Review Article

A Narrative Review of Herbal Remedies for Managing Hirsutism

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Abstract

Hirsutism is a condition that can have medical, social, and psychological implications, affecting 5% to 10% of women worldwide. Management options include cosmetic procedures and pharmacological interventions. However, medications used to treat hirsutism can have side effects, ranging from mild symptoms like nausea and headaches to more serious complications such as vascular clots, heart attacks, hepatotoxicity, osteoporosis, and effeminization of a male fetus. Therefore, this study aims to investigate the potential benefits of medicinal plants on hirsutism as a complementary approach, specifically whether they can be used as adjuvants to cosmetic procedures. Databases including Google Scholar, PubMed, Scopus, Embase, ISI, SID, and Mag Iran have been checked with related keywords from 2000 to 2023. Moreover, related articles were isolated. In total, ten trials were identified in the search. The results suggested that various herbs, including fennel, licorice, spearmint, saw palmetto, green tea, combination of Zingiber and neem, curcumin, and teupolioside have the potential as herbal remedies for hirsutism. However, further extensive well-designed studies involving a large sample size on the most promising herbs are necessary to determine their efficacy.

Keywords: *Herb, herbal medicine, herbal remedies, hirsutism, medicinal herb*

Introduction

Hirsutism affects 5% to 10% of women worldwide and is characterized by the appearance of facial hair in a male pattern distribution. This can result in medical, social, and psychological implications.[1] Hirsutism is usually associated with abnormal androgen action. It may be an isolated disorder or a sign of other conditions such as polycystic ovary syndrome (PCOS), androgen-secreting tumors, nonclassical adrenal hyperplasia (NCAH), or severe insulin resistance syndrome. Additionally, hirsutism can be caused by certain medications and their side effects.[2]

Various treatments for hirsutism management are suggested, including non-pharmacological and pharmacological treatments. Non-pharmacological approaches to treating hirsutism include lifestyle changes, cosmetic measures, and direct hair removal methods, such as epilation and electrolysis.[3] Although laser therapy cannot remove hair permanently, it is often preferred over other hair removal methods because of its selective hair damage, shorter treatment time, longer hair-free duration, and fewer side effects. Single laser treatment can reduce 10%–40% of hair, but repeated treatments can reduce up to 90% of hair.

These results may remain constant for up to 12 months.[4] However, laser therapy can have a financial impact on patients and may not always be cost-effective, often requiring repeated treatments.[5]

Various medications treat hirsutism by reducing androgen effects on hair follicles.

These include contraceptive pills, antiandrogen drugs, glucocorticoids, long-acting GnRH agonists, and AR blockers. However, each class of medication has its own set of potential complications, ranging from minor side effects such as nausea, headache, fatigue, and abdominal cramps to more serious conditions like vascular clots, gallbladder disease, heart attack, liver cancer, and osteoporosis.[6,7] Recent studies have shown that the effectiveness of pharmacological suppression of hirsutism at six months can vary depending on the type of drug used, with rates ranging from 19% to 41%.[8]

In recent years, herbal medicines have gained renewed interest due to the side effects of chemical drugs, lack of curative

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effect of modern treatment on some diseases, and microbial resistance. There has been particular interest in plants with anti-androgenic properties as an alternative treatment for hirsutism. Some studies have shown that plant-derived alternatives with antiandrogen effects could be used to treat hirsutism. Therefore, there is a need for more effective and diverse medications to treat androgen-related disorders such as hirsutism.[9,10]

Despite extensive research on hirsutism, there is currently no review article available on the effectiveness of herbal remedies in treating this condition through clinical trials. Thus, the purpose of this review is to examine the results of relevant clinical trials that evaluate the efficacy of herbs in treating hirsutism, with the objective of providing insight into whether these remedies can be used as an adjuvant to cosmetic procedures while also exploring their potential mechanisms for future studies.

Methods

This study is a narrative review that focuses on clinical trials investigating the effects of medicinal herbs on hirsutism.

Primarily, the keywords "herb," "herbal medicine," "herbal remedies," and" medicinal herb" combined with "hirsutism" were searched in Google Scholar, PubMed, Scopus, Web of Science, SID, Mag Iran, and Embase from January 2000 to 4 June 2023.

This review includes clinical trials in the form of original articles, case series, and pilot studies that evaluated the efficacy of herbal medicine on both idiopathic and non-idiopathic hirsutism and androgen hormones. Only English papers with available full text were included, and no limitations were applied based on age or ethnicity. Additionally, both single plant extracts and herbal compounds were considered. Studies with insufficient data, non-available full text, studies that focus solely on animal models or *in vitro* experiments, and studies that do not evaluate the efficacy of herbal medicine on hirsutism were excluded.

Based on the search strategy and entry criteria, we identified ten clinical trials.

Table 1 summarizes the information about these clinical trials.

Hirsutism is an endocrinological disorder that can have significant psychological effects and reduce the quality of life. Because of the side effects of medicines used to treat hirsutism, it seems that herbs alone or combined with cosmetic procedures may create a new vision for treating hirsutism. In this review, the effect of the following herbs in the treatment of hirsutism has been investigated.

Fennel

Foeniculum vulgare, commonly known as fennel, is a widely-used herb traditionally used for various gynecological conditions. These conditions include dysmenorrhea, increasing milk secretion in breastfeeding women, managing menopause-related symptoms, and improving libido.[10,21] Major components of this plant are flavonoids, volatile compounds, phenolic compounds, and a variety of fatty acids and amino acids. Due to the similarity of these fatty acids to estrogen-like components, it is assumed that they could have a role in treating hirsutism and other androgenic disorders.[11,22]

One study examined the effects of 1% and 2% fennel topical gel on mild to moderate idiopathic hirsutism. After assessing hair growth speed and thickness based on patient satisfaction and hair thickness measurements, it was found that patients who used 1% fennel topical gel experienced a 7.8% reduction in hair thickness. In contrast, those who used 2% fennel topical gel significantly affected hair growth speed and had an 18.3% reduction in hair thickness. No adverse effects were reported during the study.[11]

In another study, women with mild to moderate idiopathic hirsutism were treated with 3% fennel topical gel and a placebo. After the intervention, by assessing hair diameter, patients who received 3% fennel topical gel had an obvious reduction in hair thickness (22.7%).

Despite an increase in the active component of fennel extract in this study, there is no significant difference between the previously mentioned 2% and 3% fennel topical gel. Furthermore, in contrast to 2% fennel topical gel, 27% of patients who received 3% had experienced some side effects, including irritation and itching.[12] These side effects could be explained by either a different formulation of topical gel or an increase in the active components of fennel extract in a topical gel.

Previous studies mentioned that a possible explanation for this anti-androgenic effect of fennel is due to anethole, dianethole, and its polymers in the fennel extract. These compounds are similar to diethylstilbestrol and have estrogenic effects on the body. In addition, estrogens have an inhibitory effect on the synthesis of dihydrotestosterone (DHT) in dermal papilla, resulting in reduced testosterone and an increase in the production of weaker androgens.[23]

Licorice

Glycyrrhiza glabra, or licorice, is an old remedy for different medical conditions. Also, licorice has been used in various healthy products, such as laxatives, throat pearls, cough syrups, and to treat gastric ulcers.[24] Its main components (glycyrrhizic acid hydrolyzed in d-glycyrrhetinic acid and 18 β glucuronic acids) have anti-androgenic and estrogen-like effects and could regulate ovulation. Consequently, based on a few studies, licorice could be considered an adjuvant therapy for hirsutism and PCOS.[14,25] One clinical trial investigated the licorice root effect on testosterone levels in healthy

Table 1: Clinical Trials Evaluating the Efficacy of Herbal Medicine in Managing Hirsutism

General info	Plant name	Dosage	Duration of intervention	Dosage form	Method	Assessment	Outcomes
Javidnia *et al*. (2003) Iran[11]	*Foeniculum vulgar seed*	1% & 2% fennel extract	12 week 2/day in face	Topical cream	DB-CT/38 women, 16–53Y	Hair diameter (micrometer with 0.1 micrometer sensitivity) and rate of growth (subjective)	↓Hair diameter and rate of growth in 2% fennel cream group >1% fennel cream
Akha *et al*. (2014) Iran[12]	*Foeniculum vulgar seed*	3% fennel	24 week	Topical gel	DB-CT/44 women, 15–45 Y	Hair diameter (micrometer with 0.1 micrometer sensitivity)	↓Hair diameter in 3% fennel cream
Armanini *et al*. (2004) Iran[13]	*Glycyrrhiza glabra*	3.5 g of a commercial preparation of licorice	Daily in two luteal phase	Oral	Before–after 9 healthy, 22–26 Y	Lab test	↓Serum testosterone after second month > first month
Faghihi *et al*. (2014) Iran[14]	*Glycyrrhiza glabra*	15% licorice gel +755 nm alexandrite hair removal laser	24 week 2/day in one side of face+5 laser session	Topical	DB-CT/90 women 15–45 years old	hair density (manual magnification)	↓Hair density
Akdoğan *et al*.(2007) Turkey[15]	*Mentha spicata*	a cup of 250 mL tea steeped with %20 g/dl M. Spicata	5 days 2/day in follicular phase	Oral	Before–after study/21 women 18–40 years (idiopathic hirsutism and hirsutism in PCOS)	Lab test	↓Free testosterone ↑LH, FSH, Estradiol, and TG. No significant changes in TT and DHEA-S
Grant *et al*. (2008) United Kingdom[16]	*Mentha spicata*	Cups of tea (dried tea leaves)	30 days 2/day	Oral teabag	DB-CT 42 PCOS, 19–42 Y	FG questionnaire DQLI questionnaire Lab test	↓Hair density with DQLI No significant changes in FG score↓Total testosterone and free testosterone
Yosefi *et al*. (2009) Iran[17]	Serenoa repens	Saw palmetto (Nela Depil®) extract	3/day for 2 consecutive weeks in a month for three consecutive months	Topical Cream	Before–after 31 women, 20–45 Y (idiopathic facial hirsutism	number of excess hairs number of required hair removal methods	↓Number of excess hairs No change in the number of required hair removal methods
Anjum *et al*. (2018) India[18]	*Azadirachta indica* and *Zingiber officinale*	24gr *Azadirachta indica* +4 gr *Zingiber officinale*	3 consecutive cycles 21 days from 5th day of the cycle	Oral decoction	SB-CT 40 PCOS,14–40 Y	FG questionnaire Lab test	↓FBS & free testosterone & FG score similarly in both group↓Free insulin and lipid profile in test group
Moore (2023) USA[19]	spearmint & green tea	50mg cap green tea plus 50mg cap spearmint	Once daily for three months	oral	DB-CT 8 PCOS 25–42 Y	FG questionnaire	↓25-50% FG score
Malvasi *et al*. (2022) Italy[20]	Curcumin and teupolioside	galenical preparation mixture containing curcumin and teupolioside	12 weeks	oral	pilot study/6 women 18–37 years (hirsutism in PCOS)	FG questionnaire	↓FG score

g/dl=Grams per deciliter. Y: Years old. DB=Double blind, SB : Single blind, CT : Controlled trial. PCOS=Polycystic ovary syndrome, LH: Luteinizing hormone, FSH : Follicle-stimulating hormone, TG=Triglyceride, TT=Total testosterone, DHEA-S=Dehydroepiandrosterone sulfate, FG=Ferriman–Gallwey, DQLI=Dermatology Quality of Life Index, FBS=Fasting blood sugar, TG=Triglyceride

women. Women consumed a commercial preparation of licorice for two cycles. After one month, total testosterone was reduced from 27.8 to 19 ng, while after the second month reached to 17.5 ng.[13] In another study, women with mild to moderate idiopathic hirsutism were treated by laser and 15% licorice topical gel versus laser and

placebo. This study showed that participants who used 15% licorice topical gel as adjuvant therapy, regardless of skin phototype, had experienced a nearly 40% reduction of terminal hair density. During this study, no adverse effects from the 15% licorice topical gel were reported.[14]

The effect of licorice on hirsutism can be explained by different mechanisms. Licorice can reduce androgen levels by blocking 17-hydroxysteroid dehydrogenase (17HSD) and 17, 20-lyase. Furthermore, licorice by affecting 5α- and 5β-reductase and aromatase activity, have a direct effect on estrogen and androgen metabolism. Also, glycyrrhizin and some licorice metabolites, such as glabridin and glabrate, have estrogenic effects by stimulating estrogen receptors.[25,26] In addition, few studies mentioned that glycyrrhizic acid and glycyrrhizin have an inhibitory effect on routes of melatonin production by blocking tyrosinase activity, and this phenomenon results in the reduction of unwanted hairs.[25]

Since the methods used to conduct them were different in the two above studies, they cannot be directly compared. However, it may be beneficial to design a study that combines both methods and evaluates licorice's effect on hirsutism through lab tests and clinical manifestations.

Spearmint

Mentha spicata Labiatae known as spearmint is a herbal plant commonly found in Asia, Africa, and Australia. Few studies mentioned that spearmint directly affects androgen synthesis and metabolism and, consequently, could be effective in treating hirsutism and PCOS.[27]

In one study, the effect of spearmint herbal tea was investigated on hirsutism women. All patients received spearmint tea twice daily for 5 days. After treatment, free testosterone decreased by about 30%, and a significant increase in LH, FSH, and estradiol (E2) was observed. However, no significant changes in dehydroepiandrostenedione sulfate (DHEA-S) and total testosterone were reported.[15] In this study, it appears that the effects of spearmint tea on hair density and growth speed could not be evaluated due to the short duration of the study.

In another study, women with PCOS in two separate groups received spearmint herbal tea and chamomile tea (with no known effect on the endocrine system) for one month.

Similar to the previous study, this trial showed a significant reduction of free testosterone (24%) and total testosterone (29%) in spearmint tea patients. Also, based on the subjective DQLI questionnaire, patients stated a remarkable reduction in hair density.

However, based on the objective Ferriman–Gallwey questionnaire, no remarkable differences in hair density between both groups were reported.[16] These two studies reported no adverse effect of spearmint tea on the participants.[21,22]

As the duration of spearmint consumption increased compared to the first study, a decrease in hair density was observed. If the study had been longer, we might have also seen a decrease in the FG (Ferriman–Gallwey) score.

The effect of spearmint on hair growth and density is possibly due to its ability to increase the metabolism rate of androgens by inducing cytochrome P450 (CYP) 3A4.5. This can affect the concentration of sex hormones in the body, leading to a reduction in free testosterone but an increase in estrogen. Higher levels of estrogen can also result in higher levels of sex hormone binding globulin (SHBG), which carries the most amount of testosterone in the blood in the inactive form. Consequently, normal levels of total testosterone in participants who received spearmint tea could be justified by this increase in SHBG levels.[15]

Saw palmetto

Serenoa repens as saw palmetto (SP) is a medicinal herb native to the subtropical southeastern United States. SP has been utilized as an alternative treatment for benign prostatic hyperplasia (BPH). In numerous studies, SP is safe and effective in mild to moderate BPH compared to finasteride, tamsulosin, and placebo. However, in a recent meta-analysis, it was strongly recommended for the nocturia symptoms. Its components are fatty acids (70–95%), phytosterols (PS) such as β-sitosterol (0.1%), β-carotene, vitamin E derivatives, and polysaccharides.[28,29]

In a trial, women suffering from idiopathic facial hirsutism of the chin area used the SP extract twice daily as a topical cream for two months. The number of excess hairs revealing a 16% decrease after one month and a 29% decline after two months of treatment. Hair loss at the end of the second month compared to the end of the first month was 15%, which was statistically significant. The length of time for taking the drug appeared to impact decreasing hirsutism. The difference in the number of required hair removal methods was not statistically significant after the first and the second months of treatment. Only one patient reported contact dermatitis after using this cream.[17]

SP has an anti-androgenic effect. In various studies, its mechanism has been described as 5α-reductase inhibition. This plant non-selectively inhibited both types I and II isoenzymes of 5α-reductase compared to finasteride, which inhibits only the type II isoform.[17]

Zingiber and Neem

Zingiber officinale, with the common name of Zingiber, is native to Asia and popular as a spice in food. Ginger has many properties, including, anticoagulant, antiemetic, anti-inflammatory, and antioxidant effects.[30] *Azadirachta indica,* with the common name of neem, can be effective in treating dermatitis, eczema, acne, bacterial, fungal infections, and other skin disorders.[31]

One study clinically evaluated the efficacy and safety of mixed neem and Zingiber in hirsutism associated with PCOS. In this study, hirsutism patients secondary to PCOS in the test group were administered a decoction of neem and Zanjabeel orally from the 5th day of the cycle for 21 days for three consecutive cycles. In the control group, the standard drug-tablet cyproterone acetate 2 mg and ethinyl estradiol 0.035 mg daily once were given for the same duration. In statistical analysis, there was a decrease in modified Ferriman–Gallwey score (mFGS) in both groups, but the difference was not significant. Free testosterone serum levels in both groups significantly decreased but in the test group reduction was more. Fasting insulin in the test group significantly decreased.[18]

The brief duration of the intervention may have been the reason behind the results. Even though there was a decrease in the mFGS score in the ginger group, the difference with the control group was not significant. It is recommended to conduct a study that compares with a placebo group.

Azadirachtin-A, one of the neem components, has antiandrogen activity, so it causes a significant reduction in free testosterone in the test group. Also, neem and Zingiber have hypolipidemic effects related to the isoprenoid ingredient. On the other hand, test drugs have hypoglycaemic, insulin-sensitizing, and phytoestrogenic effects and cause a reduction of body weight, all of which help PCOS treatment.[18]

Green tea

Today, *camellia sinensis,* commonly called green tea, treats many skin diseases, including rosacea, acne, atopic dermatitis, keloids, and hair disorders, and promotes wound healing.[32] In one double-blind clinical trial women with moderate to severe hirsutism due to PCOS in the test group received one 50 mg capsule of dried spearmint leaves plus one 50 mg capsule of dried green tea leaves, once daily for three months. After three months, a 25–50% reduction in hirsutism was observed compared to the placebo group.[19]

Grant's study showed no significant changes in FG scores despite decreased DQLI by prescribing spearmint tea for a month.[16] The longer duration or a different formula used in the study (green tea plus spearmint tea) may have contributed to this result. Nonetheless, it is recommended that future studies consider increasing the sample size for more reliable findings.

Epigallocatechin, one of the components of green tea, inhibits 5α-reductase. According to this antiandrogen effect of green tea, it may promote BPH, acne, baldness, and hirsutism.[33,34]

Curcumin and Teupolioside

Curcumin contains polyphenols, and other bioactive components like sterols or phytosterols (PS) are considered the most bioactive molecules due to its biological and pharmacological properties, including antioxidant and anti-inflammatory features.[35]

Teupolioside, which is also referred to as Lamiuside "A," belongs to the group of phenylpropanoid glycosides and can be sourced from Ajuga reptans—a medicinal herb commonly used in Mediterranean traditional medicine for various conditions such as cardiovascular issues, skin disorders, and respiratory tract problems.[36]

A study examined a combination of curcumin and teupolioside for women with polycystic ovary syndrome (PCOS) who experienced hirsutism, acne, and other clinical manifestations associated with hyperandrogenism for 12 weeks. After the treatment period, there was a significant improvement in hirsutism scores, possibly due to the anti-androgenic effects of both curcumin and teupolioside.[20] The limited amount of study material is a constraint for this study.

Teupolioside has been shown to act primarily on the ovary cells as a 5α-reductase inhibitor, reducing DHT serum levels. In contrast, curcumin has been shown to inhibit ARs.[37]

Conclusions

The inadequate effectiveness and potential side effects of chemical treatments for hirsutism may prompt individuals to seek alternative complementary and integrative approaches. One such approach is using medical herbs, which may have fewer side effects. While the evidence supporting this is weak and inconclusive, there are indications that some herbal medicines, whether applied topically or taken orally, could be effective in treating hirsutism. To determine the efficacy of these herbs, more extensive studies on the most promising ones are necessary. These studies would produce preliminary data that could then be used to design a well-controlled randomized clinical trial with double blinding involving a large sample size.

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Conflicts of interest

There are no conflicts of interest.

Ethical Consideration

Nil

Code of Ethics

Nil.

Authors' Contributions

RGH: Idea of the Work, Preparation draft of the work, Data gathering, Final Approval, MR: Data gathering,

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