Arch Health Invest (2023)12(7):1495-1499
http://doi.org/10.21270/archi.v12i7.5967

Original Research

Phytotherapy used in the Treatment of Oral Diseases: a Cross-Sectional Study in Indigenous Population

Fitoterapia utilizada no Tratamento de Doenças Bucais: um Estudo Transversal em População Indígena

Fitoterapia utilizada en el Tratamiento de Enfermedades Orales: un Estudio Transversal en Población Indígena

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Abstract
Phytotherapy studies the pharmacological effects of plants with the therapeutic purpose of preventing, curing, or minimizing disease symptoms. The use of plants by indigenous people to treat health conditions has been documented since ancient times. This study aimed to report an indigenous community's herbal medicines for oral diseases. An online questionnaire was administered, in which the participant indicated the type of plant and the part used, the preparation form, the administration route, and the dental condition. Subsequently, a descriptive analysis was performed. Most study participants were women (n=72, 62.1%). Peppermint tea (21.5%) was the most used substance for mouthwash and halitosis (42.2%). The bark of Açoita (34.5%) and Aroeira (31.9%) were the most frequently used to treat dental pain. Regarding gingival diseases, most responded that they used Guamirim (64.5%). Only mallow tea was reported to treat canker sores (81%). However, for herpetic lesions, participants reported the application of clay in a wasp nest (Polistes canada), an insect present at the site (55.2%). Oral inflammation had the lowest reported use of herbal medicine, with Marcela tea being the most frequently used (10.3%). Finally, fern roots were the most frequently used for infections (32 %). In conclusion, indigenous people widely use phytotherapeutics to treat oral diseases. Learning about the use of herbal medicines in indigenous communities may increase the clinical applicability of these plants in the dental field and, in the future, serve as a basis for developing new drugs.
Descriptors: Plants, Medicinal; Population Groups; Health of Indigenous Peoples; Dentistry; Oral Health.
Resumo
A fitoterapia estuda os efeitos farmacológicos das plantas com a finalidade terapêutica de prevenir, curar ou minimizar os sintomas de doenças. O uso de plantas por povos indígenas para tratar condições de saúde foi documentado desde os tempos antigos. Este estudo teve como objetivo relatar os medicamentos fitoterápicos de uma comunidade indígena para doenças bucais. Foi aplicado um questionário online, no qual o participante indicava o tipo de planta e a parte utilizada, a forma de preparo, a via de administração e a condição dental. Posteriormente, foi realizada uma análise descritiva. A maioria dos participantes do estudo eram mulheres (n=72, 62,1%). O chá de hortelã (21,5%) foi a substância mais utilizada para bochechos e halitose (42,2%). As cascas de Açoita (34,5%) e Aroeira (31,9%) foram as mais utilizadas no tratamento de dor de dente. Em relação às doenças gengivais, a maioria respondeu que fazia uso do Guamirim (64,5%). Apenas o chá de malva foi relatado para tratar aftas (81%). No entanto, para lesões herpéticas, os participantes relataram a aplicação de argila em ninho de vespa (Polistes canada), inseto presente no local (55,2%). A inflamação oral apresentou o menor uso relatado de fitoterápico, sendo o chá Marcela o mais utilizado (10,3%). Por fim, as raízes de samambaia foram as mais utilizadas para infecções (32%). Em conclusão, os indígenas utilizam amplamente os fitoterápicos para o tratamento de doenças bucais. O conhecimento do uso de fitoterápicos em comunidades indígenas pode aumentar a aplicabilidade clínica dessas plantas na área odontológica e, futuramente, servir de base para o desenvolvimento de novos medicamentos.
Descritores: Plantas Medicinais; Grupos Populacionais; Saúde de Populações Indígenas; Odontologia; Saúde Bucal.
Resumen
La fitoterapia estudia los efectos farmacológicos de las plantas con el propósito terapéutico de prevenir, curar o minimizar los síntomas de la enfermedad. El uso de plantas por parte de los indígenas para tratar condiciones de salud ha sido documentado desde la antigüedad. Este estudio tuvo como objetivo informar sobre las medicinas herbales de una comunidad indígena para las enfermedades bucales. Se administró un cuestionario en línea, en el que el participante indicó el tipo de planta y la parte utilizada, la forma de preparación, la vía de administración y la condición dental. Posteriormente, se realizó un análisis descriptivo. La mayoría de los participantes del estudio eran mujeres (n=72, 62,1%). El té de hierbabuena (21,5%) fue la sustancia más utilizada para enjuague bucal y halitosis (42,2%). La corteza de Açoita (34,5%) y Aroeira (31,9%) fueron las más utilizadas para tratar el dolor dental. En cuanto a las enfermedades gingivales, la mayoría respondió que usaba Guamirim (64,5%). Solo se informó que el té de malva para tratar las aftas (81%). Sin embargo, para las lesiones herpéticas, los participantes relataron la aplicación de arcilla en un nido de avispas (Polistes canada), insecto presente en el sitio (55,2%). La inflamación bucal tuvo el menor uso informado de fitoterapia, siendo el té de Marcela el más utilizado (10,3%). Finalmente, las raíces de helecho fueron las más utilizadas para infecciones (32 %). En conclusión, los indígenas utilizan ampliamente los fitoterapéuticos para el tratamiento de enfermedades bucodentales. El conocimiento sobre el uso de las hierbas medicinales en las comunidades indígenas puede aumentar la aplicabilidad clínica de estas plantas en el campo dental y, en el futuro, servir como base para el desarrollo de nuevos medicamentos.
Descriptores: Plantas Medicinales; Grupos de Población; Salud de Poblaciones Indígenas; Odontología; Cirugía Bucal.

INTRODUCTION

Throughout history and in the development of civilizations, plants have been used to combat human diseases and as therapeutic agents, which may be directly associated with individuals' quality of life and survival[1]. Phytotherapy studies the application of active plant extracts in different diseases as palliative or healing strategies. Usually, access to plant extracts is easier due to their low cost and easy acquisition than synthetic drugs,

which is an interesting strategy in public health[2]. Therefore, drug development using medicinal plants can provide considerable economic benefits for treating various diseases[3].

The applicability of medicinal plants in the dental field has been the subject of many studies, particularly considering some plant species' antimicrobial, antifungal, analgesic, and anti-inflammatory effects[4]. In a systematic review, Moro et al.[5] reported that herbal medicines improved periodontal health parameters, such as pocket depth, when combined with scaling and root planing[5]. Therefore, these natural products represent an excellent alternative to oral treatments, with advantages for both patients and dentists. Furthermore, they may have less toxicity than synthetic products and have scientifically proven biocompatibility[6].

Different plants have been described for use in oral diseases, such as sweet potato (Ipomoea batatas), plantain (Plantago major), red Terramycin (Alternanthera brasiliana), mint (Mentha spicata), Mallow (Malva sylvestris), Chamomile (Matricaria chamomilla), cat's claw (Uncaria tomentosa), pomegranate (Punica granatum), mint (Mentha piperita), and melissa (Melissa officinalis)[1,6,7]. The actions include tissue repair, analgesia, reduction of the microbial load, and inflammation[6]. For example, the clove (Syzygium aromaticum) is a plant closely affiliated with dentistry, mainly due to its eugenol compound, which is present with zinc oxide in a paste classically used in endodontics, provisional restorations, periodontal dressings, and provisional cementation[8].

The use of medicinal plants by indigenous people has already been reported in the literature by authors from several countries, such as Ethiopia, China, Iran, Pakistan, India, Nepal, Africa, Mexico, and New Zealand[9-15]. In Brazil, it has been reported that before the arrival of colonizers in the 16th century, different plant species were already widely used by the natives to treat and prevent oral diseases[16].

Therefore, considering the importance of herbal medicines in dentistry, this study aimed to report the medicinal plants used by members of an indigenous community to treat oral diseases.

MATERIAL AND METHOD

This study was approved by the local Ethics Committee (CEP) and the National Research Commission (CONEP) under protocol 52611321.4.0000.5319. Furthermore, according to CNS Resolution No. 466/12, this research was authorized by Organ responsible bodies for studies with this specific population.

This exploratory cross-sectional observational study was conducted in the Kaingang Morro do Osso indigenous community in Porto Alegre, Rio Grande do Sul, Brazil. All native individuals in the tribe participated in this study, including their chiefs. Native indigenous people under 18 years of age and tribe residents who did not declare themselves indigenous were excluded.

Data collection from individuals and anonymous completion of an online form containing open and closed questions on the use of medicinal plants to combat dental diseases and improve oral hygiene was carried out between July and August 2022.

The data collection mode considered the safety and care protocols associated with Covid-19 and the Ômicron variant. After reading and acknowledging the ICF, participants answered a questionnaire remotely using the Google Forms platform (https://forms.gle/TRVdMT2nzNjghWhT9). This study followed the STROBE Checklist. The form contained questions on the use of medicinal plants, their applicability, indications, form of use, and therapeutic effects in oral diseases.

The data obtained were compiled by a researcher (DDS) in a table created exclusively for this study. Categorical variables are presented as n (%).

RESULTS

The Kaingang indigenous community in Morro do Osso in Porto Alegre RS has approximately 180 residents divided into 39 families. The final sample of this study consisted of 116 patients, of whom 72 (62.1%) were female, and 44 (37.9%) were male.

All participants reported using a toothbrush and fluoride toothpaste for oral hygiene habits. However, using dental floss resulted in a lower percentage of positive responses (56 %). When asked about the use of substances for mouthwash, half of the participants said they used them; among these, 19 individuals (16.4%) reported using commercial mouthwash. Interestingly, indigenous people have reported using herbal medicines, including mint tea (21.5%, n = 25) and cloves (6%, n = 7). Seven participants rinsed their oral cavities with only water (6.0%, n = 7). Most participants reported using herbal medicines for halitosis, including mint tea (42.24%, n = 49) and cloves (25.86%, n = 30). (Table 1).

When asked about the use of any plant or herb to treat dental pain, the bark of Açoita (34.5%), aroeira (31.9%), and Marcela tea (18.1%) were indicated. Regarding gingival diseases, most respondents used Guamirim (64.5%), followed by plantain (17.24%), and then clove tea (6.9%). Guamirim in the form of tea or burnt was reported by 62.1% of the participants as a treatment for gingival bleeding (Table 2).

The use of herbal medicines to treat oral ulcers has also been reported, in which mallow tea

was exclusively used by the vast majority (81%). For the treatment of herpetic lesions, the participants reported the application of clay in a hornet's nest *(Polistes canadians*), an insect present at the site, and 55.2% of the participants reported applying this material in a mixture with olive oil and/or mallow (Table 2).

Only 16.2% of the participants reported using herbal medicines for oral inflammation/allergy, with 10.3% using Marcela tea and 6.9% using plantain. However, regarding infection, 9.5% of the participants reported using rue, 32% used fern root, 30.2% used cinnamon-do-brejo, and 6.9% used cactus for lesions with pus (Table 2).

Table 1. Herbal medicines used in the indigenous oral hygiene routine

Dental brush and fluoride toothpaste use	**N**	**%**
Yes	116	100
No	0	0
Dental floss use	**N**	**%**
Yes	65	56
No	51	44
Mouthwash use	**N**	**%**
No	58	50
Commercial mouthwash	19	16,3
Peppermint tea	25	21,5
Clove	7	6
Water	7	6
Halitosis treatment	**N**	**%**
No	37	31,9
Peppermint tea	49	42,2
Clove	30	25,9
Another oral hygiene	**N**	**%**
No	49	42,24
"wotcha" root mouthwash	67	57,75

Data were expressed as absolute numbers and their percentage.

Table 2. Use of herbal medicines by indigenous people in the treatment of oral diseases

Dental pain	**N**	**%**
No	18	15,5
Bark of açoita	40	34,5
Bark of aroeira	37	31,9
Marcela tea	21	18,1
Gum diseases	**N**	**%**
No	13	11,2
"Guamirim"	75	64,5
Plantain	20	17,2
Clove	8	6,9
Gengival bleeding	**N**	**%**
No	44	37,9
"Guamirim"	72	62,1
Clove	30	25,9
Oral ulcers	**N**	**%**
No	22	19
Mallow tea	94	81
Herpetic Lesions	**N**	**%**
No	52	44,9
""Clay in a hornet's nest"	64	55,2
Oral Alergy/Inflamation	**N**	**%**
No	96	82,7
Marcela tea	12	10,3
Plantain	8	6,9
Infection	**N**	**%**
No	25	21,5
Fern	37	32
Swamp cinnamon	35	30,2
Rue	11	9,5
Cactus	8	6,9

Data were expressed as absolute numbers and their percentage.

DISCUSSION

The use of plants by indigenous people to treat various health conditions has been reported since 6,000 BC in the Indian subcontinent[17]. It is estimated that approximately 80% of the world's civilization uses herbs in primary health care, which emphasizes the need to include herbal medicines in the public health system, as recommended by the World Health Organization (WHO) since the Alma-Ata Declaration in 1978[7]. In this study, which was carried out on a Brazilian indigenous population, it was observed that plant knowledge could be used to treat different oral diseases.

In this context, mint tea and cloves are herbal medicines used to clean the oral cavity and treat halitosis. Mint (*Mentha piperita L.*) is widely discussed in the literature for the treatment of halitosis and is the basis for the manufacture of toothpaste, anesthetic ointments, and lozenges. In addition to its use in the form of tea, there are reports of the use of its fresh leaves in gums. Other studies have indicated its use for oropharyngeal pain, inflammation, and dental pain [2,7]. The clove (*Syzygium aromaticum L.*) has analgesic, anti-inflammatory, healing, fungicidal, antiseptic, antimycotic, bactericidal, and aromatic actions and is used against cariogenic bacteria, periodontal pathogens, bad breath, stomatitis, alveolitis, canker sores, abscesses, gingivitis, and oral inflammation[1,18]. The indigenous community in this study reported its use as a mouthwash in the form of tea with the garnish of the plant and as a kind of chewing gum for fetid odor/halitosis of the oral cavity, as reported in the literature[1]. In this study, the root of "wotcha" (an unidentified scientific name) was also reported as a means of oral hygiene.

Regarding dental pain, two plants were indicated: mastic and açoita barks. The literature indicated the use of Aroeira *(Schinus terebinthifolius Raddi or Myracrodruon urundeuva Allemao),* whether its stem bark or leaves, for antiseptic, anti-inflammatory, healing, and antimicrobial purposes, mainly in the fight against candidiasis, in addition to being an analgesic, as reported in this study[4]. Other plants cited in the literature for dental pain are mint (*Mentha piperita L.)* and chamomile (*Matricaria chamomilla L. or Matricaria recutita L);* however, these substances were not reported in this study[1,3,7].

In this study, plantain *(Plantago major L.*) was identified as an agent for treating oral edema, gingival inflammation, and inflammation in general, which is consistent with previous literature. It has anti-inflammatory, antimicrobial, analgesic, hemostatic, healing, and antioxidant properties and is used for oropharyngeal pain, pain in the oral cavity, gingival bleeding, infections, and swelling[2,7,19].

Another plant mentioned by the tribe was "Guamirim," known as pitanga preta, whose name comes from Tupi-Guarani and means "small fruit." In this study, the use of its root for gingival bleeding/gingivitis was described as either tea or

burned and placed directly in the bleeding region. No study in the literature corroborates this information and its therapeutic effects.

The main plant for treating mouth ulcers is mallow (*Malva sylvestris L.*) in the form of mouthwash and gargle with its infusion. It is known to have several medicinal properties and is primarily an anti-inflammatory agent[7,20-22]. A systematic review showed that *Jasminum grandiflorum, Ficus deltoidea, curcumin* and *Bixin orellana* presented good results in terms of reduction in the size of the oral ulcer in animal studies[23].

A community-reported substance used for the treatment of cold sores was clay from the house of the wasp species (*Polistes canadianas),* as previously reported by Apodonepa and Barreto (2015)[24]. They related the compound to the treatment of viral parotitis (mumps) and the tissue repair of the navel of newborns.

Marcela or macela (*Achyrocline satureioides*) has been reported to treat oral allergies. There is no description of this purpose in the literature; however, there is a description of its anti-inflammatory, bactericidal, antiviral, and antispasmodic actions during dental eruptions. In addition, the roots of fern (*Nephrolepis exaltata*) and swamp cinnamon (*Ocotea pulchella*) have also been reported to treat oral infections in this study. However, no reports of these plants for use in oral diseases have been reported in the literature; only cinnamon-do-brejo has been reported for schistosomiasis, a parasite that can affect humans[25]. Table 3 shows the findings of this study, grouping the different herbal medicines according to the indications reported by indigenous people.

Interestingly, the use of chamomile (*Matricaria chamomilla L. and Matricaria recutita L.*) was not included in this study. However, it is a prominent plant in cases of infection; it has healing, anti-inflammatory, antiseptic, analgesic, fungicidal, bactericidal, sedative, and antimicrobial properties and is widely used for perioral inflammation, toothache (as already presented), stomatitis, glossitis, skin rashes, and oral infections. In addition, evaluating wound healing, in vitro and in vivo model, with topical applications, chamomile in comparison to corticosteroids promoters faster wound healing process[26].

This study adds relevant information to the existing literature by listing different herbal medicines and their administration in oral diseases by members of an indigenous community. Such knowledge expands the therapeutic arsenal in dentistry in search of more accessible, less toxic, and more biocompatible treatments. In addition, this research is relevant to public health because it shows the importance of phytoodontology; therefore, several plants can be used as an escape mechanism and an aid to dental diseases. However, this study has some limitations. First, it is a cross-sectional study based on the self-completion of a questionnaire, which indicates the bias of omission of information. Second, owing to the inclusion of only one indigenous community, this study may not be extrapolated to other scenarios because of local peculiarities such as life habits and flora.

CONCLUSION

Considering this study's findings, we can conclude that plants are a great auxiliary resource to treat dental diseases. Therefore, knowledge of plants in indigenous people can contribute to implementing phytoodontology as a summative, auxiliary, or unique resource to promote the entire population's health. However, further research in this area is required to present the use of this resource in an effective, safe, and efficient way.

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CONFLICTS OF INTERESTS

The authors declare no conflicts of interests.

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Received 16/10/2022
Accepted 13/07/2023