



## Review Article

### RESEARCH WORK ON AYURVEDIC DRUGS USEFUL IN FEMALE INFERTILITY

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#### ABSTRACT

Infertility may be a cause for marital disharmony, psychological and physical ill- health. Management of infertility includes hormonal therapy, surgery and Assisted Reproductive Technology (ART). With the invention of new techniques of assisted reproductive technologies science has given a glimmer of hope in the field of infertility. But these methods are expensive and success rate are debatable and many times, the prolonged use of hormones disturbs the normal physiology of reproductive system. Ayurveda has several medicinal plants which has the potential to treat causes of infertility and effective in achievement of conception without any adverse effects. The medicinal plants mentioned in this review has an evidenced based evaluation in the infertility. The medicinal plants mostly used are antimicrobial, anti-inflammatory, antioxidant, wound healing and rejuvenators in action. These will restore the normal physiology of the reproductive system of women and finally, achievement of conception. In-vivo effect of certain plants in animal model has revealed increased gonadotropin secretion and regulation of the activity of the enzymes involved in ovarian steroidogenesis and stimulates serum estradiol level and proved to be successful in anovulatory infertility. The medicinal plants mentioned in Ayurvedic texts have the potential to correct the etiopathogenesis related to infertility and improves the physical, psychological and social health of an individual and thus better alternative to hormonal therapy. The main aim and objective of this study is to emphasis on pharmacogony of medicinal plants mentioned in Ayurvedic texts for infertility more scientifically and utility in modern era.

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#### INTRODUCTION

Infertility is defined as a failure to conceive within one or more years of regular unprotected coitus. Primary infertility denotes those patients who have never conceived and secondary infertility indicates previous pregnancy but failure to conceive subsequently. Within one year of having regular intercourse with adequate frequency 80% of couple achieve conception. Another 10% will achieve the objective and 10% remain infertile by the end of the second year.<sup>[1]</sup>

Conception depends on the fertility potential of both the male and female partner. The major cause in infertility is female (40-55%). For the conception to take place following factors plays

a great role: healthy and motile spermatozoa, ovulation, healthy tubes with patency, fertilization at ampulla of the tube, embryo should reach uterine cavity after 3-4 days of fertilization, the endometrium should be receptive for implantation and the corpus luteum should function adequately.<sup>[2]</sup>

Causes of female infertility are : ovarian (ovulation dysfunction)- 30-40%, tubal disease- 25-35%, uterine factors-10%, cervical factors- 5% and endometrial factors -1-10% (FIGO). Management of infertility includes hormonal therapy, surgery and Assisted Reproductive Technology (ART).

According to Ayurvedic prospective, the woman in whom there is hindrance of any kind to the normal process of conception is *Vandhya* (Shabdakalpadruma). As per Acharya Sushruta, the four essential factors for conception are: *Ritu* (fertile period), *Ksetra* (healthy reproductive organs), *Ambu* (nutrient fluid), *Beeja* (sperm or ova). Any abnormality in either of the factors will effect the process of conception.<sup>[3]</sup>

Acharya Charaka has considered *Vandhya* under abnormalities of *Bijamsa* (congenital deformities)<sup>[4]</sup> and described it in eighty types of *Vatavyadhi*. Abnormalities of *Yoni* (reproductive organ), psychology, *Sukra* (sperm), *Aartva* (ovarian hormones and ova), dietetic and mode of life, *Akala yoga* (coitus in improper time), *Bala Kshaya* (loss of strength) are the responsible factors for infertility.<sup>[5]</sup>

Medicinal plants mentioned in Ayurvedic texts are effective to enhance conception and have potential to add to existing treatment options and these drugs are devoid of any side effects. Though the several drugs in Ayurvedic texts mentioned in gynaecological disorders are useful in infertility but there are specified drugs also which helps to achieve conception.

*Prajasthapana Mahakashaya* has been mentioned by Acharya Charaka in Sutrasthana in reference to infertility which includes ten medicinal plants viz. *Endri* (*Bacopa monnieri*), *Brahmi* (*Centella asiatica*), *Shataveerya* (*Asparagus racemosus*), *Shasaraveerya* (*Cynodon dactylon*), *Amogha* (*Stereospermum suaveolens*), *Avyatha* (*Tinospora cordifolia*), *Shiva* (*Terminalia chebula*), *Arishta* (*Picrorhiza kurroa*), *Vatyapushpi* (*Sida cordifolia*), *Vishksenkanta* (*Callicarpa macrophylla*).

The medicinal plants mentioned here has been mentioned in Samhitas i.e. Charaka Samhita, Shushruta Samhita, Ashtanga Hridayam, Bhava prakash and Nighantus viz. Bhava Prakash Nighantu, Raj Nighantu, Raj Ballabh Nighantu, Madnapal Nighantu, Dhanvantari and Shodal Nighantu.

The main aim and objective of this study is to emphasis on pharmacogony of medicinal plants mentioned in Ayurvedic texts for infertility more scientifically and utility in modern era.

## Research Work on the Medicinal Plants Useful in Female Infertility Mentioned in Ayurvedic Texts

### 1. *Bacopa monnieri* (*Endri*)

Study on animal model of *B. monnieri* has shown following actions:

- Protective effect on DNA damage and Free Radical scavenging capacity.<sup>[6]</sup>

- *B. monnieri* on vascular and intestinal smooth muscles of rabbit and Guinea pig has shown Calcium antagonist activity.<sup>[7]</sup>

- Antistress effects of Bacosides of *B. monnieri*; modulation of Hsp 70 expression superoxide dismutase and cytochrome P450 on rat brain.<sup>[8]</sup>

### 2. *Terminalia chebula* (*Shiva/ Haritaki*)

- Antibacterial and anti-fungal activity shown by different fractions from fruits screened.<sup>[9]</sup>

- Anti-microbial activity of *Terminalia chebula* Retz fruit extract against microorganisms, *Bacillus subtilis*, *Staphylococcus aureus*, *Staphylococcus epidermis*, *Escherchia coli*, *Staphylococcus flexineria* and *Pseudomonas aeruginosa*.<sup>[10]</sup>

### 3. *Cynodon dactylon* (*Doorva/ Shasraveerya*)

- The plant checks uterine bleeding, strengthen the uterus, avert abortion and augment fetal growth. <sup>[11]</sup>

- Marked antioxidant activities of ethanol extract of aerial parts <sup>[12]</sup>. The flavonoids present in the aqueous extract of this plant might be responsible for its marked antioxidant efficacy at tissue level in ST2- induced diabetic rats.<sup>[13]</sup>

- It has potent aphrodisiac and male fertility activity. Methanolic extract has shown effect in overcoming stress induced sexual dysfunction, performance and semen concentration.<sup>[14]</sup>

- The study on animal model has revealed its immunomodulatory, anti-cancer, anti-inflammatory and antidiuretic activity.<sup>[15]</sup>

### 4. *Callicarpa macrophylla* (*Priyangu*)

- Using diclofenec sodium as standard, aqueous as well as ethanolic extract of leaves were evaluated for their anti-inflammatory activity using carrageenan paw edema method. Results showed that ethanolic extract have better anti-inflammatory profile than aqueous extract.<sup>[16]</sup>

- Ethanolic extract of stem bark has shown moderate growth inhibitory activity against all the bacterial strains.<sup>[17]</sup>

### 5. *Tinospora cordifolia* (*Avyatha / Guduchi*)

- Diabetic patients with foot ulcers on *Tinospora cordifolia* as an adjuvant therapy showed beneficial effect of immuno-modulation for ulcer healing, better outcome in wound healing, reduced debridement and improves phagocytosis were statistically significant.<sup>[18]</sup>

- The antioxidant capacity of its stem methanol extract in daily oral administration of 500mg per kg of body weight for 40 days in alloxan induced diabetic rats has shown that erythrocytes membrane lipid peroxide and catalase activity was increased where as the activities of super oxide dismutase, glutathion per oxidase were found to be

decreased significantly ( $P < 0.01$ ) in alloxan- induced diabetic rats.<sup>[19]</sup>

- It has an anti-inflammatory, analgesic and spasmolytic activities which will be helpful in management of various painful conditions during menstruation. It regularizes the menstrual flow.<sup>[20]</sup>

### 6. *Asparagus recemosus* (*Shatavari*)

- Trial suggests that the extract blocks the uterine contractions and spontaneous motility, may be blocking the pitocin sensitive receptor. This activity can be helpful for using the same as uterine sedative and helpful in different menstrual problems like dysmenorrhea.<sup>[21]</sup>

- Its use is noted in menorrhagia and threatened abortion.<sup>[22]</sup>

- The results suggest an estrogenic effect of *Shatavari* on the female mammary gland and genital organs. Hyperplasia of glandular and muscular tissue and hypertrophy of glandular cells were observed in the genital organs. The parenchyma of the genital organs showed abundant glycogen granules with dilated blood vessels and thickening of epithelial lining. The oviduct in the treated group showed hypertrophied muscular wall, whereas the ovary revealed no effect of the drug.<sup>[23]</sup>

- The saponin rich fraction has shown antioxytocic activity. The saponin inhibited oxytocin - induced uterine contractions in-vivo.<sup>[24]</sup>

- Different concentrations of the methanol extract of the root showed considerable antibacterial efficacy against *E.coli*, *Shigella* dysentery, *Shigella sonnei*, *Shigella flexneri*, *Vibrio cholerae*, *Salmonella typhi*, *Pseudomonas putida* and *Staphylococcus aureus*.<sup>[25]</sup>

- *Shatavari* is antiabortifacient, anti-inflammatory, antiviral and galactagogue and has positive influence on Hypothalamus- Pituitary- Ovarian axis. *Asparagus racemosus* is mainly known for its phytoestrogenic properties. With an increasing realization that HRT with synthetic estrogen is neither as safe nor as effective as previously envisaged, *shatavari* is a good alternative.<sup>[26]</sup>

### 7. *Sida cordifolia* (*Bala*)

- Ethanol extracts has shown anti-oxidant properties.<sup>[27]</sup>

- Inhibitory activity on gram negative bacteria than gram positive bacteria was observed with Methanolic and Aqueous extract. Antifungal activity was observed equivalent to fluconazole with aqueous extract.<sup>[28]</sup>

- The analgesic and anti-inflammatory activities was observed on the carageenan induced rat paw edema.<sup>[29]</sup>

### 8. *Stereospermum suaveolens* (*Amogha/ Patla*)

- Ethanol extract from the stem bark possess potent analgesic and antipyretic activity in various experimental animal models at the doses of 200 and 400 mg/kg body weight.<sup>[30]</sup>

- The study on carageenan- induced paw edema method in adult rats has shown anti- inflammatory action.<sup>[31]</sup>

### 9. *Saraca indica* (*Ashoka*)

- A phenolic glycoside P<sub>2</sub> showed highly potent and specific oxytocic activity in-vitro and in-vivo on uteri of rat and isolated human myometrial strips and fallopian tube. P<sub>2</sub> active in remarkably low concentrations and non- toxic to animals upto 250 mg/ kg.<sup>[32]</sup>

- Two crude glycosides isolated from bark exhibited uterine spasmogenic activity. Both showed significant stimulant action on isolated uteri of rat, guinea pig, rabbit, dog and human. Pure phenolic glycoside P<sub>2</sub> was highly potent and showed consistent oxytocic activity.<sup>[33]</sup>

- It has stimulatory effect on the ovarian tissue, which may exhibit an estrogen- like activity that enhances ovulation and repair of the endometrium.<sup>[34]</sup>

- Tannins and other glycosides present in *Saraca indica* make it useful in menorrhagia, dysmenorrhoea, Post partum hemorrhage and leucorrhoea.<sup>[35]</sup>

### 10. *Adhatoda vasica* (*Vasa*)

- Vasicine has shown uterotonic activity in different species including human beings and the effect was influenced by the degree of priming of the uterus by estrogens. In both pregnant and non-pregnant human uteri vasicine initiate rhythmic contractions of myometrial strips and trial suggests its effect comparable to oxytocin and methergin. It is used in various bleeding disorders, due to its styptic action.<sup>[36]</sup>

- Various extract has shown anti-inflammatory activity.<sup>[37]</sup>

### 11. *Symplocos racemosa* (*Lodhra*)

- It exhibits antispasmodic and relaxant effect on several spasmogens of the uterine smooth muscles.<sup>[38]</sup>

- It has beneficial effect in menstrual disorders, the bark extract reduces the frequency and intensity of the contractions in both pregnant and non-pregnant uteri.<sup>[39]</sup>

- The main chemical constituents are oleanolic acid, acetyl oleanolic acid, betulonic acid and ellagic acid. It is useful in frequent abortions, menorrhagia,

leucorrhoea, reduced libido and vaginal ulcerations.<sup>[40]</sup>

- Oral administration of its aqueous extract in female rats, significantly stimulated serum FSH and LH level, folliculogenesis and detached oocytes. Ovary weight of treated animals was increased as a result of FSH surge.<sup>[41]</sup>

### 12. *Glycyrrhiza glabra (Madhuyasthi)*

- Maximum estrogenic activity in plant was found at beginning of vegetative growth; thereafter estrogens decreased about 2-fold with plant growth and development estrogen content decreased less significantly.<sup>[42]</sup>

### 13. *Cyperus rotundus (Musta)*

- Phytochemical studies have led to the identification of more than 60 sesquiterpenes besides flavonoides, furochromones, triterpenes and sterols.<sup>[43]</sup>

- Tuber of the plant exhibits estrogenic activity.<sup>[44]</sup>

- Relaxation of the isolated uterus was noted in the animal study and possible action in relieving spasmogenic pain associated with uterus. Its anti-inflammatory and analgesic activity put forth better therapeutic activity.<sup>[45]</sup>

### 14. *Boerhaavia diffusa (Punarnava)*

- It possess potent anti-inflammatory and antifibrinolytic activity and thus useful in menstrual disorders like menorrhagia.<sup>[46]</sup>

- Ethanolic extract has shown anti-inflammatory and analgesic properties comparable to that of ibuprofen and observed to stop intrauterine contraceptive device induced bleeding in monkeys.<sup>[47]</sup>

### 15. *Withania somnifera (Ashwagandha)*

- It has anti-stress activity which helps to improve libido and sexual desire. Glycowithanolides extracted from *Withania somnifera* taken once daily for 21 days has shown increase in all enzymes like superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPX) showing its antioxidant activity. The anti-stress property is due to anxiolytic GABA-mimetic activity which act independent of GABA receptors may be contributory. This helps to improve loss of libido present due to chronic stress. Thus, clinical trials shows that *Withania somnifera* helps to increase libido, better sexual performance, antioxidant and anti-stress activity.<sup>[48]</sup>

### DISCUSSION

The prime function of the drugs is to restore the disrupted anatomical continuity and function of an affected part. The medicinal plants mostly used are antimicrobial, anti-inflammatory, antioxidant,

wound healing and rejuvenators in action. Thus, correct the etiopathogenesis, effective in curing the diseases, will restore the normal physiology of the reproductive system of women and finally, achievement of conception. Studies on animal model has revealed that certain drugs has direct action on Hypothalamus- Pituitary- Ovarian axis, increased Gonadotropin secretion helps in regulation of the activity of the enzymes involved in ovarian steroidogenesis and stimulates serum estradiol level and proved to be successful in anovulatory infertility.

### CONCLUSION

The medicinal plants mentioned in this review has an evidenced based evaluation in the infertility. These have the potential to correct the etiopathogenesis related to infertility and improves the physical, psychological and social health of an individual. These drugs have been effective to enhance the conception and are devoid of any adverse effect and better alternate to hormonal therapy. But further studies should be required scientifically on pharmacogenosy of various medicinal plants mentioned in Ayurvedic texts for infertility. There are several drugs where specific isolated pharmacological action has yet to be analysed, here plant should be studied in- vivo in total instead of isolation.

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