

ETHNOPHARMACOLOGICAL KNOWLEDGE OF MEDICAL PLANTS IN THE TREATMENT OF ARTERIAL HYPERTENSION AND DIABETES MELLITUS

CONHECIMENTO ETNOFARMACOLÓGICO DE PLANTAS MEDICINAIS NO TRATAMENTO DA HIPERTENSÃO ARTERIAL E DIABETES MELLITUS

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Abstract: The study investigates the use of medicinal plants in treating symptoms of non-communicable chronic diseases, with a focus on Systemic Arterial Hypertension and Diabetes Mellitus, in the municipalities of Talismã and Gurupi, Tocantins. It aims to identify the most recommended plants for these conditions through an ethnopharmacological survey. The research employed semi-structured questionnaires using the snowball sampling method until sample exhaustion. Among the 106 cited plants, only 9 were identified as recommended for managing Diabetes Mellitus or Hypertension, all in the municipality of Gurupi. The results highlight the relevance of traditional knowledge in the recommendation of medicinal plants and emphasize the need for further studies on their efficacy and safety. This research contributes to expanding knowledge about the therapeutic use of plants in addressing public health problems associated with these diseases.

Keywords: Arterial Hypertension. Diabetes Mellitus. Medicinal Plants. Tocantins.

Resumo: O estudo investiga o uso de plantas medicinais no tratamento de sintomas de doenças crônicas não transmissíveis, com ênfase na Hipertensão Arterial Sistêmica e no Diabetes Mellitus, nos municípios de Talismã e Gurupi, Tocantins. Objetiva-se identificar as plantas mais indicadas para essas condições por meio de um levantamento etnofarmacológico. A pesquisa utilizou questionários semiestruturados aplicados pela metodologia bola de neve até o esgotamento amostral. Entre as 106 plantas citadas, apenas 9 foram apontadas como indicadas para o manejo do Diabetes Mellitus ou da Hipertensão Arterial, todas no município de Gurupi. Os resultados destacam a relevância do saber popular na indicação de plantas medicinais e reforçam a necessidade de aprofundar estudos sobre sua eficácia e segurança. A pesquisa contribui para ampliar o conhecimento sobre o uso terapêutico de plantas no enfrentamento de problemas de saúde pública associados a essas doenças.

Palavras-chave: Hipertensão Arterial. Diabetes Mellitus. Plantas Mediciniais. Tocantins.

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Introduction

The human practice of using plants for a variety of purposes, such as food, treatment and prevention of diseases, transportation, artistic and religious expressions is one of the oldest activities (SANTOS et al, 2020). The medicinal use of plants has evolved from experience and observation, contributing to the development of a rich cultural tradition, ranging from the simple preparation of teas to more advanced methods, such as the industrial manufacture of herbal medicines (SANTOS, R. L. et al., 2011). Brazil is characterized by a vast diversity of plant species, home to numerous medicinal plants (CHIACCHIO, A. D., et al., 2023) that have become the basis for the production of phytotherapies and other medicines. These plant species with medicinal properties are abundant (FIRMINO; BINSFELD, 2013).

Systemic Arterial Hypertension (SAH) is a chronic condition characterized by persistently high blood pressure (BP) levels, the lack of adequate control of which can result in systemic implications due to structural and/or functional damage to target organs. It is considered a public health problem worldwide, as it contributes as a risk factor for cardiac and cardiovascular complications, triggering lesions in the blood vessels that affect vital organs such as the kidneys, heart and brain (MIRANDA, 2023). According to the 2020 Brazilian Hypertension Guidelines, controlling hypertension requires lifelong monitoring and treatment, which can be both pharmacological and non-pharmacological (BARROSO et al., 2021). There are various drugs used to control SAH in medical practice, such as diuretics, beta-blockers, alpha-blockers, direct vasodilators, angiotensin-converting enzyme inhibitors, direct renin inhibitors, calcium channel blockers, angiotensin II AT1 receptor blockers, among others.

Another chronic metabolic disease that is also a public health problem is Diabetes Mellitus (DM), which is characterized by high levels of glucose in the blood (hyperglycemia) as a result of defects in the secretion and/or action of insulin in the individual's body. The World Health Organization (WHO), highlights hyperglycemia - the origin of the diabetic disorder - as the third most important factor in premature mortality, demonstrating the importance of listing and clarifying the factors associated with this disease, between 2000 and 2019, there was a 3% increase in age-adjusted mortality rates due to diabetes. In lower-middle-income countries, the diabetes-related mortality rate rose by 13% (World Health Organization, n.d. 2023). The treatment of diabetes highlights the relevance of the guidelines of the Brazilian Diabetes Society, which advocate a comprehensive range of therapeutic strategies, encompassing lifestyle modifications, glycemic monitoring, medication administration, among other aspects pertinent to the management of the disease. The increase in the incidence of diabetes is associated with factors such as the epidemiological transition, the nutritional transition, sedentary lifestyles and excessive consumption of sugar-rich foods, among others. The treatment of Diabetes Mellitus varies according to the classification of the disease, which can be Type 1 DM, Type 2 DM or Gestational Diabetes Mellitus (SOCIEDADE BRASILEIRA DE DIABETES, 2023).

Treatment with medicinal plants is a practice that is growing considerably, whether through the use of plants or even herbal products and medicines. The aim of this study was therefore to carry out an ethnopharmacological survey of the medicinal plants that are best known by the population of two municipalities in the south of Tocantins for hypertension and diabetes mellitus.

Methods

The research was carried out in the municipalities of Talismã and Gurupi, cities located in the southern region of the state of Tocantins. Adults of both genders were interviewed, such as raisers, farmers and gardeners. Individuals were selected using the snowball technique, in which a respondent indicates other individuals with knowledge of medicinal plants who could be interviewed due to their ability to identify other similar members until the sample is exhausted.

The data were collected in 2017 and 2018 by means of a semi-structured questionnaire according to the methodology proposed by Albuquerque & Hanazaki (2005). We analyzed the

profile of the interviewees, which medicinal plants they knew, how they were prepared, their use and therapeutic indications. The scientific names of the plants mentioned by the population were identified by consulting the Missouri Botanical Garden, Empresa Brasileira de Pesquisas Agropecuarias (EMBRAPA), INCT - Virtual Herbarium of Flora and Fungi, Re flora - Flora do Brasil and Herbarium Berolinense. This Project was approved by the Research Ethics Committee of the Federal University of Tocantins (0106/2012).

Results and discussion

The use of medicinal plants dates back to ancient practices of traditional medicine, often passed down orally. Research into this subject provides important results for the development of new drugs (MADEIRO, LIMA, 2015). In this study, the total number of people who volunteered to provide information on medicinal plants through their previous knowledge or their own use in the two municipalities was 50, aged between 20 and 89. In Talismã, 100% of them were in the 50-89 age group, while in Gurupi 62.5% were in this age group, and the majority were female in both municipalities. Not only do women use medicinal plants more often than men, but they also have a greater propensity to pass on this knowledge to subsequent generations. This trend highlights that women play a significant role as preservers and transmitters of this practice, contributing to its continuity over time (LOPES et al., 2021).

The predominance of the female gender could also be observed in the study carried out by Caetano et al. (2015), who assessed the use of medicinal plants by the population of the municipality of Lagarto - SE and Carmo, who carried out an ethnopharmacological study of the medicinal plants used by the population of the Andorinhas health unit in the municipality of Vitória - ES.

The population of Gurupi showed a heterogeneous level of education, as it encompasses all levels of education, but in the city of Talismã there were only two levels: illiterate and incomplete primary education. Medicinal plants are widely used as an alternative therapy to treat various pathologies due to their significant therapeutic potential. This traditional care practice has been employed and passed down from generation to generation through empirical knowledge over a long period of time (BADKE et al., 2012). Although initially associated with popular knowledge, these plants are progressively being integrated into scientific understanding. The population's search for this alternative stems not only from the therapeutic effects of plants, but also from the challenges in accessing health services and the costs associated with industrialized medicines (VEIGA JÚNIOR; PINTO; MACIEL, 2005). The understanding of medicinal plants is not influenced by the level of schooling, which makes the importance of popular knowledge evident.

The survey of medicinal plants had a total of 106 plants, distributed in 42 families, with the Lamiaceae family being the most represented in both cities. Of the 106 plants, only 9 were cited as a popular indication for Diabetes Mellitus or Hypertension, and only in the municipality of Gurupi (Table I).

Table I. Medicinal plants described in the municipality of Gurupi - TO with popular indications for Hypertension or Diabetes Mellitus.

Popular name	Family	Scientific name	Mode of use	Part of the plant	Popular indication
Alecrim	Lamiaceae	<i>Rosmarinus officinalis</i>	Tea	Leaf	Hipertension
Cagaita	Myrtaceae	<i>Eugenia dysenterica DC.</i>	Tea	Leaf, fruit	Diabetic control
Capim Santo	Graminiaceae	<i>Cymbopogon citratus D.C.</i>	Tea	Leaf, root	Hipertension

Gengibre	Zingiberaceae	<i>Zingiber officinale</i> R.	Tea	Root	Diabetic control
Limão	Rutaceae	<i>Citrus limon</i> (L.) Burn.	Tea, juice	Leaf	Hipertension
Podoi	Fabaceae	<i>Copaifera langsdorffii</i> Desf.	Oil	Bark	Diabetic control
Poejo	Lamiaceae	<i>Mentha pullegium</i> L.	Tea	Leaf	Diabetic control
Quebra pedra	Euphorbiaceae	<i>Phyllanthus niruri</i> L.	Tea	Leaf	Diabetic control
Sete dor	Lamiaceae	<i>Plectranthus barbatus</i> Andr.	Tea, juice	Leaf	Diabetic control

Source: Authors.

The use of Alecrim, Capim Santo and Limão as popular indications for hypertension was mentioned in the ethnopharmacological study of medicinal plants used by the population with hypertension in the Andorinhas unit in the municipality of Vitoria - ES (CARMO, R. A. 2006). Some pharmacological tests carried out on alecrim leaves have shown that they may be antihypertensive, through their diuretic effect and inhibition of the angiotensin-converting enzyme (ACE). Haloui *et al.* (2000) carried out a study with rats in which the 8% aqueous extract showed a significant increase in diuresis, followed by urinary excretion of sodium, potassium and chloride.

No scientific articles were found proving the effect of plants on the treatment of Diabetes mellitus; Cagaita, Podoi, Poejo and Sete Dor, only Quebra Pedra was cited, indicating that this plant has a potential diuretic, hypotensive and hypoglycemic effect for humans (SRIVIDYA N, PERIWAL S; 1995). According to Lacerda et al. (2023), several benefits associated with the daily consumption of gengibre have been revealed, including a reduction in anthropometric parameters, improvements in blood glucose levels, insulin, lipid profile, inflammatory and antioxidant markers and positive effects in the treatment of individuals with DM2.

The most prevalent method of use was tea, with the leaf being the most commonly used part of the plant. The preparation consists of an infusion in which the part used is covered in boiling water and left to steep for minutes, and a decoction in which the plant is immersed in water and boiled for a short time.

Final Considerations

We can conclude from this survey that women were the population that participated most, and that there are few medicinal plants indicated for the treatment of diabetes and hypertension. In addition to the low number of known plants, there are also few articles with pre-clinical and clinical tests attesting to the effects of these plants.

References

ALBUQUERQUE, U. P.; HANAZAKI, N. As pesquisas etnodirigidas na descoberta de novos fármacos de interesse médico e farmacêutico: fragilidades e perspectivas. **Rev. Bras. Farmacogn.**, v.16, p.678-689, 2006.

BADKE, R. M.; BUDÓ, D. M. L.; ALVIM, N. A. T.; ZANETTI, G. D.; HEISLER, E. V. Saberes e práticas populares de cuidado em saúde com o uso de plantas medicinais. **Texto & Contexto Enfermagem**, 2012; 21 (Abril-Junho). Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-07072012000200014&lng=en. Acesso em: 28 jan. 2024.

BARROSO, W. K. S. et al. **Diretrizes Brasileiras de Hipertensão Arterial** – 2020. *Arq. Bras. Cardiol.*, v. 116, n. 3, p. 516-658, 2021.

CAETANO, N. L. B. et al. Plantas medicinais utilizadas pela população do município de Lagarto-SE, Brasil–ênfase em pacientes oncológicos. **Revista Brasileira de Plantas Medicinai**s, v. 17, n. a00101s1, p. 748-756, 2015.

CARMO, R. A. do. **Estudo etnofarmacológico de plantas medicinais utilizadas pela população com Hipertensão Arterial Sistêmica da unidade de saúde de Andorinhas no município de Vitória** -ES. 2006. 118 p. Dissertação (Mestrado em Ciências Fisiológicas)-Universidade Federal do Espírito Santo, Vitória, 2006. Disponível em: <https://repositorio.ufes.br/server/api/core/bitstreams/053d73b9-9326-4c54-8668-65786b6e6a32/content>. Acesso em: 28 jan. 2024.

CHIACCHIO, A. D.; RAMOS, G. L. G.; COSTA, A. F.; FONSECA, J. B.; SIQUEIRA, S. B.; NASCIMENTO, G. N. L. Avaliação do potencial antimicrobiano in vitro do extrato etanólico da Guazuma ulmifolia Lamarck. **Revista Observatorio de la Economía Latinoamericana**, v. 21, n. 12, p. 28058-28072, 2023.

FIRMINO, F. C.; BINSFELD, P. C. A biodiversidade brasileira como fonte de medicamentos para o SUS. 2011. 6ª Mostra de Produção Científica da Pós-Graduação Lato Sensu da PUC (Pós-Graduação Lato Sensu) - PUC Goiás, [S. l.], 2011.

HALOUI, M.; LOUEDEC, L.; MICHEL, J.; LYOUSSI, B. Experimental diuretic effects of Rosmarinus officinalis and Centaurium erythraea. *Journal of Ethnopharmacology*, v. 71, 2000.

LACERDA, S. DE S.; RUBACH, S. C.; FANCHIOTTI, F. E.; CONSTANT, P. B. L.; SILVA, R. R. DA. Efeito do gengibre (*Zingiber officinale*) nos marcadores antropométricos e bioquímicos em pacientes com diabetes mellitus tipo 2: revisão integrativa. **RBONE - Revista Brasileira de Obesidade, Nutrição e Emagrecimento**, v. 16, n. 105, p. 1075-1094, 30 jan. 2023.

LOPES, B. E. R.; BARBIERI, M. G. M.; CAMPOS, W. A. Análise comparativa entre o uso de plantas medicinais e medicamentos industrializados em Rolim de Moura do Guaporé-RO. **Biodiversidade**, v. 20, n. 1, p. 129-138, 2021.

MADEIRO, A. A. S.; LIMA, C. R. **Estudos etnofarmacológicos de plantas medicinais utilizadas no Brasil**: revisão de literatura. *Cadernos de graduação ciências biológicas e da saúde*, 2015; 3(1): 69-76. Disponível em: <file:///C:/Users/USER/Downloads/2405-8232-1-PB.pdf>. Acesso em: 28 jan. 2024.

MIRANDA, C. H. A Jornada para o Controle da Hipertensão Arterial no Brasil. **Arq. Bras. Cardiol.**, 2023(8): e20230533, 2023.

SANTOS, R. L.; GUIMARAES, G. P.; NOBRE, M. S. C.; PORTELA, A. S. Análise sobre a fitoterapia como prática integrativa no Sistema Único de Saúde. **Rev. Bras. Pl. Med.**, v. 13, n. 4, p. 486-491, 2011. Disponível em: <http://dx.doi.org/10.1590/S1516-05722011000400014>.

SANTOS, K. M.; MARTINS, M. L.; NASCIMENTO, G. N. L. Levantamento etnofarmacológico das plantas medicinais utilizadas no município de Tocantinópolis – TO. **Revista Desafios**, v. 7, Especial - PIBIC, 2020.

SOCIEDADE BRASILEIRA DE DIABETES. **Diretriz da Sociedade Brasileira de Diabetes**. Aprovado pelo Comitê Central. DOI: 10.29327/5238993. ISBN: 978-85-5722-906-8, 2023.

SRIVIDYA N, PERIWAL S. Diuretic, hypotensive and hypoglycaemic effect of Phyllanthus amarus. **Indian J Exp Biol.**, v.33, n.11, p.861-4, 1995.

VEIGA JUNIOR, V. F.; PINTO, A. C.; MACIEL, M. A. M. Plantas medicinais: cura segura. **Química Nova**, São Paulo, v. 28, n. 3, p. 519-528, Maio-Jun. 2005.

WORLD HEALTH ORGANIZATION. **Diabetes**. Disponível em: <https://www.who.int/news-room/fact-sheets/detail/diabetes>. Acesso em: 20 maio 2024.

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