooked with sugar to prepare a syrup that is used as expectorant in humans, to be ingested three to four times a day. Roots are reported to be very toxic and used to prepare an abortive tea, to be taken in a single dose of approximately 100 ml.

Comments

Research shows that this herb is widely used in the traditional medicine of various regions of the world (Asia, Americas and Africa) to treat insect and scorpion bites, skin, liver, digestive, renal and reproductive problems, venereal diseases, mycoses, cholera, and malaria, besides being used as an abortive agent (Dash & Abdullah, 2013; Di Stasi & Hiruma-Lima, 2002). No indications of use for Newcastle disease or similar arboviruses in birds were found in the literature.

Lippia alba (Mill) N.E.Br. ex Britton & P. Wilson (Verbenaceae, erva-cidreira)

Veterinary use indicated by interviewees (2): The leaves are cleaned and boiled in water and cooking salt. The resulting liquid is placed in a thin bottle and used as a suppository for digestive disorders in farm animals.

Other uses indicated by the interviewees (11): Leaf tea is used as a tranquilizer, and to combat anemia, headache, and digestive disorders in humans.

Comments

Several studies have demonstrated the veterinary use of *L. alba* as anti-inflammatory, analgesic, anthelmintic and healing agent (Soares & Tavares-Dias, 2013).

Momordica charantia L. (Cucurbitaceae, melão-brabo)

Veterinary use indicated by interviewees (2): Leaf juice is used to treat skin infections in animals caused by mites (scabies), lice and ticks.

Other uses indicated by interviewees (2): The leaves are cleaned and boiled to make a tea to be used once a day for the treatment of hemorrhoids in humans. The bitter taste is a limiting aspect for its use.

Comments

Clinical support for the use of this drug to combat scabies in farm animals has been proven (Carneiro *et al*., 2013; Dantas Neto *et al*., 2017). A study carried out in rural communities of Oeiras (Piauí State) cited its use in humans to combat hypertension, rheumatism, skin mycoses ("impigem"), renal calculi, dengue, and intestinal worms, among other diseases (Oliveira *et al*., 2010).

***Nicotiana tabacum* L. (Solanaceae, fumo)**

Veterinary use indicated by interviewees (2): Leaf juice is used to treat skin infections in animals caused by mites (scabies), lice and ticks.

Other uses indicated by the interviewees (0): No other uses indicated.

Comments

The veterinary use to combat ticks is widely cited in the literature (Olivo *et al*., 2009; Araújo *et al*., 2013). Ethnobotanical studies mention its application for medicinal purposes, to combat hair loss (Macedo *et al*., 2011), and as a soothing agent (Moreno-Coutiño & Bello, 2012).

Passiflora cincinnata Mast. (Passifloraceae, maracujá-da-caatinga)

Veterinary use indicated by interviewees (1): The "juice" from the arillus of seeds is dripped into the eyes of birds to treat inflammations.

Other uses indicated by interviewees (0): No other uses indicated.

Comments
Cordeiro & Felix (2014) comment on the use of leaves by a rural community for skin inflammation and heart problems in humans. No studies on veterinary use were found.

Phaseolus lunatus L. (Fabaceae, fava)
Veterinary use indicated by interviewees (1): Leaf juice is used in the treatment of fowl pox.

Other uses indicated by interviewees (2): Leaf and stem juice is used in the treatment against pityriasis versicolor, a common skin disease known as "pano branco", caused by the fungus *Malassezia furfur* (Oliveira *et al*., 2002). The seeds are cooked and used as food.

Comments
In the Indo-Pak subcontinent, seeds are used as an antipyretic. In Africa, powdered seeds are applied over minor wounds and abscesses to promote healing (Saleem *et al*., 2016). Studies show the veterinary use of the plant for animal feed (Silva *et al*., 2015b).

Solanum paniculatum L. (Solanaceae, jurubeba)
Veterinary use indicated by interviewees (2): The peel of fruits is soaked in water for 15 days, and the resulting liquid is employed for the treatment of digestive disorders in animals.

Other uses indicated by interviewees (4): Fresh fruits and syrup made from them are used to fight anemia and stomach ache, and as an expectorant. Roots are cleaned and cooked to make a syrup with expectorant action. Washing the hair with a preparation obtained by cooking stems provides shine and prevents hair loss.

Comments
The species is widely studied for medicinal purposes such as treatment of diseases of the respiratory system, anemia, liver problems, and mycoses, among others (Meyer *et al*., 2012; Cordeiro & Felix, 2014). The root meal was studied by Vilela *et al*. (2009) as anthelmintic in sheep, obtaining good results. Moura & Andrade (2007) cite the use of the species in urban yards to combat herbivory.

DISCUSSION

In our study, the majority of the plants cited by the interviewees are intended for the prevention or treatment of common diseases affecting domestic animals such as digestive disorders, scabies (mites), and lice and tick infestations. However, the use of *H. indicum* and *A. congestiflora* in the treatment of fowl pox and Newcastle disease, both of compulsory notification (Brasil, 2013), deserves special mention.

The name "neocasto" attributed to the disease by a member of the Alves family who indicated this use and his description of symptoms in hens and roosters led us to conclude that the term is a corruption of the word Newcastle. The interviewee reported having learned the use of plants for the treatment of "neocasto" with Gypsies of the state of Bahia during his nomadic life, indicating that this application is practiced in other communities.

Newcastle disease is a highly infectious avian pneumo-encephalitis that affects farm and wild birds. The etiologic agent is an avian paramyxovirus type 1 (APMV-1) belonging to the genus *Avulavirus*, of the family Paramyxoviridae (Ellakany *et al*., 2019). The contingency plan developed by the Ministry of Agriculture of Brazil (Brasil, 2013) defines respiratory problems, followed by nervous and digestive disorders and head edema as typical symptoms of this infection. The severity of the symptoms and mortality rates are due to the virus strain.

According to the World Organization for Animal Health (OIE, 2011), the transmission of Newcastle disease takes place through direct contact with contaminated birds, by inhalation of dry feces or ingestion of contaminated food and water. There is no consensus on vertical transmission and the incubation period is 21 days. Found throughout the world, the disease is currently controlled in Canada, the United States and some western European countries. In these countries, beyond Brazil, the control in commercial herds is done by means of vaccination and quality control. The Ministry of Agriculture (Brasil, 2013) showed in the contingency plan that the last major epidemic of the disease in Brazil occurred in 2005.

The two plant species cited by the interviewees as bioactive in both prophylaxis and treatment of Newcastle disease have secondary metabolites with proven anti-inflammatory and antiviral activity against the infectious salmon anemia virus (ISAV) (Modak *et al*., 2012) and canine distemper virus (CDV) (Brum, 2006). The family to which ISAV belongs (Orthomyxoviridae) is classified by the Baltimore System in the group V (RNA, single chain and negative sense), the same group of the family to which Newcastle disease virus

(NDV) (Paramyxoviridae) and CDV belong.

Phytochemical studies on *H. indicum* have shown that its leaves have tannins, alkaloids, steroids and triterpenes, while the roots present alkaloids, steroids, tannins, flavonoids and cardiotonic glycosides. Amines such as putrescine, spermidine and spermine have also been found in leaves and inflorescences (Costa, 2010; Martins *et al*., 2016). According to Costa (2010), the antimicrobial activity found in plants of the Boraginaceae family results from the presence of alkaloids and tannins. The study also reports that the alkaloids acetylasiocarpine, europine and heliosurpine were extracted from all parts of *H. indicum*; heliconium and licopsamine from the root; and heliotrin from seeds. Heliothrin extracted from *H. subulatum* showed antiviral activity against coxsackievirus, poliovirus, measles virus, and vesicular stomatitis virus.

Research on species of the genus *Heliotropium* showed antiviral activity from other secondary metabolites. An example is the use of the flavonoid 7-O-methyleryiodicthiol extracted from *H. sinuatum*, which proved to be effective in the treatment of ISAV (Modak *et al*., 2012). Another example of antiviral action of a species of the genus *Heliotropium* is the action of the filifolinyl ester extracted from *H. filifolium* on an infectious virus of the family Birnaviridae that causes hepatic necrosis in salmon (Modak *et al*., 2010).

Heliotropium indicum produces several phenolic compounds, being the highest concentration and highest antioxidant effect found in the inflorescence (Kumar *et al*., 2014). The antioxidative capacity of the phenolic compounds found in *H. indicum* may be responsible for the prophylactic and therapeutic effect reported by interviewees regarding Newcastle disease.

From the phytochemical point of view, *A. congestiflora* is little studied. Pereira *et al*. (2018) has recently isolated the ferulo-2 propenoic acid, 3- (4-hydroxy-3-methoxyphenyl) decyl ester from the hexane extract of its roots to confirm its analgesic and anti-inflammatory actions. Ferulate and its non-esterified form, ferulic acid, are phenolic compounds derived from cinnamic acid, considered powerful antioxidants (Paiva, 2014). Phenolic acids have the ability to bind to glycoproteins by modifying the chemical structure of cellular receptors or by blocking the host cell receptor binding site on the virus (Brum, 2006). Ferulic acid at the concentration of 120 µg/mL presented antiviral action, as prophylaxis, with an efficacy of 46.2%. At concentrations varying from 100 to 150 µg/mL, it presented virucidal action, as treatment, with an efficacy of 99%. The greater efficacy of ferulic acid as treatment rather than as prophylaxis of distemper must be related to its action as inhibitor of virus replication (Brum, 2006).

The mode of use of *A. congestiflora* reported by the interviewees, cutting it into small pieces and placing it in the drinking water of birds, is similar to the maceration method reported in the literature for ferulic acid extraction (Schneider *et al*., 2015).

No publications were found that report the action of metabolites produced by *H. indicum* and *A. congestiflora* on NDV, but the secondary metabolites found by Kumar *et al*. (2014) and Pereira *et al*. (2018) present an efficient action against NDV-like viruses. The research shows that specific studies are needed to confirm the action of these species against Newcastle disease.

CONCLUSION

In the medicinal flora of the gypsy families studied, eight species were indicated for the prevention or treatment of common diseases in farm animals, and two were used against Newcastle disease, whose notification is compulsory.

The indication of *A. congestiflora* and *H. indicum* for the treatment of Newcastle disease broadens the knowledge about the therapeutic potential of these species.

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