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Izabel Cristina Santiago Lemos

Department of Nursing,
Regional University of Cariri,
Crato, Ceará, Brazil.

Luanna Gomes da Silva

Department of Nursing,
Regional University of Cariri,
Crato, Ceará, Brazil.

Gyllyandeson de Araújo

Delmondes
Department of Nursing,
Regional University of Cariri,
Crato, Ceará, Brazil.

Cicera Norma Fernandes Lima

Department of Biological
Chemistry, Regional University
of Cariri, Crato, Ceará, Brazil.

George Pimentel Fernandes

Department of Education,
Regional University of Cariri,
Crato, Ceará, Brazil.

Roseli Barbosa

Department of Biological
Chemistry, Regional University
of Cariri, Crato, Ceará, Brazil.

Irwin Rose Alencar de Menezes

Department of Biological
Chemistry, Regional University
of Cariri, Crato, Ceará, Brazil.

Marta Regina Kerntopf

Department of Biological
Chemistry, Regional University
of Cariri, Crato, Ceará, Brazil.

Correspondence

Izabel Cristina Santiago Lemos

Department of Nursing,
Regional University of Cariri,
Crato, Ceará, Brazil.

Natural resource use in traditional community for the treatment of diarrheal diseases in children from the Northeast of Brazil

Izabel Cristina Santiago Lemos, Luanna Gomes da Silva, Gyllyandeson de Araújo Delmondes, Cicera Norma Fernandes Lima, George Pimentel Fernandes, Roseli Barbosa, Irwin Rose Alencar de Menezes, Marta Regina Kerntopf

Abstract

Based on the prevalence of diarrheal diseases in childhood, it is essential to know the types of plants or animals involving the practices of traditional medicine in their treatment. This research aimed to identify plants and animals used by mothers or caregivers for the treatment of diarrheal diseases in children and show the ways of use. The research was conducted in Santo Antônio Community (Barbalha - CE). For data collection, the techniques of "Rapport" and "Snowball", a closed questionnaire application and a semi-structured interview were used. Data were analyzed using descriptive statistics (simple and percentage rate) and the Relative Frequency of Citation (RFC). Within the 21 mentioned types, there are highlighted: *Egletes viscosus* (L.) Less *Plectranthus barbatus* Andrews and *Psidium guajava* L., with its RFC: 0.40; 0.38 and 0.33, showing the teas as a form of traditional predominant use.

Keywords: Diarrhea, Child Health, Traditional Medicine, Ethnobotany.

1. Introduction

The isolated or associated use of natural resources such as plants and animals is a very common practice in the context of Traditional Medicine in several communities^[1-4]. Its use is effective for the treatment of diseases, being a positive experience, reaffirmed over the years, in different generations^[5-7].

The knowledge about this practice focuses more intensely on female people, conditioning a knowledge cycle undeniably reflected in caring the family by these women, especially their children^[8, 9].

The traditional medical practice in children's health care can be used to treat childhood illnesses such as diarrheal diseases. Diarrheal diseases are considered a public health problem in Brazil, which mainly affects children aged between 0-5 years old^[10].

Acute diarrheal diseases are infectious and transmissible gastroenteritis caused by different enteropathogenic agents^[11], especially the *Escherichia coli*, *Shigella* and *Salmonella* bacterial agents, Rotavirus viral agent and also the protozoan *Cryptosporidium*, *Entamoeba histolytic* and *Giardia lamblia*^[12].

According to the World Health Organization (WHO), the disease primarily shows an increase in evacuation frequency, aqueous or inconsistent stool, during or above a 24 hours period^[13]. It may also present nausea, vomiting, fever and abdominal pain, and as a serious consequence, there are the dehydration and malnutrition pictures^[14].

In Brazil, the micro-regions with the highest probability of hospitalization and death due to childhood diarrhea are located in the North and Northeast^[11]. They have a death rate in children under one-year-old with 10,362 cases from 2000 to 2010, and of these 60% happened in the Northeast^[15]. Dias *et al.*^[16], highlights that this problem is one of the leading causes of death for children in the country due to socioeconomic inequality.

Thus, it is stressed that the risk factors for the incidence of diarrheal diseases include socioeconomic, demographic and cultural aspects, highlighting poverty, early weaning, nutritional deficiencies and a lower level of maternal education^[17].

Therefore, these factors contribute to natural resource use in the treatment of this disease, since the use of these resources is a more affordable alternative, because of its low cost when

compared to pharmaceutical medicine [18]. These natural resources are used by some localities, especially in developing countries, where the difficulty in accessing official health services, make them seek, to a greater or lesser extent, for alternatives presented by Conventional Medicine [19, 20].

Therefore, this study aimed to survey the possible animal and plant species used in a particular traditional community for the treatment of diarrheal diseases in children, pointing their respective forms of use and level of relevance to the community.

2. Methods

It is a descriptive, exploratory study with a quantitative approach developed in Santo Antônio community, located in Arajara District, in the municipality of Barbalha (CE), from May 2013 to September 2014.

The study population consisted of residents of the community, aged between 12 and 90 years old, with knowledge regarding the use and management of medicinal plants and animals for the treatment of diarrheal diseases in children. The final sample had 54 participants defined from the data saturation technique.

For the research purposes, there was data collection through community visits initially with the “rapport” application technique aiming at initial contact with the community leader to gain confidence in obtaining information [21].

Later, the “snowball” technique was used to find the research participants, where people using and handling plants and animals to treat diarrheal diseases indicated where we could find other people who met the inclusion criteria [21].

As a tool for data collection, a closed questionnaire was chosen for socioeconomic characterization of the research subjects, which is practical to answer - because it does not demand excessive time and facilitates the categorization of responses for statistical analysis [22].

After that, a semi-structured interview guide was used, as it allows greater flexibility and it is an effective tool to collect descriptive data from the individual’s language [23].

Data analysis used descriptive statistics (simple and percentage frequency) and the Relative Frequency of Citation (RFC), obtained from the FC/N ratio, where FC is the number of respondents who mentioned the use of the species and N is the total number of study respondents [24].

It is noteworthy that during the development of the research, all the requirements of the Guidelines and Standards of Research Involving Human Beings were met, regulated by Resolution 466/12 of the National Health Council (NHC).

Thus, the anonymity and confidentiality of information gathered was guaranteed to the surveyed participants, and the Instrument of Consent Form (ICF) was provided in which the subject is free to participate in the research or decline at any stage.

Therefore, in line with the ethical aspects, the research was submitted to the Research Ethics Committee (REC) of the Regional University of Cariri - URCA, located in the municipality of Crato, to its contemplation and analysis. It was approved after the assent of the REC under number 705.497.

3. Results

Research participants characteristics

According to the data shown in Table 1, it is noteworthy that from 54 respondents to the survey, 55.56% are female, while

44.44% are male. The highest proportion of participants were in the age group between 30-45 years old (27.78%). Also, most of the sample (22.22%) reported living in the area to a greater or equal period to 20 years and less than 30 years.

Table 1: Profile of informants of Santo Antônio (Barbalha) - CE.

Municipality	Place	N	%
Barbalha – CE	Sto. Antônio	54	100
Gender			
Male		24	44.44
Female		30	55.56
Age Group			
12-21		9	16.67
22-29		11	20.37
30-45		15	27.78
46-59		11	20.37
60-75		3	5.56
76-96		5	9.25
Time residing in the area			
< 5 years		--	--
≥ 5 < 10 years		3	5.56
≥ 10 < 20 years		8	14.81
≥ 20 < 30 years		12	22.22
≥ 30 < 40 years		8	14.81
≥ 40 < 50 years		11	20.37
≥ 50 < 60 years		9	16.67
≥ 60		3	5.56
Education			
Non-Educated		--	--
Incomplete Elementary School		15	27.78
Complete Elementary School		3	5.56
Incomplete High School		12	22.22
Complete High School		23	42.59
Others		1	1.85
Occupation			
Health community agent		1	1,85
Farmer		28	51,85
Retired		9	16,67
Self-employed		3	5,56
Commercial employee		1	1,85
Student		6	11,11
Manicure		1	1,85
Mason		1	1,85
Professor		1	1,85
Seller		3	5,56
Marital Status			
Single		13	24,07
Married		38	70,37
Widow/Widower		3	5,56
Divorced		--	--

Source: Direct Research held in Sto. Antônio community – Barbalha, 2014

It is noted the prevalence of subjects with complete high school with 42.59% and 51.85% were farmers. A curious fact is that most of them, 70.37%, say they are married, and there are not informants saying they are divorced.

Species cited for the treatment of diarrhea in children

The collected data identified 21 species of medicinal plants used by Sto. Antonio community for the treatment of diarrheal diseases in children, teas as the most mentioned traditional use. However, for this health problem, animal species were not mentioned by the informants. Table 2 details these data.

Table 2: Plant species used in Sto. Antonio community (Barbalha) - CE for the treatment of Diarrhea in children, with their common names, scientific names, parts used and forms of traditional use

Common Name	Scientific Name	Parts Used	Forms of Traditional Use
Algodão	<i>Gossypium hirsutum</i> L.	Leaf	Tea (Infusion)
Aroeira	<i>Myracrodruon urundeuva</i> Fr. Allemão	Bark	Tea (Infusion)
Barbatimão	<i>Stryphnodendron coriaceum</i> Benth	Bark	Tea (Infusion)
Boldo	<i>Plectranthus barbatus</i> Andrews	Leaf	Tea (Infusion)
Cajazeiro/ Cajá	<i>Spondias mombin</i> L.	Leaf	Juice; Macerated
Cajueiro/ Caju	<i>Anacardium occidentale</i> L.	Bark; Leaf	Tea (Decoction); Macerated
Cidreira/ Erva-Cidreira	<i>Lippia alba</i> (M.) N.E. Br.	Leaf	Tea (Infusion)
Coentro	<i>Coriandrum sativum</i> L.	Seed	Tea (Decoction)
Contra-Erva	<i>Dorstenia cayapia</i> Vell	Leaf; Root (rhizome)	Tea (Decoction); Macerated
Goiabeira-branca/ Goiaba branca	<i>Psidium guajava</i> L.	Sprout	Juice; Macerated; Tea (Decoction); Tea (Infusion)
Hortelã	<i>Mentha arvensis</i> L.	Leaf	Tea (Infusion)
Janaguba	<i>Himatanthus drasticus</i> (Mart.) M.M. Plumel	Latex	In natural
Laranja	<i>Citrus aurantium</i> L.	Bark (fruit); Leaf	Macerated; Tea (Infusion); Tea (Decoction).
Macela/ Marcela	<i>Egletes viscosa</i> (L.) Less.	Leaf; Flower	Tea (Infusion); Tea (Decoction)
Malva do Reino	<i>Plectranthus amboinicus</i> (L.) Spreng	Leaf	Tea (Infusion)
Mamão/ Mamoeiro	<i>Carica papaya</i> L.	Flor; Sprout	Macerated; Tea (Infusion); Tea (Decoction)
Mangueira	<i>Mangifera indica</i> L.	Leaf	Juice; Macerated; Tea (Infusion)
Mão de Deus	<i>Tithonia diversifolia</i> (Hemsl.) A. Gray	Leaf	Tea (Decoction); Juice
Marmeleiro	<i>Croton sonderianus</i> Müll. Arg.	Stalk	Tea (Infusion)
Tamarino/ Tamarinda	<i>Tamarindus indica</i> L.	Sprout	Tea (Decoction); Juice; Macerated
Urucu	<i>Bixa orellana</i> L.	Sprout; Root	Tea (Decoction)

Source: Direct Research held in Sto Antôniocommunity – Barbalha, 2014

Relative frequency of citation

In Table 3, we find the RFC for species that have been reported treating diarrheal diseases in children, highlighting as the most cited species: viscose *Egletes* (L.) Less (0.40); *Plectranthus barbatus* Andrews (0.38) and *Psidium guajava* L. (0.33) mentioned 22, 21 and 18 times, respectively.

Table 3: Relative frequency of citation - RFC of mentioned species for the treatment of Diarrheal Diseases in Children in Sto. Antonio Community (Barbalha) – CE

Species	RFC*
1. <i>Gossypium hirsutum</i> L.	0.05
2. <i>Myracrodruon urundeuva</i> Fr. Allemão	0.01
3. <i>Stryphnodendron coriaceum</i> Benth	0.09
4. <i>Plectranthus barbatus</i> Andrews	0.38
5. <i>Spondias mombin</i> L.	0.05
6. <i>Anacardium occidentale</i> L.	0.09
7. <i>Lippia alba</i> (M.) N.E. Br.	0.20
8. <i>Coriandrum sativum</i> L.	0.01
9. <i>Dorstenia cayapia</i> Vell	0.03
10. <i>Psidium guajava</i> L.	0.33
11. <i>Mentha arvensis</i> L.	0.03
12. <i>Himatanthus drasticus</i> (Mart.) M.M.Plumel	0.05
13. <i>Citrus aurantium</i> L.	0.07
14. <i>Egletes viscosa</i> (L.) Less.	0.40
15. <i>Plectranthus amboinicus</i> (L.) Spreng	0.07
16. <i>Carica papaya</i> L.	0.22
17. <i>Mangifera indica</i> L.	0.05
18. <i>Tithonia diversifolia</i> (Hemsl.) A. Gray	0.07
19. <i>Croton sonderianus</i> Müll. Arg.	0.07
20. <i>Tamarindus indica</i> L.	0.05
21. <i>Bixa orellana</i> L.	0.03

Source: Direct Research held in Sto. Antônio community – Barbalha, 2014

* Some participants mentioned more than one species.

4. Discussion

Emphasizing the chemical composition of the essential oils of the viscose *E. (L.) Less*, species most used by the participants and popularly known as “chamomile” it is characterized by

presenting flavonoids and terpenoids. Thus, according to Batista *et al.* [25], pharmacological studies revealed that the species maybe anti-nociceptive, anti-convulsive, anti-bacterial, anti-inflammatory, antithrombotic, hepatoprotective and gastro-protective.

Lorenzi, Matos (E. (L.) Less is very used in popular medicine in several regions of Brazil. Ethnobotanics surveys showed its medicinal properties, in particular for the treatment of digestive and intestinal disorders.

For example, in the study by Ribeiro *et al.* [27], where the data collection took place in the city of Aratama - CE, the viscose *E. (L.) Less* was indicated by the informants as useful for poor digestion, liver pain, stomachpain, abdominal pain and bloating.

In research conducted in the valley community of Comprida dos Oliveiras (Pombal) and Poço de José de Moura, both in the state of Paraíba, the use of viscose *E. (L.) Less* was again associated with the treatment of bowel problems, heartburn and diarrhea [28, 29].

Regarding the second most commonly used species, *P. barbatus* Andrews, commonly known as “boldo” there is the presence of guaienes, fenchone and fixed terpene components such as barbatusinain its phytochemical analysis. The *Plectranthus* species of the genus have the biosynthetic ability to produce a range of secondary metabolites [30].

Therefore, the interest in the study of phytochemical species has been promoting the wide use of popular leaves. In this context, it is highlighted that several pharmacological actions have already been assigned, tested and proven for the species *P. barbatus* Andrews [31, 32]. However, it is recognized that the popularly known Boldo is mainly used for gastric disorders [31].

This fact is mentioned by numerous ethnobotanical studies, as the research developed by Costa and May worm [33], in Minas Gerais, where *P. barbatus* Andrews species is shown as being effective to treat indigestion, stomachache, “liver pain” and “hangover”.

In the research of Pilla, Amorozo or Furlan ^[34], *P. barbatus* Andrews species was the most cited by the respondents, with the largest use agreement (91.4%), among the interviewees. Boldo was cited by 71% for digestive system disorders, noting that the species is useful for the treatment of “stomachache” or diarrhea, corroborating the data of this study.

In addition to “chamomile” and “boldo”, *P. guajava* L., that is, white guava was also widely mentioned for treating diarrhea in children. Considering the phytochemical analysis of the leaves, there is the presence of bisabolene, sesquiterpenes, diethoxyethane and diethoxymethane acetals, and the fixed components of the leaves have numerous ellagitannins ^[26].

As the main constituent of its fixed oil, there is the linoleic acid present in the seeds. It is stressed also that the anti-diarrheal action has been proven through studies with the aqueous crude extract of guava sprout or “eye” ^[26].

Thus, it can be said that the anti-diarrheal action of the *P. guajava* L species as mentioned by the residents of Sto. Antônio agreed with the literature ^[35, 36].

For example, Gonçalves *et al.* ^[37] studied the antibacterial effect of the essential oil and extract from the leaves of guava on diarrhea-causing bacteria, *Staphylococcus aureus*, *Salmonella spp.* and *Escherichia coli*. As a result, there was an inhibitory effect against *S. aureus* and *Salmonella spp.* Thus, the authors concluded that these extracts are very active against some bacterial strains ^[37].

Another study published in 2005, found the effect of crude aqueous extract (EAB) of the of *P. guajava* L. leaves in the intestinal transport of water in rats and on the gastrointestinal propulsion in mice, and the result was that EAB of guava showed potential anti-diarrheal action ^[38].

Also, there are numerous recent ethnobotanical surveys mentioning *P. guajava* L., to be effective for the treatment of diarrhea, supporting information collected on Sto. Antônio about the therapeutic use of this species ^[27, 39-41].

Thus, it is noteworthy that several studies refer these types of species such as effective for the treatment of diarrhea, corroborating the information of the people of Sto. Antônio community about the therapeutic utility of these plant species in childcare affected by diarrheal diseases.

5. Conclusions

This study enabled to rescue the popular knowledge used in traditional communities, highlighting the use of natural resources as alternative practices in the treatment of diarrheal diseases and promote the value of cultural aspects in full practice of health care to the children, enabling funding grants to develop research aimed to deepen their understanding of traditional knowledge introduced and assess the level of influence that these practices play in health care of the population.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

All the Authors made substantive intellectual contributions to this study in data collection, identification of plants, preparation and editing of the manuscript and proof reading.

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