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PLANTS WITH PHYTOESTROGENIC ACTIVITY: A REVIEW

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ABSTRACT

Introduction: Phytoestrogens are plant-based natural compounds which exist in nature and which imitate the structural and physiological functions of human estrogen to control hormonal regulation. The Unani medicinal system uses four plants Asparagus racemosus Glycyrrhiza glabra Trigonella foenum-graecum and Foeniculum vulgare to treat women's health because these plants contain high amounts of phytoestrogen compounds. The plants have been used traditionally as galactagogues and menstrual regulators and uterine tonics because recent research explains their medicinal properties through scientific methods. **Methods:** This review was conducted through a comprehensive analysis of classical Unani literature and modern scientific research. Researchers collected relevant data from ethnopharmacological sources and peer-reviewed journals and experimental and clinical studies to study phytoestrogen-rich plants and their phytochemical composition and mechanisms of action and therapeutic relevance in women's health. **Result:** The results showed that the examined plants contained various phytoestrogenic compounds which included isoflavones and lignans and flavonoids and coumestans that act as selective estrogen receptor modulators. The compounds bind to estrogen receptors in the body which results in hormonal changes that help treat menstrual disorders and infertility and menopausal symptoms and metabolic disorders. Unani principles which combine with modern biomedical research demonstrate that plants which contain phytoestrogens function as effective natural alternatives to synthetic hormones. **Discussion and Conclusion:** The study results

demonstrate that Unani medicinal plants which contain phytoestrogens offer significant therapeutic benefits for the treatment of hormonal disorders.The research suffered from two main obstacles which included the unpredictable distribution of phytochemicals and the absence of common research protocols that were required for clinical testing. The research needs additional experimental work together with clinical testing to determine the safety aspects and effectiveness and proper medical application of the treatment.

KEYWORDS: Phytoestrogens, Unani medicine, women's health, medicinal plants, hormonal disorders.

INTRODUCTION

The natural plant-based substances called phytoestrogens function as non-steroidal compounds whose molecular structure matches the human estrogen hormone 17β-estradiol. The compounds show estrogen receptor binding because their molecular structure resembles both ERα and ERβ estrogen receptors which leads to hormonal interference within the body (Dixon, 2004). The substances roughly divide into three main categories which include coumestans (e.g., coumestrol), lignans (e.g., enterolactone and enterodiol), isoflavones (e.g., genistein and daidzein), and several flavonoids (e.g., glabridin and quercetin). The Fabaceae (legumes) and Poaceae (grains) and Asteraceae (herbs) plant groups all contain phytoestrogens which function as selective estrogen receptor modulators (SERMs) that can either mimic or block estrogen effects depending on tissue type and hormone levels. The research community shows interest in these compounds because their two operational pathways provide a secure option to replace standard hormone replacement therapy (HRT) which presents high-risk side effects including cardiovascular disease and endometrial disorders and breast cancer but successfully alleviates menopausal symptoms (Patisaul & Jefferson, 2010).

The research investigates phytoestrogens as potential therapeutic compounds through their binding ability to ERβ receptors which depend on their gut microbe connections that enable their transformation into active metabolites (Gupta et al., 2023; Ahmad et al., 2024). The increasing number of studies demonstrates that patients with hormone-related diseases benefit from using plant-based treatments which offer greater safety and naturalness compared to traditional medicines.

The Unani system which originated from Greco-Arabic traditions, uses phytoestrogen-rich plants to restore balance among Akhlat (humors), which includes Dam [blood], Balgham

[phlegm], Safra [yellow bile], Sauda [black bile], and to control Mizaj (temperament) through its formalized practices that Ibn Sina developed in his time. The Unani system uses its complete system of treatment to address Ehtebas-e-Haid, Zof-e-Bah, and Dusoomat by using Tadbeer which includes Muqawwi and Mudir and Musaffi methods of treatment. Unani formulations use Nigella sativa and Glycyrrhiza glabra as essential elements because these plants demonstrate sustainable harvesting practices, which connect to ancient Silk Road trade routes (Rehman et al., 2023). The application of Unani medicine gained proof through recent research which showed that Foeniculum vulgare promotes lactation while Trigonella foenum-graecum helps treat PCOS (Ahmad et al., 2024). The field encounters three main challenges, which include irregular phytoestrogen levels, insufficient clinical research, and active regulatory obstacles, yet personalized medicine offers potential solutions to these problems (Ahmad et al., 2024).

The clinical value of traditional methods extends to their important cultural and spiritual and environmental ties. The Unani system demonstrates how South Asian and Greco-Arabic medicinal traditions merged through the historical trade routes which included the Silk Road. The Ayurvedic system recognizes Saraca asoca for its medicinal properties and its role as a symbol of female reproductive power and feminine strength. The existing practices continue to play a vital role in treating women's health issues which include infertility and menopause and menstrual cycle abnormalities.

Traditional practices gain scientific validation through modern research studies. The study shows that gut bacteria are vital for transforming phytoestrogens into bioactive compounds such as equol which enhances their bioavailability and therapeutic value (Ahmad et al., 2024). Preclinical research suggests that phytoestrogens can block the development of hormone-sensitive cancers which include breast and prostate tumors while clinical studies demonstrate that Asparagus racemosus and Linum usitatissimum and Cimicifuga racemosa have menopausal symptom relief effects (Gupta et al., 2023). The substances demonstrate a potential to treat metabolic disorders such as type 2 diabetes and polycystic ovarian syndrome through their capacity to enhance insulin sensitivity and lipid metabolic functions (Ahmad et al., 2024).

The review aims to:

- Identify key phytoestrogen-rich plants used in traditional systems through their classical knowledge and modern scientific research.

- The study will evaluate their methodologies which include action mechanisms and traditional uses and potential medical applications within different healing systems.

MATERIALS AND METHODS

Study Design

The research study performed an all-encompassing narrative study which examined medicinal plants with high phytoestrogen content used in Unani medicine to assess their effects on women's health. The review aimed to combine traditional Unani knowledge with modern scientific studies which examined phytochemical properties and biological functions and medical uses of phytoestrogens.

Literature Search Strategy

The researchers conducted a structured literature search which examined both traditional Unani texts and current scientific research sources. The researchers used classical Unani texts and pharmacopoeias and traditional compendia to discover which medicinal plants existed in history as treatments for hormonal and reproductive health issues. The researchers obtained modern scientific literature through electronic databases which included PubMed and Scopus and Google Scholar and ScienceDirect and ResearchGate.

The search terms included keyword combinations which contained the terms "phytoestrogens" and "Unani medicine" and "medicinal plants" and "women's health" and "isoflavones" and "lignans" and "flavonoids" and "estrogen receptors" and "menopause" and "PCOS" and "infertility." The researchers selected articles that were written in English and met their requirements.

Inclusion and Exclusion Criteria

The study included research that demonstrated phytoestrogenic properties and described phytochemical content and traditional Unani practices and medicinal plant effects in hormonal and metabolic conditions. The researchers used experimental research and clinical trials and ethnopharmacological studies and review papers. The study results were excluded from consideration because they lacked scientific value and contained incomplete information and did not match phytoestrogenic activity research.

Data Extraction and Analysis

Researchers obtained data about plant species and their common names and their phytochemical content and their methods of action and their Unani traditional uses and their contemporary scientific validation. The researchers conducted a qualitative analysis of the collected data which they arranged into three main themes of chemical diversity and active

substance functions and medical uses. The study connected traditional Unani concepts of Mizaj (temperament), Akhlat (humors), and Quwa (faculties) with contemporary biomedical research to create a comprehensive understanding of the two fields.

Ethical Considerations

The study required no ethical approval because it used only existing published research without conducting experiments on humans or animals.

RESULTS

1. Phytoestrogens: Chemistry and Mechanisms of Action

Plants contain phytoestrogens which exist as natural polyphenolic compounds that have the ability to either mimic or control estrogen functions within the human body. The molecular structure of these compounds enables them to interact with estrogen receptors (ERα and ERβ) through their capacity to bind with the receptors, which results in either receptor activation or inhibition depending on the specific tissue, type of receptor, and hormonal state of the body (Setchell, 1998). Traditional medical practices consider phytoestrogens to be crucial elements because of their distinctive properties.

1.1 Chemical Diversity

Scientists categorize phytoestrogens into four main categories, which each display different chemical properties and medicinal benefits.

- **Isoflavones:** Plants containing isoflavones includes Trigonella foenum-graecum (Fenugreek), Pueraria tuberosa (Vidari Kanda), and Medicago sativa (Alfalfa). Isoflavones including genistein and daidzein are well-known for their strong binding affinity to estrogen receptors which makes them potent estrogenic substances (Patel et al., 2020).
- **Lignans:** The active compound found in seeds exists as Lignans which gut microorganisms convert into enterolactone and enterodiol that exhibit weak estrogenic properties (Thompson et al., 2006).
- **Coumestans:** The plant Medicago sativa (Alfalfa) contains the phytoestrogen coumestrol, which binds strongly to estrogen receptors and drives its biological functions (Patisaul & Jefferson, 2010).
- **Flavonoids:** The herbs Glycyrrhiza glabra (Licorice), Foeniculum vulgare (Fennel), Curcuma longa (Turmeric), and Commiphora wightii (Guggul) contain flavonoids which act as estrogenic substances and antioxidant agents within particular bodily organs (Simons et al., 2011; Gupta et al., 2023).

1.2 Mechanisms of Action

Phytoestrogens affect human health through a variety of biological mechanisms

- Phytoestrogens act as selective estrogen receptor modulators SERMs which enable them to bind to ERβ the receptor subtype that protects breast and uterine and prostate tissues (Setchell 1998). Research conducted recently demonstrates that this receptor preference decreases standard hormone therapy risks which include endometrial overgrowth. Puerarin from Pueraria tuberosa has been shown to enhance bone health while not inducing breast tissue growth (Ahmad et al. 2024).

- Some phytoestrogens block the function of two different enzymes which include aromatase that transforms androgens into estrogens and 5α-reductase which controls testosterone processing. This regulation improves disorders such as PCOS and benign prostatic hyperplasia (Adlercreutz 2002). Recent studies 2024 show that Vitex agnus-castus can influence prolactin and estrogen levels making it effective for regulating menstrual cycles.

- Phytoestrogens from isoflavone and lignan and flavonoid families can decrease oxidative stress by using their ability to neutralize reactive oxygen species. This effect provides special benefits for people who experience aging and hormonal diseases (Thompson et al. 2006). Turmeric contains curcuminoids which deliver powerful antioxidant and anti-inflammatory benefits that become especially useful during menopause (Gupta et al. 2023).

- The chemicals modulate genes which control inflammation and cell growth and cell death through their effects on estrogen receptors and other signaling pathways. Thymoquinone exists as a vital element of Nigella sativa because researchers found it to function as a controller of inflammation-related genes which helps handle hormonal disorders (Ahmad et al., 2024).

- The latest studies demonstrate that gut bacteria function as essential agents which transform phytoestrogens into their active biological forms. The human body converts isoflavones into equol while it transforms lignans into enterolactone both of which improve estrogenic effects based on the person's gut bacteria (Patisaul & Jefferson, 2010). The study by Ahmad et al. (2024) discovered that humans producing equol with specific

gut bacteria showed improved results from Trigonella foenum-graecum treatment for their PCOS condition.

2. Phytoestrogen-Rich Plants in Indigenous Systems of Medicine

TABLE 1: Phytoestrogens-Rich Plants in traditional systems.

S. No.	Plant Name	Vernacular Names	Phytoestrogen Content	Traditional Uses	Scientific Evidence	Therapeutic Applications
1.	*Asparagus racemosus*	*Satavar*, Shatavari	Steroidal saponins (shatavarins), isoflavones (Goyal, 2019)	*Muqawwi-e-Rahm* (uterine tonic), *Mudir-e-Shir*, balances *Balgham* and *Safra*, *Musaffi-e-Dam* (Khan et al., 2019; Rehman et al., 2023)	Increases uterine weight, binds ERs, reduces hot flashes, improves bone density; 2023 trials confirm PCOS efficacy (Bhatnagar et al., 2005; Goyal, 2019; Gupta et al., 2023)	PCOS, menopausal symptoms, osteoporosis, infertility
2.	*Pueraria tuberosa*	*Bidarikand*, Vidari Kanda	Isoflavones (puerarin, daidzein, genistein) (Patel et al., 2020)	*Muqawwi-e-Bah* (aphrodisiac), balances *Sauda* and *Balgham*, supports *Quwa-e-Tanqiya* (detoxifying faculty) (Khan et al., 2019; Ahmad et al., 2024) Galactagogue, tonic for menstrual disorders, menopause (Sharma et al., 2018)	ERβ-selective binding, reduces menopausal symptoms, improves lipid profiles; 2024 study confirms bone health benefits (Malaivijitnond, 2012; Patel et al., 2020; Ahmad et al., 2024)	Menopause,osteoporosis, hormonal imbalances, dyslipidemia
3.	*Saraca asoca*	Ashoka, Asoka	Flavonoids, lignans (Swarnalatha et al., 2015)	*Muqawwi-e-Rahm*, regulates *Dam*, reduces *Hararat* (heat) in uterus, supports *Tadbeer-e-Haid* (Khan et al., 2019) Uterine tonic for menorrhagia, dysmenorrhea, uterine fibroids (Sharma et al.,	Modulates estrogen levels, reduces uterine inflammation; 2023 data suggest endometrial health benefits (Swarnalatha et al., 2015; Gupta et al., 2023)	Menstrual irregularities, uterine disorders, menopausal symptoms

				2018)		
4.	*Withania somnifera*	*Asgandh*, Ashwagandha	Flavonoids, withanolides with mild estrogenic activity (Sharma et al., 2018)	*Muqawwi-e-A'sab*, balances *Balgham* and *Sauda*, supports *Quwa-e-Nafsaniya* (Khan et al., 2019)	Mild estrogenic effects, supports adrenal function; 2024 study links to menopausal symptom relief (Bhatnagar et al., 2005; Ahmad et al., 2024)	Menopause, stress-related hormonal imbalances, infertility
5.	*Cimicifuga racemose*	Black Cohosh	Isoflavones, triterpene glycosides (Borrelli and Ernst, 2008)	*Mudir-e-Haid*, balances *Hararat* and *Sauda*, reduces menopausal *Hararat* (Ahmad et al., 2024)	Reduces hot flashes, binds ERs; 2023 meta-analysis confirms efficacy but notes variability (Borrelli and Ernst, 2008; Gupta et al., 2023)	Menopause, menstrual disorders
6.	*Mucuna pruriens*	Velvet Bean	Flavonoids, L-dopa with mild estrogenic activity (Sharma et al., 2018)	*Muqawwi-e-Bah*, balances *Balgham* and *Sauda*, supports *Quwa-e-Tanasuliya* (Khan et al., 2019; Ahmad et al., 2024)	Limited estrogenic activity; 2024 study suggests reproductive health benefits (Ahmad et al., 2024)	Infertility, menopause, hormonal imbalances
7.	*Curcuma longa*	*Zard chob*, haldi, Turmeric	Flavonoids, curcuminoids with mild estrogenic activity (Sharma et al., 2018)	*Musaffi-e-Dam*, balances *Safra* and *Hararat*, *Muqawwi-e-Jigar* (liver tonic) (Khan et al., 2019; Rehman et al., 2023)	Mild estrogenic effects; 2023 study links to menopausal mood stabilization (Gupta et al., 2023)	Menopause, inflammatory disorders, hormonal imbalances
8.	*Terminalia chebula*	*Halela*, Haritaki	Flavonoids with mild estrogenic activity (Sharma et al., 2018)	*Muqawwi-e-Meda*, balances *Balgham* and *Sauda*, supports *Quwa-e-Hazima* (digestive faculty) (Khan et al., 2019)	Limited estrogenic activity; 2024 study suggests metabolic benefits (Ahmad et al., 2024)	Menopause, metabolic disorders, digestive health
9.	*Sesamum indicum*	Til (Sesame)	Lignans (sesamin, sesamolin) (Sharma et al., 2018)	*Muqawwi-e-Qalb*, balances *Sauda* and *Hararat*, *Musaffi-e-Dam* (Khan et al., 2019; Rehman et al., 2023)	Mild estrogenic effects; 2023 study confirms cardiovascular benefits (Gupta et al., 2023)	Menopause, cardiovascular health, skin disorders
10.	*Commipho*	*Muqil*,	Flavonoids,	*Muqawwi-e-*	Limited estrogenic	Metabolic

	ra wightii	Guggul	guggulsterones with mild estrogenic activity (Sharma et al., 2018)	*Meda*, balances *Safra* and *Dam*, reduces *Dusoomat* (dyslipidemia) (Khan et al., 2019; Ahmad et al., 2024)	activity; 2024 study suggests lipid-lowering effects (Ahmad et al., 2024)	disorders, menopause, dyslipidemia
11.	*Angelica sinensis*	Dong Quai	Flavonoids, ferulic acid with estrogenic activity (Gupta et al., 2023)	*Mudir-e-Haid*, balances *Balgham* and *Dam*, supports *Quwa-e-Tanasuliya* (Ahmad et al., 2024)	Strong estrogenic effects; 2023 study confirms menopausal symptom relief (Gupta et al., 2023)	Menopause, menstrual disorders, infertility
12.	*Trigonella foenum-graecum*	*Hulba*, Methi (Fenugreek)	Isoflavones, diosgenin (Khan et al., 2019)	*Mudir-e-Shir* (galactagogue), *Mudir-e-Haid* (menstruation promoter), *Muqawwi-e-Meda* (stomach tonic), balances *Safra* and *Dam* (Khan et al., 2019; Rehman et al., 2023)	Increases prolactin, estrogenic effects, improves bone density; 2024 trial validates PCOS benefits (Sreeja et al., 2010; Khan et al., 2019; Ahmad et al., 2024)	Lactation support, menopause, PCOS, diabetes
13.	Glycyrrhiza glabra	*Aslussoos*, *Mulethi* (Licorice)	Flavonoids (glabridin) (Simons et al., 2011)	*Muqawwi-e-A'sab* (nervine tonic), *Musaffi-e-Dam* (blood purifier), balances *Balgham* and *Safra*, supports *Quwa-e-Nafsaniya* (psychic faculty) (Khan et al., 2019; Rehman et al., 2023)	Tissue-selective estrogenic effects, reduces menopausal symptoms; 2023 study highlights anti-inflammatory synergy (Simons et al., 2011; Gupta et al., 2023)	Menopause, adrenal fatigue, inflammatory disorders
14.	*Medicago sativa*	Rijqa (Alfalfa)	Coumestans (coumestrol), isoflavones (Patisaul and Jefferson, 2010)	*Muqawwi-e-Badan*, balances *Sauda* and *Balgham*, supports *Quwa-e-Ghaziya* (nutritive faculty) (Khan et al., 2019; Rehman et al., 2023)	Strong estrogenic activity, improves lipid profiles, bone health; 2024 data suggest metabolic benefits (Patisaul and Jefferson, 2010; Ahmad et al., 2024)	Menopause, osteoporosis, malnutrition
15.	*Foeniculum vulgare*	*Badiyan*, Saunf	Flavonoids, anethole with	*Mudir-e-Shir*, *Mudir-e-Haid*,	Estrogenic effects, promotes lactation;	Lactation support,

		(Fennel	estrogenic activity (Khan et al., 2019)	balances *Balgham* and *Safra*, *Muqawwi-e-Meda* (Khan et al., 2019; Rehman et al., 2023)	2024 study confirms menopausal symptom relief (Rather et al., 2016; Ahmad et al., 2024)	menopause, menstrual disorders
16.	*Nigella sativa*	*Habb-ul-sauda*, Kalonji (Black Seed)	Flavonoids, thymoquinone with mild estrogenic activity (Khan et al., 2019)	*Muqawwi-e-Badan* (general tonic), balances *Sauda* and *Dam*, supports *Quwa-e-Mudafiat* (immune faculty) (Khan et al., 2019; Parhizkar et al., 2016)	Limited estrogenic activity; 2023 study supports reproductive health benefits (Parhizkar et al., 2016; Gupta et al., 2023)	Menopause, infertility, immune health
17.	*Vitex agnus-castus*	Chaste Tree	Flavonoids, iridoid glycosides with estrogenic activity (Khan et al., 2019)	*Mudir-e-Haid*, balances *Sauda* and *Balgham*, supports *Quwa-e-Tanasuliya* (reproductive faculty) (Khan et al., 2019; Ahmad et al., 2024)	Modulates hormonal balance; 2024 study confirms efficacy in PMS and menopause (Ahmad et al., 2024)	Menopause, menstrual disorders, infertility
18.	*Linum usitatissimum*	*Katan*, Alsi	Lignans (secoisolariciresinol diglucoside) (Thompson et al., 2006)	*Muqawwi-e-Qalb* (cardiac tonic), balances *Sauda* and *Safra*, *Musaffi-e-Dam* (Khan et al., 2019; Rehman et al., 2023)	Reduces menopausal symptoms, improves lipid profiles; 2023 trial confirms cardiovascular benefits (Gupta et al., 2023)	Menopause, cardiovascular health, breast cancer prevention

3. Therapeutic Applications of Phytoestrogens in Traditional Medicine

3.1 Relief from Menopausal Symptoms

Women encounter multiple menopausal symptoms which include hot flashes and sleep difficulties and mood disturbances and vaginal drying because their estrogen levels decrease during menopause. traditional system of medicine treats these disorders through the application of Asparagus racemosus and Pueraria tuberosa and Cimicifuga racemosa and Curcuma longa and Angelica sinensis (Sharma et al., 2018). Unani medicine uses Trigonella foenum-graecum and Glycyrrhiza glabra and Foeniculum vulgare and Vitex agnus-castus as

traditional herbs which help restore hormonal balance through the process of body harmonization (Khan et al., 2019).

Recent research (2023-2024) has promoted these traditional applications. Clinical trials have shown that Asparagus racemosus and Linum usitatissimum lead to significant reductions in hot flashes which improve postmenopausal women's overall quality of life (Gupta et al., 2023). A 2023 meta-analysis confirmed that Cimicifuga racemosa effectively treats menopausal symptoms although people may respond differently to the treatment (Borrelli & Ernst, 2008; Gupta et al., 2023). Curcuma longa has emerged as a natural treatment for mood disorders. Angelica sinensis continues to undergo academic investigation regarding its potential vaginal health benefits (Ahmad et al., 2024). The plants work together to deliver plant-based solutions which provide moderate effects that serve as substitutes for hormone replacement therapy and have reduced negative impacts.

3.2 Improving Reproductive Health

Unani and Ayurveda systems of traditional medicine dedicate their complete focus to achieving optimal reproductive health. The use of phytoestrogen herbs enables people to treat their menstrual problems including menstrual irregularities and excessive menstrual flow and postmenopausal symptoms and difficulties with conception.

The Unani medicine system uses Trigonella foenum-graecum and Foeniculum vulgare and Vitex agnus-castus for treating PCOS through lactation enhancement and hormonal balance restoration (Khan et al., 2019). The results of the 2023-2024 trials demonstrated that Trigonella and Vitex restore ovulation in PCOS patients while Foeniculum enhances lactation by increasing prolactin levels (Gupta et al., 2023; Ahmad et al., 2024). Mucuna pruriens and Angelica sinensis function as natural fertility boosters because recent research shows they enhance ovarian capacity and improve endometrial implantation potential (Ahmad et al., 2024).

Uterine tonics contain Saraca asoca which serves as their primary ingredient to treat menorrhagia and uterine fibroids. The preclinical studies confirmed that the treatment reduces uterine inflammation while it controls estrogen production (Swarnalatha et al., 2015).

3.3 Supporting Bone Health

The bone mineral density decreases after menopause because the body produces less estrogen which leads to an increased risk of osteoporosis. The plants Pueraria tuberosa Linum usitatissimum Medicago sativa and Sesamum indicum which contain high levels of

phytoestrogens have been proven to stimulate bone formation through their effects on osteoblast cells while they prevent bone loss (Patel et al. 2020; Thompson et al. 2006).

The research conducted by Ahmad et al. (2024) demonstrates that puerarin which exists in Pueraria tuberosa works through estrogen receptor-beta pathways to improve bone density, thus making it a superior treatment option than conventional osteoporosis medications. The lignans extracted from Linum usitatissimum decreased postmenopausal women's bone turnover markers while Sesamin which comes from Sesamum indicum showed potential to preserve bone health in preclinical testing (Gupta et al. 2023; Ahmad et al. 2024). The research findings confirm that these plants have traditional medicinal value for use as healing tonics.

3.4 Cardiovascular Benefits

The risk of heart disease increases as estrogen levels decrease after menopause. Traditional medicinal systems have used herbs since ancient times to create heart health treatments that include Linum usitatissimum and Glycyrrhiza glabra and Foeniculum vulgare and Sesamum indicum and Commiphora wightii.

Modern evidence supports these approaches. A clinical trial conducted in 2023 found that Linum usitatissimum lignans decreased LDL cholesterol levels and increased HDL cholesterol levels (Gupta et al 2023). Glycyrrhiza glabra contains glabridin, which helps to decrease oxidative stress and inflammation that affects blood vessels. New research suggests that when paired with other flavonoids, they have synergistic effects. According to Ahmad et al 2024 research, Commiphora wightii Guggul continues to show potential for decreasing triglyceride levels (Ahmad et al 2024). Antioxidant-rich herbs like Foeniculum vulgare and Sesamum indicum enhance heart health because traditional medicine uses them as restorative tonics (Rather et al. 2016).

3.5 Cancer Prevention Potential

Researchers are assessing plant isoflavones and lignans from Pueraria tuberosa and Linum usitatissimum and Sesamum indicum as potential defense mechanisms against breast and prostate and endometrial hormone-dependent cancers (Dixon, 2004). The drugs show high selectivity for estrogen receptor beta (ERβ) which leads to decreased cancer cell growth and increased cancer cell death.

Epidemiological research from 2023 indicates high consumption of these phytoestrogens to a lower risk of breast cancer especially among those who use Linum and Sesamum on a regular

basis (Gupta et al., 2023). The safety of phytoestrogens depends on their specific chemical properties because compounds like Medicago sativa coumestrol can start hormone-driven cancers in people who are sensitive to its effects (Patisaul and Jefferson, 2010). Current research investigates Curcuma longa because its strong anti-inflammatory and antioxidant properties may lead to new cancer prevention drug development (Ahmad et al., 2024).

3.6 Managing Metabolic Disorders

The use of phytoestrogenic plants enables treatment of metabolic diseases which include diabetes and PCOS and dyslipidemia. The plants Trigonella foenum-graecum Medicago sativa Nigella sativa Terminalia chebula and Commiphora wightii have been used in traditional medicine to enhance digestion and restore hormonal balance and boost metabolic processes (Khan et al. 2019 , Parhizkar et al. 2016).

The scientific studies validate these medicinal uses. The study from 2024 showed that Trigonella foenum-graecum decreases blood glucose and HbA1c levels in diabetic patients (Ahmad et al. 2024). The research demonstrated that Commiphora wightii and Terminalia chebula demonstrated both lipid-reducing effects and anti-inflammatory effects during animal studies. The active component of Nigella sativa known as thymoquinone demonstrates promise for enhancing insulin sensitivity in metabolic disorders which occur in PCOS (Gupta et al. 2023). The results validate the ancient method of using herbs to control metabolic processes.

3.7 Broader Health Applications

The health benefits of phytoestrogens extend beyond their main health benefits because they provide advantages for immune system operations and inflammation control and skin wellness. The anti-inflammatory effects of Curcuma longa and Glycyrrhiza glabra have been established since ancient times. The research study indicates that the substance can decrease systemic inflammation which menopausal women experience (Gupta et al., 2023).

The plants of Sesamum indicum and Withania somnifera not only enhance skin elasticity but also assist the body during stressful situations according to increasing scientific evidence which shows that these plants possess adaptogenic properties that help treat hormonal disorders (Ahmad et al., 2024). The results demonstrate that phytoestrogens can address various health problems which affect people's overall health and well-being.

DISCUSSION

Unani medicine has a long history of using herbs to improve women's health, and many of them are now known to be high in phytoestrogens. Classical authors such as Ibn Sina listed plants like Satavar, Mulethi, and Badiyan as treating irregular periods, sterility, and poor breastfeeding. The three categories of plant-based products included Mudir-e-Haiz which functions as a menstrual regulator, Mudir-e-Laban which serves as a galactagogue, and Muqawwi-e-Rahm which acts as a uterine tonic. Modern research has confirmed that these plants contain estrogen-like substances that help control hormonal function.

The Unani system distinguishes itself through its complete system of healthcare. The formulation of Majoon and Arq uses herbs to create treatments that restore the patient's Mizaj through their healing process. Mulethi functions as a tonic that supports general wellness through its properties as a herb with moderate estrogenic effects. This research confirms the ability of these herbs to produce both antioxidant and adaptogenic effects while they demonstrate their capability to regulate hormonal functions.

Recent research indicates that fennel improves lactation and menstrual cycles, fenugreek promotes milk production and metabolic health, and flaxseed’s lignans aid in cardiovascular and hormonal balance. The Unani concept of restoring equilibrium matches the way phytoestrogens function as SERMs which provide benefits during low estrogen levels and protect users during high estrogen levels.

The situation presents several obstacles. The level of phytoestrogen concentration varies depending on where and how plants are grown and prepared. The absence of large-scale clinical studies for most Unani medicines makes it impossible to recommend specific dosages. Further safety studies must be conducted to assess safety for women who have disorders that are sensitive to hormones.

The Unani tradition shows multiple connections to contemporary scientific research. The Unani system has potential to benefit women's integrative healthcare through its phytoestrogen-rich plants which can be standardized and tested through more comprehensive research.

CONCLUSION

Unani medicine has an abundance of herbal medicines that contemporary science has identified as sources of phytoestrogens. The botanical extracts Satavar, Mulethi, Hulba, and Badiyan have served traditional functions that include menstrual control and fertility enhancement and menopause relief and breastfeeding support. The current understanding of

these advantages links them to isoflavones and lignans because these substances function like natural selective estrogen receptor modulators that help the body in areas where estrogen levels are low while avoiding the dangers of synthetic hormonal products.

The Unani medical system treats people by using phytoestrogens to restore their body balance and improve their overall wellness. The herbs require clinical testing and better standardization procedures before they can become accepted medical treatments in today's healthcare system.

Unani medicine provides Unani medicine-based phytoestrogen-rich plants that create a pathway between traditional knowledge and modern scientific understanding. The combination of rigorous research and practical application of these products will result in development of safe natural solutions that respect cultural traditions for addressing women's hormonal issues and maintaining their health.

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