

The medicinal plants effective on female hormones: A review of the native medicinal plants of Iran effective on estrogen, progesterone, and prolactin

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ABSTRACT

Reproduction and female hormones is an important fertility health issue which is highly important in population planning. Given the significance of fertility and reproduction, and the side effects due to chemical drugs, the aim of this review article is to report the most important native medicinal plants of Iran effective on female hormones--estrogen, progesterone, and prolactin. The relevant articles, indexed in the databases Google Scholar, Scopus, Islamic World Science Citation Center, and Scientific Information Databases, were searched for by the key words--estrogen, progesterone, prolactin, female hormones, fertility, medicinal plants, and Iran. According to the study findings, *Aloe vera*, *Foeniculum vulgare*, *Anethum graveolens*, *Portulaca oleracea* L, *Phoenix dactylifera* and *Allium sativum* were effective on estrogen, *A. graveolens*, and *P. dactylifera*, on progesterone, and *F. vulgare*, and *Vitex agnus-castus* L. on prolactin. Out of these plants, *A. graveolens*, *F. vulgare*, and *P. dactylifera* exerted more pronounced effects on female hormones. In addition to protecting reproductive organs through antioxidant effects, the compounds of these plants can regulate female hormones through affecting the glands that secrete female hormones.

KEY WORDS: Female hormones, fertility, milk secretion, medicinal plants, Iran.

1. INTRODUCTION

Today, reproduction, fertility, and population planning are considered critical issues especially in developing countries. In this regard, it is important to identify and use drugs with few side effects that are able to regulate fertility and help to reproduce through affecting the glands that secrete female hormones (Kooti, 2014). At puberty and before pregnancy, sexual activity appears and large amounts of sex hormones, estrogen and progesterone, are produced. These hormones help to prepare uterus, vagine, and oviducts. Besides that, prolactin increases in pregnancy and causes induction of breastfeeding. Therefore, estrogen, progesterone, and prolactin contribute significantly to pregnancy and fetal growth and should be investigated closely.

Nowadays, given the side effects due to man-made drugs, plants and traditional medicine are being increasingly used and the benefits of different plants are attracting more attention day-to-day (Moradi, 2013; Darani, 2015; Baharvand-Ahmadi, 2015; Sarrafchi, 2015; Ebrahimie, 2015; Bahmani, 2015; 2016; Nasri, 2015; Parsaei, 2016; Shirani, 2011). Several studies have pointed to the therapeutic effects of the plants which are used according to traditional and modern medicine (Asadi-Samani, 2015; 2016; Moradi, 2016; Parsaei, 2016; Rouhi-Boroujeni, 2016; Jivad, 2016; Mohsenzadeh, 2016; Ahmadipour, 2016; Baradaran, 2013). In addition, some studies have investigated and occasionally confirmed the previously unknown therapeutic properties and different aspects of the efficacy of medicinal plants (Bahmani, 2012; 2015; Baharvand-Ahmadi, 2011; 2016; Delfan, 2015; Rabiei, 2013; Kooti, 2014; Shirani, 2011; Moradi, 2012; Nasri, 2013; Samarghandian, 2016; Azadpour, 2016; Madihi, 2013). Unlike modern drugs, which may cause side effects even more dangerous than the disease for which they are consumed despite having superficial attraction compared to the medications used according to traditional medicine, medicinal plants can exert beneficial effects on different organs of the body with several therapeutic effects and also cause very few side effects, if used at appropriate doses (Delfan, 2015; Bahmani, 2014; Nasri, 2013; 2015; Akhlaghi, 2011; Mardani, 2015).

Regarding the significance of fertility and reproduction in women, the side effects due to chemical drugs, and positive properties of medicinal plants, this review article is to report the native medicinal plants of Iran that are effective on sex hormones, estrogen, progesterone, and prolactin.

2. MATERIALS AND METHODS

For this study, various combinations of words "Medicinal plants", "Estrogen", "Progesterone", "Prolactin" and "Iran" and their Persian equivalents were entered into various databases including Magiran, SID, and IranMedex as well as international databases Scopus. The articles in English and Persian languages published between 1976 and Dec, 2015 were considered in this study.

3. RESULTS

The medicinal plants effective on estrogen:

***Aloe vera*:** An experimental study on female, adult Wistar rats demonstrated that in the treatment group orally administered with 50, 100, and 200 mg/kg body weight (BW) of hydroalcoholic *A. vera* extract for 10 days, estrogen concentration did not change significantly compared to the control group (Poorfarid, 2013).

***Foeniculum vulgare*:** *F. vulgare* has been used for thousands of years as an estrogenic agent. The effects of fennel fruit extract on mammary gland and oviduct has been investigated. The results have confirmed the effects of natural estrogen for this plant seed extract (Kooti, 2015).

***Anethum graveolens*:** An experimental work conducted on female rats demonstrated that estrogen serum concentration increased significantly in the groups administered with 50 and 100 mg/kg of the extract compared to control and sham groups (Heidarifar, 2015).

***Portulaca oleracea* L.:** An experimental study on female adult and virgin rats demonstrated that estrogen serum concentration increased significantly in the groups administered with 200, 400, and 800 mg/kg compared to control and sham groups (Hosseini, 2013).

***Phoenix dactylifera*:** An interventional study on female Wistar rats indicated that in the groups orally administered with 200 and 400 mg/kg BW of *P. dactylifera* powdered extract for 10 days, estrogen concentration changed significantly compared to the control group (Moshtagh, 2010).

***Allium sativum*:** An experimental study on rat model demonstrated that *A. sativum* can cause increase in estrogen concentration. In that study, 400 mg of *A. sativum* extract alone caused an increase in estrogen by 0.32 ± 0.01 .

Medicinal plants effective on progesterone

***A. graveolens*:** An experimental study on female rats indicated that progesterone serum concentration increased significantly in the groups administered with 50 and 100 mg/kg *A. graveolens* extract compared to control and sham groups (Heidarifar, 2015).

***P. dactylifera*:** An interventional study on female Wistar rats demonstrated that in the treatment groups orally administered with 200 and 400 mg/kg BW of *P. dactylifera* powdered crust extract for 10 days, progesterone concentration changed significantly compared to the control group (Moshtagh, 2010).

Medicinal plants effective on prolactin

***Vitex agnus-castus* L.:** In a study, prolactin serum concentration increased considerably after administration with 2, 10, and 70 mg/kg of *V. agnus-castus* leave extract on the day 7 of pregnancy compared to control group (Shoorideh, 2007).

***F. vulgare*:** In a study on Wistar rats, 140 and 280 mg of aqueous *F. vulgare* extract caused increase in prolactin (Siyahi, 2009).

DISCUSSION

In this review of the native medicinal plants of Iran effective on female hormones, some plants such as *F. vulgare*, *A. graveolens*, *P. oleracea* L., *P. dactylifera*, *V. agnus-castus* L. and *A. sativum* were reported to exert pronounced effects on different female hormones. Out of these plants, *A. graveolens*, and *P. dactylifera* were reported to exert positive effects on both progesterone and estrogen and cause increase in their concentrations. Besides that, *F. vulgare* has been found to cause increase in prolactin and estrogen.

A. Vera is a plant from liliopsida class, liliales order, and liliaceae genus, with over 250 species occurring worldwide. The main chemical compounds of the *A. vera* are anthraquinones (aloein, aloe amodine, and coumaric acid), polysaccharides, glycoproteins, prostaglandins, phytoestrogens such as beta-cytosterol, cholesterol, and fatty acids like campostanol (Botes, 2008; Surjushe, 2008). *A. vera* extract can increase ovarian steroidogenesis and hence estrogen because of containing phytoestrogens such as beta-sitosterol (Telefo, 2004). *V. agnus-castus* contains certain effective compounds including flavone-c-glycoside, casticin, omoorientin, orientin, isoorientin, isovitexina, isovitexin-glucoside, isovitexin-xiloside, and luteolin-7-glycoside (Russo, 1996). *P. oleracea* L. has been reported to contain p-coumaric acid (Mubashir, 2011). Certain compounds such as alliin, allicin, allyl propyl disulfide, diallyl trisulfide, s-allyl cysteine, and allyl mercaprocysteine have been identified in *A. sativum* (Sarkar, 2006; Lanzotti, 2006; Rahman, 2006). The protective effects of *P. dactylifera* have already been demonstrated on sperm parameters and sex hormones in male mice (Baharara, 2015). *P. dactylifera* palm fruits were assessed for the presence of antioxidant compounds such as anthocyanins, carotenoids, vitamins, and phenolic compounds (Amira, 2012). In some studies, the useful effects of *F. vulgare* were demonstrated on increase in milk secretion in breastfeeding. In these works, presence of some compounds, such as anatole effective in increasing milk secretion, reduces menstrual pain and facilitates birth, primary dysmenorrhea, and fertility (Kooti, 2015). Indeed, anatole is the main constituent of *F. vulgare* plant that exhibits estrogenic properties (Albert-Puleo, 1980). Moreover, *A. graveolens* is an aromatic annual grassy plant from the Umbelliferae family that originally comes from Eastern Mediterranean. The whole vegetative organ contains essence. Previous studies revealed that *A. graveolens* caused some changes in female reproductive system that induced fertility. Dill seed aqueous extract can induce fertility with no effects on oocyte

structure (Monsefi, 2015). High doses of *A. graveolens* seed aqueous and ethanolic extracts caused significant increase in duration of the estrous cycle, diestrus phase, and progesterone concentration (Monsefi, 2006). This herb consists of some monoterpenes such as carvone, limonene and trans-anethole and some flavonoids such as kaempferol and vicenin. As well, kaempferol, trans-anethole, and limonene exhibit phytoestrogenic properties. Phytoestrogens can compete with endogenous estrogen and bind to enzymes related to estradiol synthesis and metabolism (El Mansouri, 2016; Kurzer, 1997). In addition to plant-based phytoestrogens, many of these medicinal plants contain antioxidants that are able to increase female hormones and hence exert their effects in addition to protecting female reproductive system against adverse, teratogenic effects of radiation and compounds.

4. CONCLUSION

The effective compounds of introduced plants in this study may be used to produce effective medicinal plants on estrogen, progesterone, and prolactin if they are investigated further in clinical trials and their effective doses are determined.

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