



REVIEW ARTICLE

Phytotherapy in Prostate Health: A Comprehensive Review of Key Plant-Based Antioxidants in the Treatment of Prostatitis and their Mechanisms of Action

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(Received: 10 September 2024

Accepted: 26 November 2024)

KEYWORDS

Men;
Prostate;
Benign prostate hyperplasia;
Traditional medicine;
Herbal therapy;
Iran

ABSTRACT: Prostatitis, characterized by inflammation of the prostate gland, is a common condition among men, especially those in middle age, and is associated with painful symptoms and urinary complications. While bacterial infections are the primary cause, non-infectious factors can also contribute to the disease. Treatment of prostatitis typically involves the administration of anti-inflammatory drugs, analgesics, and antibiotics, which may be associated with adverse effects. This study aims to identify medicinal plants used in traditional Iranian medicine for the treatment of prostatitis. In this review, keywords such as "medicinal plants," "prostate," "bladder infection," "traditional medicine," and "Iran" were used to search for relevant articles. The databases used for this search included Google Scholar, SID, Magiran, PubMed, and Scopus. Articles related to ethnobotany were selected for the literature review. Plants such as green tea, flaxseed, pumpkin, turmeric, pomegranate, tomato, licorice, nettle, apple, red clover, horsetail, carrot, beetroot, turnip, artichoke, cabbage, tribulus, red pepper, soybean, onion, garlic, strawberry, raspberry, and blackberry are among the most important medicinal plants effective in the treatment of benign prostatic hyperplasia. The results of this review suggest that the use of medicinal plants is a low-risk and effective approach to the treatment of prostatitis.

INTRODUCTION

In societies with inadequate health infrastructure, both chronic and acute diseases, infectious and non-infectious, can cause significant crises, leading to pain, suffering, and economic burdens on healthcare systems [1-6]. These conditions also result in long-term physical and psychological distress for patients [7-12]. The prostate, a

small gland below the bladder, plays a key role in male reproduction by producing semen and protecting sperm [13-14]. As men age, the prostate may enlarge, causing urinary issues if neglected [14]. Prostatitis, an inflammation of the prostate, affects men aged 30-50 and, though not cancerous, can cause pain and discomfort [15-17]. It is

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DOI: 10.60829/jchr.2024.

often caused by bacterial infections but can also result from stress or autoimmune diseases [17]. Symptoms include painful urination, difficulty urinating, and groin or pelvic pain [17-18]. Diagnosis is made through urine tests, clinical exams, and ultrasound [19].

Phytotherapy, the scientific use of medicinal plants, blends traditional knowledge with modern research to offer natural, less harmful treatments [20]. It plays a key role in developing new drugs [20]. While antibiotics, anti-inflammatory drugs, and analgesics are commonly used to treat prostatitis, they often have side effects [20-21]. In many regions, herbal medicines are more affordable and accessible than chemical drugs, offering a safer alternative with fewer side effects [25-32]. Traditional medicine often relies on natural remedies and lifestyle changes to manage prostatitis and prostatic hyperplasia, improving symptoms and quality of life [33]. However, patients should consult a physician before starting any treatment to ensure safety and effectiveness. This review aims to evaluate medicinal plants used in traditional Iranian medicine for prostatitis, exploring how their antioxidants reduce inflammation and support prostate health.

MATERIALS AND METHODS

In this review study, the keywords "medicinal plants", "prostate", "traditional medicine", and "Iran" were used to locate relevant articles. The databases selected for the search included Google Scholar, SID, Magiran, PubMed, and Scopus. Initially, a comprehensive search without time restrictions was conducted to identify all relevant articles.

Search Strategy

Keywords were combined in the search process and results were limited to articles written in Persian and English. Studies investigating the effects of medicinal plants on the prostate in the context of traditional Iranian medicine were selected as the primary focus for review.

Inclusion Criteria

The articles selected for this study included those that were fully published, studies that examined the effects of medicinal plants on the prostate as documented in traditional medical sources, and articles that specifically examined the effects of medicinal plants in the context of Iran.

Exclusion Criteria

Articles published only as abstracts, studies on the effects of medicinal plants conducted in other countries, and research not related to the prostate were excluded from the study.

RESULTS

In Iranian traditional medicine, medicinal plants such as green tea, flaxseed, pumpkin, turmeric, pomegranate, tomato, licorice, nettle, apple, red clover, horsetail, carrot, beetroot, turnip, artichoke, cabbage, tribulus, red pepper, soybean, onion, garlic, strawberry, raspberry, and blackberry are considered among the most important for treating benign prostate hyperplasia. Additional findings on medicinal plants effective against prostatitis are presented in Table 1.

Table 1. Medicinal plants effective against prostatitis.

Name	Persian Name	Scientific Name	Family	Active Ingredients	Plant type	Mechanism of action [34-40]
Green tea	Chaye Sabz	<i>Camellia sinensis</i>	Theaceae	Catechins, Caffeine	Perennial plant	Antioxidant and anti-inflammatory effects
Flaxseed	Katan	<i>Linum usitatissimum</i>	Linaceae	Omega-3 fatty acids Lignans,	Annual plant	Mitigate inflammation and enhance prostate health
Pumpkin	Kadoo Tanbbal	<i>Cucurbita pepo</i>	Cucurbitaceae	β -Carotene, Zinc, Omega-3 fatty acids	Annual plant	Mitigate inflammation and enhance prostate health
Turmeric	Zardchoobeh	<i>Curcuma longa</i>	Zingiberaceae	Curcumin	Perennial plant	Antioxidant and anti-inflammatory effects
Pomegranate	Anar	<i>Punica granatum</i>	Punicaceae	Antioxidants, Oligomericacids	Perennial plant	Antioxidant and anti-inflammatory effects
Tomato	Gojeh frangi	<i>Solanum lycopersicum</i>	Solanaceae	Lycopene, Vitamin C	Annual plant	Antioxidant effects and protection of prostate cells
Licorice	Shirin baysn	<i>Glycyrrhiza glabra</i>	Fabaceae	Glycyrrhizin, Flavonoids	Perennial plant	Anti-inflammatory effects
Nettle	Gazaneh	<i>Urtica dioica</i>	Urticaceae	Flavonoids, Vitamins	Perennial plant	Reducing inflammation and improving prostatitis symptoms
Apple	Sib	<i>Malus domestica</i>	Rosaceae	Fiber, Vitamin C	Perennial plant	Antioxidant effects
Red clover	Shabdareh ghermez	<i>Trifolium pratense</i>	Fabaceae	Isoflavones	Perennial plant	Hormonal effects and reduction of inflammation
Horsetail	Dome asb	<i>Equisetum arvense</i>	Equisetaceae	Silicone, Flavonoids	Perennial plant	Anti-inflammatory effects
Carrot	Havij	<i>Daucus carota</i>	Apiaceae	β -Carotene	Annual plant	Antioxidant effects and protection of prostate cells
Beetroot	Choghondar	<i>Beta vulgaris</i>	Amaranthaceae	Nitrite, Antioxidants	Biennial plant	Antioxidant and anti-inflammatory effects
Turnip	Shslgham	<i>Brassica rapa</i>	Brassicaceae	Vitamin C, Fiber	Biennial plant	Anti-inflammatory effects
Artichoke	Kangar farangi	<i>Cynara scolymus</i>	Asteraceae	Synarin, Vitamins	Perennial plant	Antioxidant and anti-inflammatory effects
Cabbage	Kalam	<i>Brassica oleracea</i>	Brassicaceae	Vitamin K, Vitamin C	Biennial plant	Antioxidant and anti-inflammatory effects
Tribulus	Kharkhasak	<i>Tribulus terrestris</i>	Zygophyllaceae	Plant steroids	Annual plant	Increasing testosterone levels and improving prostate function
Red pepper	Felfele ghermez	<i>Capsicum annuum</i>	Solanaceae	Capsaicin	Annual plant	Reduction of inflammation
Soybean	Soya	<i>Glycine max</i>	Fabaceae	Isoflavones	Annual plant	Hormonal effects and prostate health improvement
Onion	Piaz	<i>Allium cepa</i>	Alliaceae	Allicin, Flavonoids	Annual plant	Antioxidant effects
Garlic	Sir	<i>Allium sativum</i>	Alliaceae	Cillin · Allicin	Perennial plant	Antioxidant and anti-inflammatory effects
Strawberry	Toot farangi	<i>Fragaria ananassa</i>	Rosaceae	Antioxidants, Vitamin C	Perennial plant	Antioxidant effects
Raspberry	Tameshk	<i>Rubus idaeus</i>	Rosaceae	Antioxidants, Vitamin C	Perennial plant	Antioxidant effects
Blackberry	Toot siah	<i>Rubus fruticosus</i>	Rosaceae	Antioxidants, Vitamin C	Perennial plant	Antioxidant effects and protection of prostate cells

The Rosaceae family contains the highest proportion of anti-prostate medicinal plants with 23.5%. The inclusion of four plants from this family underscores its importance in pharmaceutical sciences and medical applications. Notable examples, such as strawberries and raspberries, exhibit antioxidant and anti-inflammatory properties. The Fabaceae family, represented by three plants, is known for its nutritional and medicinal value, contributing to improved nutritional status and disease treatment. Families such as Theaceae, Zingiberaceae, and Equisetaceae, each represented by a single plant, may have fewer resources compared to other families. This does not diminish their importance, however, as each plant may have unique properties. Many of the plants listed exhibit anti-inflammatory and antioxidant effects, highlighting the critical role of herbs in managing inflammation and oxidative damage, thereby improving prostate health and reducing the risk of chronic disease. Several herbs, including flaxseed, pumpkin, and red clover, are particularly effective in reducing inflammation and promoting prostate health. The table includes a variety of perennial, annual, and biennial plants, demonstrating that plants with different growing seasons can have similar beneficial effects on different areas of health, particularly the prostate.

DISCUSSION

Prostatitis is a common inflammatory condition in men that can result from both infectious and non-infectious causes. It causes pain, swelling, and urinary problems, and significantly reduces the quality of life of those affected [41]. Standard treatments include non-steroidal anti-inflammatory drugs (NSAIDs), antibiotics, and other specialized medications. In recent years, however, there has been growing interest in the use of medicinal plants and natural antioxidants as low-risk and effective alternatives for treating prostatitis [42].

Given the numerous side effects associated with conventional prostatitis medications, many individuals now prefer natural and herbal products [43]. The therapeutic benefits of various medicinal plants have been validated in

numerous diseases and cancers [43]. A key strategy in the prevention and treatment of prostatitis is to reduce inflammation and oxidative stress, which can damage prostate tissue. Plant antioxidants, known for their anti-inflammatory properties and ability to neutralize free radicals, play a critical role in mitigating this damage. By reducing inflammation and preventing cellular destruction, these compounds help maintain prostate tissue health and alleviate disease symptoms, thereby positively influencing the treatment process [44].

Plant antioxidants use several mechanisms to reduce inflammation and oxidative stress in prostatitis [45-47]. These compounds inhibit inflammatory pathways such as NF- κ B and COX-2 and reduce the production of inflammatory cytokines [48]. They prevent oxidative damage by neutralizing free radicals and reducing reactive oxygen species (ROS) [49]. They also help control chronic inflammation and infection by boosting the immune system [50]. Some, such as phytoestrogens, benefit prostate health by regulating sex hormones [51, 52]. The active compounds in plants are responsible for their medicinal effects. These compounds, such as alkaloids, flavonoids, and polyphenols, work through various mechanisms to influence the body's systems. Identifying and using these substances in both traditional and modern medicine helps in providing natural and less harmful treatments for diseases [53-56].

CONCLUSIONS

Phytotherapy using herbal antioxidants is an effective and low-risk strategy for controlling and preventing prostatitis. These compounds contribute to prostate health by reducing inflammation and oxidative stress, enhancing immune system function, and regulating hormonal pathways.

ACKNOWLEDGEMENTS

The authors would like to express their gratitude to the clinical research development unit of Imam Khomeini Hospital, Urmia University of Medical Sciences, and Isfahan University of Medical Sciences for English editing and their helping with data collection.

ETHICAL CONSIDERATION

This study was performed in line with the principles of the Declaration of Helsinki.

Conflict of interests

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

Funding support

The authors did not receive support from any organization for the submitted work

Consent to participate

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

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