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A Review of the Most Important Medicinal Plants Affecting Male Infertility Based on the Teachings of Iranian Traditional Medicine

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A B S T R A C T

Objective: Male infertility is a significant global health concern influenced by various factors, including genetic disorders, environmental exposures, and lifestyle choices. Iranian traditional medicine, with its rich heritage, offers natural remedies particularly medicinal plants to address male infertility. Many of these plants are believed to enhance sperm quality, regulate hormones, and strengthen the male reproductive system. This review aims to examine key medicinal plants recommended in Iranian traditional medicine for treating male infertility.

Methodology: This narrative review was conducted by consulting primary texts and credible sources in Iranian traditional medicine to identify medicinal plants traditionally used for male infertility.

Results: The findings reveal a range of plants considered effective in traditional treatments of male infertility. These include *Tribulus terrestris* L., *Zingiber officinale* Roscoe, *Juglans regia* L., *Prunus dulcis* (Mill.) D.A.Webb, *Vitis vinifera* L., *Trigonella foenum-graecum* L., *Petroselinum crispum* (Mill.) Fuss, *Allium sativum* L., *Matricaria chamomilla* L., *Crocus sativus* L., *Portulaca oleracea* L., *Origanum majorana* L., *Daucus carota* L., *Rubus idaeus* L., *Prunus avium* L., *Trifolium pratense* L., *Vitex agnus-castus* L., *Phaseolus vulgaris* L., *Vicia faba* L., *Glycine max* (L.) Merr., *Apium graveolens* L., *Spinacia oleracea* L., *Camellia sinensis* (L.) Kuntze, *Urtica dioica* L., *Musa spp.* L., *Allium cepa* L.. Each plant is noted for its potential role in improving reproductive health through various mechanisms.

Conclusion: Medicinal plants in Iranian traditional medicine hold promise as complementary therapies alongside modern medical treatments for male infertility. However, further scientific research is essential to confirm their efficacy, safety, and to develop standardized therapeutic protocols.

Keywords: Male infertility, Medicinal plants, Iranian traditional medicine, Herbal therapy, Infertility treatment

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Introduction

Infertility affects 60 to 80 million couples worldwide, and this number is increasing [1]. Male infertility is a common clinical problem with multifactorial origins, affecting approximately 15% of couples worldwide and contributing significantly to overall infertility rates [2]. Male infertility can be caused by genetic abnormalities and medical conditions, but modifiable environmental and lifestyle factors also play a substantial role [3]. This condition stems from a variety of physiological, anatomical, and hormonal disturbances that can reduce the chances of successful conception [4]. Beyond its physical implications, male infertility also exerts considerable psychological stress on couples, often leading to anxiety, depression, and a decline in quality of life issues that warrant psychiatric attention and supportive care [5]. Despite the development of universally accepted criteria for the diagnosis of infertility, the optimal infertility treatment contains a lot of controversial subjects [6].

Clinically, male infertility may present with symptoms such as ejaculatory disorders, reduced semen volume, testicular pain or swelling, and varicocele. These signs are critical for a comprehensive diagnostic assessment [7]. The evaluation of male infertility typically involves a thorough physical examination and semen analysis, focusing on parameters such as sperm count, motility, morphology, and overall quality. Additional diagnostic tools such as leukocytospermia testing, azoospermia staining, and fructose level measurements—are often employed to enhance diagnostic accuracy.

Common etiologies of male infertility include reduced production of healthy sperm, impairments in sperm transport or function, and underlying factors such as chronic illnesses, infections, hormonal imbalances, genetic disorders, or environmental exposures [8]. Hormonal deficiencies, obstruction of the reproductive tract, or abnormal spermatogenesis may present with symptoms such as reduced libido, erectile dysfunction, or testicular pain. Unhealthy lifestyle habits and environmental toxins further contribute to male reproductive dysfunction [9].

The pathophysiology of male infertility involves disruptions in one or more stages of sperm production, maturation, transport, or function. This complex process is governed by the hypothalamic-pituitary-gonadal (HPG) axis, which regulates the release of gonadotropin-releasing hormone (GnRH), luteinizing hormone (LH), and follicle-stimulating hormone (FSH). These hormones stimulate testosterone production and support spermatogenesis in the testes [9]. Any disruption in this axis—such as hormone deficiency, tissue resistance, or dysfunction of Sertoli or Leydig cells—can lead to impaired sperm production [10]. Obstructions in the epididymis, vas deferens, or ejaculatory ducts, as well as oxidative stress from free radicals, chronic infections, and genetic abnormalities like Klinefelter syndrome, can also damage sperm structure and function, ultimately reducing sperm count, motility, or quality [7–10].

Treatment options for male infertility include surgical, pharmacological, hormonal, and assisted reproductive technologies (ART), each tailored to the underlying cause to enhance conception potential [11]. Although pharmacological agents such as clomiphene citrate, gonadotropins, anti-estrogens, and testosterone-stimulating drugs can improve reproductive function, they are often associated with adverse effects, including mood disturbances, hormonal fluctuations, gynecomastia, hepatic dysfunction, reduced libido, increased thrombotic risk, and headaches [12]. Prolonged use may even suppress the HPG axis, disrupting natural spermatogenesis [13,14].

Traditional medicine, particularly Iranian traditional medicine (ITM), introduces complementary strategies such as herbal remedies, lifestyle adjustments, and dietary modifications for managing male infertility. These approaches aim to enhance sperm quality and restore hormonal balance and are most effective when integrated with conventional medical treatments under professional supervision [15]. Medicinal plants are especially valued for their natural origin and relatively low side-effect profile, making them attractive as adjunct therapies [16]. Plants such as Tribulus terrestris, Withania somnifera (Ashwagandha), Panax ginseng, Lepidium meyenii (Maca), and Ginkgo biloba contain antioxidant and hormone-modulating compounds that can improve sperm count, motility, quality, and libido. However, their use should be guided by medical consultation to prevent adverse interactions or complications [16]. Given the growing interest in alternative approaches, this review aims to explore the most effective medicinal plants used in Iranian traditional medicine for treating male infertility

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Methodology

This study was conducted as a narrative review aimed at identifying medicinal plants effective in treating male infertility within the framework of Traditional Persian Medicine (TPM). Initially, authoritative classical sources in TPM, including canonical texts on traditional medicine and medicinal herbs, as well as other historical manuscripts, were thoroughly examined. Additionally, an electronic search was carried out across online academic databases using both Persian and English keywords such as "male infertility," "herbal medicine," "Traditional Persian Medicine," and "sperm quality improvement."

Inclusion criteria encompassed scholarly articles, books, and treatises that addressed the treatment of male infertility using medicinal plants explicitly within the context of TPM. Only those sources that clearly identified the scientific name of the plant, its mechanism of action, and the specific plant part employed were considered eligible for inclusion.

Exclusion criteria applied to materials that focused solely on modern medicine or lacked precise information regarding male infertility and the role of medicinal plants in TPM.

Ultimately, the selected plants were analysed and categorised based on the frequency of their mention in traditional sources, their described function in strengthening the reproductive faculties, and their reputed effects in enhancing sperm quality and sexual vitality.

Results

An examination of classical sources in Traditional Persian Medicine (TPM) revealed a consistent reference to a range of medicinal plants frequently cited for their potential benefits in treating male infertility. Based on the frequency of citation in traditional texts and a qualitative content analysis of the relevant manuscripts, the following plants emerged as the most prominent remedies recommended for male infertility:

Tribulus terrestris L., Zingiber officinale Roscoe, Juglans regia L., Prunus dulcis (Mill.) D.A.Webb, Vitis vinifera L., Trigonella foenum-graecum L., Petroselinum crispum (Mill.) Fuss, Allium sativum L., Matricaria chamomilla L., Crocus sativus L., Portulaca oleracea L., Origanum majorana L., Daucus carota L., Rubus idaeus L., Prunus avium L., Trifolium pratense L., Vitex agnus-castus L., Phaseolus vulgaris L., Vicia faba L., Glycine max (L.) Merr., Apium graveolens L., Spinacia oleracea L., Camellia sinensis (L.) Kuntze, Urtica dioica L., Musa spp. L., Allium cepa L..

Further therapeutic details related to the usage, preparation, and traditional applications of these plants are summarised in Table 1 [18–37].

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Table 1: Medicinal plants effective in male infertility according to the teachings of Traditional Persian Medicine

Persian Name	Common English Name	Scientific Name	Family	Plant Part Used	Traditional Usage	Proposed Mechanism of Action
Kharkhasak	Tribulus	*Tribulus terrestris* L.	Zygophyllaceae	Fruit, leaves	Decoction or extract	Increases testosterone, improves sperm quality
Zanjabil	Ginger	*Zingiber officinale* Roscoe	Zingiberaceae	Rhizome	Decoction or powder	Anti-inflammatory, increases blood flow to testes
Gerdoo	Walnut	*Juglans regia* L.	Juglandaceae	Seed	Oral consumption	Rich in antioxidants, sperm enhancer
Badam	Almond	*Prunus dulcis* (Mill.) D.A.Webb	Rosaceae	Seed	Oral consumption	Source of vitamin E, protects sperm
Angoor	Grape	*Vitis vinifera* L.	Vitaceae	Fruit	Fresh or decoction	Potent antioxidant, improves reproductive cell health
Shanbalileh	Fenugreek	*Trigonella foenum-graecum* L.	Fabaceae	Seed	Decoction or powder	Elevates sex hormone levels
Jafari	Parsley	*Petroselinum crispum* (Mill.) Fuss	Apiaceae	Leaves, stem	Decoction or fresh	Anti-inflammatory, hormone regulation
Sir	Garlic	*Allium sativum* L.	Amaryllidaceae	Clove	Raw or cooked consumption	Strong antioxidant, improves circulation
Baboneh	Chamomile	*Matricaria chamomilla* L.	Asteraceae	Flower	Decoction	Stress reduction, anti-inflammatory
Zafaran	Saffron	*Crocus sativus* L.	Iridaceae	Stigma	Decoction or food additive	Increases libido, improves sperm quality
Shahtareh	Purslane	*Portulaca oleracea* L.	Portulacaceae	Leaves, stem	Fresh consumption or decoction	Antioxidant, enhances sperm quality
Marzanjosh	Marjoram	*Origanum majorana* L.	Lamiaceae	Leaves, flowers	Decoction or extract	Anti-inflammatory, supports reproductive system health
Havij	Carrot	*Daucus carota* L.	Apiaceae	Root	Raw or cooked consumption	Rich in vitamins, improves ovarian and testicular function
Tamshak Ghermez	Raspberry	*Rubus idaeus* L.	Rosaceae	Fruit	Fresh or decoction	Antioxidant, supports reproductive cell health
Gilas	Cherry	*Prunus avium* L.	Rosaceae	Fruit	Fresh consumption	Antioxidant, anti-inflammatory

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Shabdar	Clover	*Trifolium pratense* L.	Fabaceae	Flower	Decoction or extract	Regulates sex hormones
Panj Angosht	Chaste tree	*Vitex agnus-castus* L.	Lamiaceae	Fruit	Decoction or extract	Hormone regulation, enhances fertility
Lubia Sabz	Green bean	*Phaseolus vulgaris* L.	Fabaceae	Fruit (pod)	Cooked consumption	Source of fiber and nutrients, improves general health
Baqala	Broad bean	*Vicia faba* L.	Fabaceae	Seed	Cooked consumption	Protein and vitamin source, enhances fertility
Soy	Soybean	*Glycine max* (L.) Merr.	Fabaceae	Seed	Cooked or extract	Hormonal balancing effects, fertility enhancement
Karafs	Celery	*Apium graveolens* L.	Apiaceae	Stem, leaves	Fresh or decoction	Anti-inflammatory, improves circulation and hormones
Esfenaj	Spinach	*Spinacia oleracea* L.	Amaranthaceae	Leaves	Fresh or cooked consumption	Rich in iron and antioxidants, supports cell health
Chay Sabz	Green tea	*Camellia sinensis* (L.) Kuntze	Theaceae	Leaves	Decoction	Potent antioxidant, improves sperm health
Gazneh	Nettle	*Urtica dioica* L.	Urticaceae	Leaves	Decoction or extract	Increases energy, improves reproductive health
Moz	Banana	*Musa spp.* L.	Musaceae	Fruit	Fresh consumption	Source of potassium and vitamins, boosts energy
Piaz	Onion	*Allium cepa* L.	Amaryllidaceae	Bulb	Raw or cooked consumption	Antioxidant, increases blood flow

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Discussion

Male infertility represents a significant public health and social concern, prompting increased efforts to identify effective therapeutic approaches, including traditional medicine and the use of medicinal plants. The findings of this review highlight that Iranian traditional medicine has, over centuries, utilized a variety of medicinal herbs to enhance male reproductive function. These botanicals, employed naturally and with minimal side effects, have demonstrated the capacity to improve sperm quality, regulate hormonal balance, and strengthen sexual vitality [38].

Plants such as *Tribulus terrestris* (puncture vine), *Zingiber officinale* (ginger), and *Trigonella foenum-graecum* (fenugreek) are recurrently mentioned in Iranian traditional medical texts, all possessing antioxidant and hormone-modulating properties. Contemporary scientific research corroborates these benefits. *Tribulus terrestris*, for instance, is known to elevate testosterone levels, thereby stimulating sperm production and improving sperm motility and morphology [38-40]. Ginger, through its anti-inflammatory effects and enhancement of testicular blood flow, supports the health of germ cells [39]. Fenugreek acts on the hypothalamic-pituitary-gonadal axis, promoting hormonal equilibrium and increasing the production of healthy sperm [40]. Other botanicals, such as walnuts and almonds, serve as rich sources of antioxidants and vitamin E, which protect sperm cells from oxidative damage [41,42]. Oxidative stress remains a principal factor in sperm cell deterioration, and its mitigation plays a critical role in preserving reproductive health and enhancing fertility potential [43]. Medicinal plants containing antioxidant compounds such as saffron, garlic, and chamomile have likewise been shown to alleviate oxidative stress and contribute to improved sperm parameters [44-46].

Furthermore, herbs like *Vitex agnus-castus* (chaste tree) and *Origanum vulgare* (oregano) are traditionally employed to regulate hormones and restore endocrine balance, thereby supporting the biological processes integral to sperm production [47,48]. Anti-inflammatory plants, including parsley and *Fumaria officinalis* (fumitory), help reduce chronic inflammation of the male reproductive tract, a recognized contributor to infertility [49,50].

Nonetheless, it is essential to emphasize that the use of medicinal plants for treating male infertility requires a thorough understanding of their mechanisms of action, appropriate dosages, and potential interactions with conventional pharmaceuticals [51-53]. Despite the longstanding history of their application in traditional medicine, rigorous clinical and experimental studies remain limited, and high-quality evidence supporting their efficacy and safety is still emerging. Integrating these botanical therapies with modern medical treatments may offer a more holistic and effective approach to managing male infertility [54-57].

Conclusion

In conclusion, this review strongly advocates for further research encompassing clinical trials, pharmacological investigations, and safety evaluations of selected medicinal plants to enable their reliable and scientifically validated use as complementary treatments for male infertility. Educating patients and healthcare providers on the proper application of these herbal remedies and emphasizing the importance of consulting specialists play a pivotal role in optimizing therapeutic outcomes. These medicinal plants, rich in bioactive phytochemicals such as flavonoids, saponins, alkaloids, and antioxidants, have demonstrated the potential to enhance spermatogenesis, reduce oxidative stress, and improve the function of reproductive glands. The evidence compiled here clearly suggests that employing these botanicals as safe and effective adjunct therapies could help restore physiological balance within the male reproductive system and offer promising avenues for the management of male infertility.

Statements and Declarations

Competing interests

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

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Ethics approval

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

Consent to participate

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

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