



Ethnobotanical Study of Medicinal Plants Used for Prostatitis in Dehloran County, Ilam Province, Western Iran

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ABSTRACT

Introduction: Prostatitis is an inflammatory condition of the prostate gland caused by bacterial infections or non-infectious factors. This condition is typically characterized by symptoms such as pelvic pain, urinary frequency, and burning during urination. If left untreated, prostatitis may result in complications, including sexual dysfunction, infertility, and chronic urinary infections. This ethnobotanical study aims to identify and document medicinal plants traditionally used in Dehloran County, Ilam Province, based on the local inhabitants' traditional knowledge.

Methodology: A mixed-methods approach, combining quantitative and qualitative techniques, was employed. Data were collected through semi-structured interviews with 25 herbalists and traditional healers in Dehloran. The collected information was analyzed using both quantitative and qualitative methods to provide a comprehensive understanding of the traditional uses of medicinal plants in the region.

Results: The study identified eight species of medicinal plants traditionally recognized in the Dehloran region as effective remedies for prostate-related issues. These plants include borage, pumpkin, licorice, yarrow, camel's thorn, ginger, nettle, and chicory. Among these, borage and pumpkin exhibited the highest usage rates, with a Use Report (UR) of 9, Relative Frequency of Citation (RFC) of 0.36, and Percentage of Familiarity and Use (PFU) of 34.6%, making them the most commonly utilized plants for managing prostate conditions in the area.

Conclusion: The findings of this study highlight the traditional use of several indigenous medicinal plants in Dehloran for alleviating prostatitis symptoms. These results can aid in the preservation of traditional knowledge and support the development of complementary therapies for prostatitis.

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Introduction

The prostate is one of the vital glands in the male reproductive system, roughly the size of a walnut and composed of connective and muscular tissue. This gland surrounds the urethra and is situated between the

bladder and the penis (Hayward and Cunha, 2000). During ejaculation, the prostate adds a milky, alkaline fluid to the semen, which aids in the preservation, nourishment, and enhancement of sperm, contributing to

the milky appearance of semen. This fluid contains nutrients such as zinc, citrate, and fructose, which provide the necessary energy for sperm motility. Additionally, substances within the semen protect the urinary tract and sperm from pathogens and bacteria (Ballentine Carter and Coffey, 1990). During puberty, the prostate grows under the influence of testosterone and its byproduct, dihydrotestosterone (DHT). This hormone is primarily produced in the testes and, to a lesser extent, in the adrenal glands. The prostate is located posteriorly in the peripheral zone, near the rectum, making digital rectal examination (DRE) and prostate-specific antigen (PSA) blood tests common methods for screening prostate diseases (Pienta and Esper, 1993). Urinary problems are typically not symptoms of prostate cancer; rather, they are more often due to benign prostatic hyperplasia (BPH), which occurs from the enlargement of the transitional zone of the prostate, close to the urethra (Pernar et al., 2018). With aging, typically from the ages of 40 to 50, the size of the prostate changes, and at older ages, especially after 80, it may cause urinary and fertility issues. The exact cause of prostate enlargement is not precisely known, but factors such as increasing age, genetics, physical inactivity, obesity, and diabetes may play a role (Pernar et al., 2018). Benign prostatic hyperplasia (BPH) is influenced by factors such as age, family history, race, and lifestyle. This condition is rarely seen in men under 40, but its prevalence increases with age, affecting approximately one-third of men by age 60 and half by age 80 with moderate to severe symptoms (Timms, 2008). Having first-degree relatives with a history of prostate problems increases the risk. Racially, Asian men are less likely to develop BPH compared to Caucasian and African American men, with African American men possibly experiencing symptoms at a younger age (Timms, 2008). Lifestyle factors, such as obesity, increase the risk of BPH, while regular exercise helps reduce this risk. These factors highlight the combined impact of age, genetics, race, and lifestyle on the occurrence and severity of BPH symptoms (Timms, 2008). Symptoms of prostate enlargement include difficulty starting urination, incomplete bladder emptying, urinary frequency, an urgent need to urinate, incontinence, and kidney stones (Sharp et al., 2010). In severe cases, prostate enlargement can damage the kidneys and bladder. Prostatitis, or inflammation of the prostate, is often accompanied by pain and burning during urination and can become chronic if left untreated. Prostatitis may arise from bacterial infections, immune and neurological disorders, prostate injuries, or psychological factors (Lipsky et al., 2010).

Treatment for prostatitis includes both pharmacological and non-pharmacological approaches. Antibiotics are prescribed for bacterial infections, and non-steroidal anti-inflammatory drugs (NSAIDs) help reduce pain and inflammation. Alpha-blockers also improve urinary symptoms. Non-pharmacological methods include warm baths, prostate massage, physiotherapy exercises, and lifestyle changes such as reducing alcohol and caffeine intake. In cases where stress is a factor, psychological counseling and relaxation techniques can be effective. Advanced treatments, such as biofeedback

and surgery, are considered for treatment-resistant cases. This combined approach aids in improving symptoms and enhancing patients' quality of life (Zorman et al., 2015). Traditional medicine serves as a complementary approach in treating prostatitis, involving the use of medicinal plants, natural substances, and non-pharmacological techniques that can help alleviate symptoms and enhance the quality of life for patients (Zorman et al., 2015). Pharmaceutical treatments for prostatitis may have a range of side effects that negatively impact patients' quality of life. Antibiotics prescribed for bacterial prostatitis can lead to gastrointestinal issues, allergic reactions, and bacterial resistance. NSAIDs and analgesics may cause complications such as stomach ulcers, bleeding, and adverse effects on the kidneys. Alpha-blockers may relieve urinary symptoms but can also result in hypotension, fatigue, and sexual dysfunction. Hormone therapy might induce weight changes and sexual problems. Therefore, consulting with a physician about potential side effects before starting treatment is crucial (Vasan et al., 2012). The aim of this research is to identify and investigate the medicinal plants used in Dehloran County, Ilam Province, through an ethnobotanical approach. This study aims to document local knowledge regarding the medicinal uses of plants, contributing to the preservation of cultural heritage, the development of innovative treatments, and raising public awareness about medicinal plants.

Materials and Methods

Methodology

This cross-sectional ethnobotanical study was conducted in the city of Dehloran, located in the Ilam province, during the year 2024. Dehloran is situated in the foothills of the Zagros Mountains and is characterized by its mountainous climate and stunning natural landscapes. It shares borders with the cities of Abadan and Dareh Shahr to the north and Mehran and Iraq to the west. Recognized for its rich history and cultural heritage, Dehloran is considered one of Iran's ancient regions, housing numerous historical sites. The local population speaks Kurdish and Persian, and their rich culture encompasses music, dance, and local customs. The economy of Dehloran primarily relies on agriculture, livestock farming, and handicrafts, with crops such as wheat and legumes cultivated in the area. The city's historical castles and pristine natural attractions make it an appealing destination for tourists. Overall, Dehloran stands out as a center for cultural and economic exchange in the region, given its rich history and natural beauty.

To gather traditional medicinal information on plants effective for the prostate, standardized ethnobotanical questionnaires were designed and utilized. A field researcher personally visited local herbal shops in Dehloran and conducted interviews with herbalists and knowledgeable individuals active in this domain to collect the necessary information. The questionnaire included personal details and information regarding local plants, the plant parts used, methods of usage, and traditional therapeutic effects on the prostate (Razmjoue et al., 2024).

For the identification of medicinal plants, traditional information was initially collected and then verified using the online database [The Plant List] (<http://www.theplantlist.org/>) and the flora of Ilam authored by Dr. Valiollah Mozaffarian.

Data Analysis Methods

In this cross-sectional study, after data collection, qualitative indices such as the Informant Consensus Factor (ICF), Relative Frequency of Citation (RFC), and Usage Rate (UR) were employed to statistically analyze the collected data. Based on the obtained results, statistical analysis was performed using SPSS software (Razmjoue et al., 2024).

The methods of analysis involved calculating UR, RFC, ICF to achieve the study's objectives. The UR index represents the total number of usage reports for each case as reported by informants. The RFC is calculated to assess the relative importance of species in local medicinal practices. The RFC index is derived using the following formula (Razmjoue et al., 2024):

$$RFC = FC / N$$

Here, RFC indicates the number of individuals who mentioned the usage of a particular species. In this context, FC represents the number of informants and interviewees who cited the specific species, while N is the total number of individuals interviewed. The RFC index varies from zero (indicating that no local individuals with knowledge about the plant's uses reported it) to one (indicating that all knowledgeable local individuals mentioned the medicinal use of the plant) (Razmjoue et al., 2024).

Additionally, the ICF serves as a measure to evaluate the consensus among different sources regarding the use of medicinal plants. This index is typically calculated as follows:

ICF Formula:

$$ICF = (N - n) / (N - 1)$$

Where:

N: is the total number of citations to medicinal plants (the sum of citations for all plants),

n: is the number of plants that have at least one citation.

The quantitative methods utilized in ethnobotanical studies allow researchers to use these formulas to select the most important species of medicinal plants for initiating pharmacological research during clinical studies. Traditional medicinal information regarding plants effective for the prostate was gathered through questionnaires. The researcher conducted interviews with each herbal shop in the cities of Ilam, Abdanan, and Dehloran. The researcher collected traditional information about the plants and other necessary details. Additionally, information was collected from local sources engaged in this field using the questionnaire. The questionnaire encompassed personal information and details about local plants, the parts used, methods of usage, and traditional therapeutic effects on the prostate. This study represents a cross-sectional ethnobotanical investigation conducted in 2024 in Ilam province, focusing on collecting traditional medicinal information regarding plants effective for the prostate using the ethnobotanical questionnaire (Razmjoue et al., 2024).

Limitations of the Study and Mitigation Strategies

One potential challenge in implementing the study may be the lack of cooperation from some herbalists. To mitigate this issue, a minimum of 25 standardized questionnaires were considered necessary to achieve reliable results.

Results

The results obtained from the analysis and evaluation of qualitative and quantitative data, along with the analysis of questionnaires collected from herbalists in Dehloran, are reported here. As illustrated in Table 1, the demographic characteristics of the herbalists in Dehloran city, derived from the collected questionnaires, are presented.

Table 2 presents the medicinal plants used by herbalists in the city of Dehloran for the treatment of prostate disorders.

After collecting the data, 25 acceptable questionnaires were obtained from the city of Dehloran. As shown in Table 3, the names of the plants, their frequency of use percentage, relative frequency of references, and the instances of use by herbalists in Dehloran are presented. The most frequently used medicinal plants in this city were borage (*Anchusa*) and pumpkin (*Cucurbita*). According to the data in this table, 9 herbalists from Dehloran (34.6%) considered these medicinal plants effective for prostate disorders. Additionally, information regarding other mentioned medicinal plants can be observed.

The Informant Consensus Factor (ICF) for our data is approximately 0.875, indicating a high level of agreement among sources regarding the use of medicinal plants.

The distribution of each plant family reported to be effective for prostate disorders by herbalists in the city of Dehloran is illustrated in Figure 1. The families Fabaceae (2 cases) and Asteraceae (2 cases) were identified as having the most significant effects on the prostate according to the herbalists in Dehloran. Additionally, the distribution of other families mentioned by the herbalists is specified in Figure 1. Figures 2 and 3 present the percentages of the utilized plant parts and the traditional methods of usage.

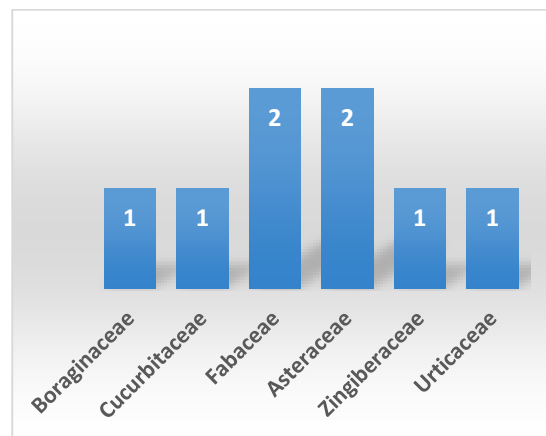


Figure 1: Distribution of antiprostate plant families in the city of Dehloran

Table 1: Demographic characteristics of herbalists in Dehloran city

City	Gender	Education Level	Language (Ethnicity)	Age Range (Year)			
Dehloran	Male	22	Diploma	20	Kurdish	18	23-52
	Female	3	Associate's Degree	2	Lor	6	
			Bachelor's Degree	3	Lak	1	

Table 2: Medicinal plants utilized by herbalists in dehloran for the treatment of prostate disorders

Scientific name	Plant family	Used organ	Traditional method used
<i>Anchusa italica</i>	Boraginaceae	Flower	Herbal tea
<i>Cucurbita maxima</i>	Cucurbitaceae	Seed	Decoction
<i>Glycyrrhiza glabra</i>	Fabaceae	Root	Decoction
<i>Achillea millefolium</i>	Asteraceae	Leaf	Herbal tea
<i>Alhagi persarum</i>	Fabaceae	Aerial parts	Decoction
<i>Zingiber officinale</i>	Zingiberaceae	Root	Decoction
<i>Urtica pilulifera</i>	Urticaceae	Leaf	Decoction
<i>Cichorium intybus</i>	Asteraceae	Aerial parts	Decoction

Table 3: Plant name, ICF, RFC, and UR in the city of Dehloran

The name of the plant	Plant name	Use report (UR) (UI)	Relative Frequency of Citations (RFC)	Informant Consensus Factor (ICF)
<i>Anchusa italica</i>	Borage	9	0.36	34.6 %
<i>Cucurbita maxima</i>	Pumpkin	9	0.36	34.6 %
<i>Glycyrrhiza glabra</i>	Licorice	8	0.32	30.7 %
<i>Achillea millefolium</i>	Yarrow	7	0.28	26.9 %
<i>Alhagi persarum</i>	Camel's thorn	7	0.28	26.9 %
<i>Zingiber officinale</i>	Ginger	7	0.28	26.9 %
<i>Urtica pilulifera</i>	Nettle	6	0.24	23 %
<i>Cichorium intybus</i>	Chicory	4	0.16	15.3 %

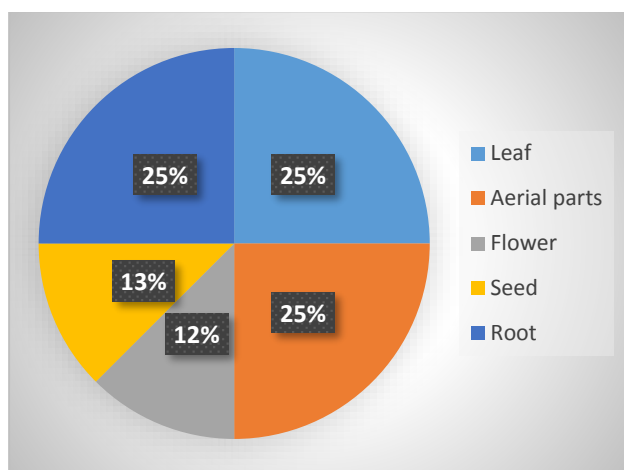


Figure 2: Percentage of plant parts used as antiprostate remedies in Dehloran

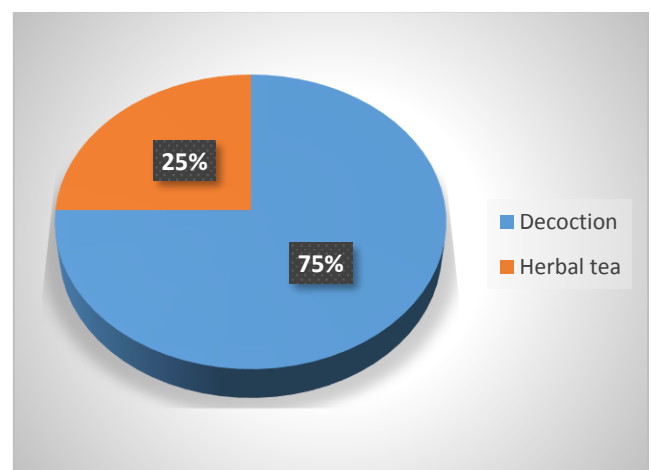


Figure 3: Percentage of traditional methods of use

Discussion

The prostate is a small yet vital gland in the male reproductive system that naturally undergoes changes and issues with age. In this context, the use of medicinal plants has garnered significant attention as an effective method in traditional medicine and indigenous treatments, particularly in Iran. Due to its geographical and climatic diversity, Iran hosts various medicinal plants utilized for addressing prostate issues. Ethnobotany refers to the study of the relationship between human communities and medicinal plants. In Iran, this knowledge is particularly rich and abundant across different regions with diverse geographical and climatic characteristics. Each area, due to its specific climatic and cultural conditions, has unique medicinal plants that are employed in the treatment of various diseases, including prostate problems.

Iranian traditional medicine is grounded in ancient medical theories, such as those proposed by Avicenna and Rhazes, which emphasize the use of medicinal plants in treating illnesses. Throughout history, numerous plants have been used to address various health concerns. In traditional Iranian medicine, pumpkin seeds (*Cucurbita*) are utilized for prostate health due to their anti-inflammatory and anti-androgenic properties. Research has shown that these seeds can help alleviate symptoms of benign prostatic hyperplasia (BPH) (Yousefi et al., 2019).

Results from an ethnobotanical study in Urmia indicated that the medicinal plant nettle (*Urtica*) is used in the region for prostate treatment (Yousefi et al., 2019). Additionally, findings from an ethnobotanical study in Behbahan, Khuzestan province, revealed that the medicinal plants knotgrass (*Polygonum aviculare*) and dioecious nettle (*Urtica dioica*) are employed for prostate treatment in this area (Razmjoue et al., 2017). Borage, known for its anti-inflammatory and antioxidant properties, has been traditionally used for various ailments. This plant, rich in omega-3 fatty acids and flavonoids, can help alleviate inflammation and pain associated with prostatitis. Furthermore, borage is recognized as a natural laxative that may improve urinary function and facilitate urination (Henkel and Agarwal, 2020).

Licorice is another medicinal plant effective in treating prostatitis. Its anti-inflammatory properties and mucosal protection capabilities can effectively reduce prostate inflammation and alleviate related symptoms. Moreover, licorice can help balance hormones and mitigate side effects associated with hormonal issues in men (Li et al., 2019). Yarrow is a plant widely used in traditional medicine for its antibacterial and anti-inflammatory properties. Studies have shown that yarrow can improve prostatitis symptoms and positively impact overall prostate health by reducing inflammation and microbial infections (Yarnell and Abascal, 2005).

Camel's thorn is a medicinal plant traditionally used for urinary and prostatitis issues. Due to its diuretic properties, it can enhance kidney and bladder function while alleviating prostatitis symptoms. Additionally, common broom contains compounds that may help relieve inflammation and pain in the prostate area (Nejabatbakhsh et al., 2016). Ginger, a well-known spice, possesses strong

anti-inflammatory and antioxidant properties. Research has indicated that ginger consumption can reduce prostate inflammation and improve prostatitis symptoms by boosting the immune system and enhancing blood flow to the prostate (Li et al., 2015).

In ethnobotany, it has been observed that a medicinal plant can have different therapeutic effects in various geographical areas. These differences depend on numerous factors, such as climatic conditions, soil type, and local usage methods (Bahmani et al., 2023). For instance, medicinal plants growing in hot and dry regions may differ chemically and therapeutically from those found in cooler, more humid areas (Nazarbaghi et al., 2024). Furthermore, the methods of extraction and preparation can significantly influence their therapeutic properties (Soltanbeigi et al., 2023). Different cultures also have their unique ways of utilizing medicinal plants, leading to diversity in therapeutic effects (Ranjbari et al., 2024). These variations in therapeutic effects due to biological and environmental changes can impact the understanding and utilization of medicinal plants. Therefore, a thorough examination of environmental conditions and traditional methods of using medicinal plants in different regions can contribute to a better understanding of their therapeutic properties. Consequently, recognizing local plant flora and its specific characteristics can enhance the exploitation of natural resources and traditional treatments.

Conclusions

The use of native medicinal plants in Iran for treating prostate problems is supported not only by historical experiences and traditional medical knowledge but also by scientific research. Plants such as pumpkin seeds, spearmint, saffron, milk thistle, flaxseed, garlic, and turmeric, due to their anti-inflammatory and antioxidant properties, can contribute to improving prostate health. However, to achieve better results, it is recommended that the use of these plants be conducted under the supervision of specialists and in a scientific and precise manner.

Declarations

Conflict of interest

The authors have no competing interests to declare that are relevant to the content of this article.

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Consent for publications

Informed consent was obtained from all individual participants included in the study.

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Authors' contributions

Naser Abbasi: Conceptualization, original draft writing, investigation, writing (including reviewing and editing), and formal analysis.

Reza Asadzadeh: Conceptualization, supervision, and project administration.

Foroozesh Seydi: Conceptualization, original draft writing, investigation, writing (including reviewing and editing).

Mahmoud Bahmani: Conceptualization, supervision, and project administration.

Ethical considerations

Ethical issues (including plagiarism, misconduct, data fabrication, falsification, double publication or submission, redundancy) have been completely observed by the authors.

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