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Review Article

A Review on Medicinal Plants of North Eastern Region with Potential Antifertility Activity

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A B S T R A C T

The increase in population is becoming a comprehensive problem, causing much pressure on economic, social and natural assets. Oral contraceptive agents have improved the rate of infertility but their unusual side effects limit the use. Current antifertility therapy lacks satisfactory success due to this adverse effect; hence, patients are seeking complementary and alternative medicine for anti-fertility action. Ayurveda and other Indian literature mention the use of plants in various human ailments. India has about more than 45000 plant species and among them several thousand are claimed to possess medicinal properties. Researchers conducted in the last few decades on the plants mentioned in ancient literature or used traditionally for anti-fertility action. This review reveals that some plants and their part used having anti-fertility action, which are helpful for researcher to develop new herbal anti-fertility formulations. In the recent years, interest in drugs of plant origin has been progressively increased. The aim of this review is to highlight the work on anti-fertility of plant origin. For women who can't use modern forms of contraception due to adverse effect or other reasons, therefore herbs can offer alternatives and reducing fertility would be better than other contraceptives. This article may help investigators to identify medicinal plants responsible for anti-fertility activity.

Key words: Anti-fertility, Herbal Contraceptives, Population Explosion, Birth Control, Medicinal plants.

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INTRODUCTION

The unexpected evolution of the world population stands as one of the important measures of the modern era to think over. The present total world population is around 6.46 billion and particularly that of India is around 1.1 billion. One of the life-threatening problems of the developing countries like in India is the geometrical rise of human population. Today, we realize that our sheer numbers have increased so much that they are straining Earth's capacity to supply food, energy, and raw materials. Advances in medication and general wellbeing have led to a noteworthy decline in mortality and an expanded future. This flare-up in the population will have a negative influence on our economic policies and would simultaneously misbalance our financial foundation. Thus, the control of human fertility in the sense of its limitation is the most vital and crucial of all biosocial and medical problems confronting mankind today.2 Since ancient times, plants have been a source of drugs, but scientific medicines tend to ignore the importance of herbal medicine. The World Health Organization suggested that effective, locally available plants can be used as substitutes for drugs.1 The development of new fertility regulating drugs from medicinal plants is an attractive preposition, because from times immemorial, humans have relied on plants and their products as sources of drugs and therapeutic agents, although in recent times, synthetic drugs are used extensively in modern medicine systems. The plant products are becoming more popular than the synthetic drugs, in recent times. It is mainly attributed to their low toxicity and long-standing experience of the use of these drugs in ethnic medicine system like Ayurveda. Family planning has been promoted through several

methods of contraception, but due to serious adverse effects produced by synthetic steroidal contraceptives, attention has now been focused on indigenous plants for possible contraceptive effect. Although contraceptives containing estrogens and progesterone are effective and popular, the risks associated with the drugs have triggered the need to develop contraceptives drugs from medicinal plants. Hence, there is a need for searching suitable products from indigenous medicinal plants that could be effectively used in the place of pills.2 Since herbal drugs are easily available and with no side effects, the current study was undertaken.

SOME MEDICINAL PLANT WITH ANTI-FERTILITY POTENTIAL

Some medicinal plants have proven to possess a traditional as well as scientifically proven anti-fertility action. A brief report of plants has been tested for antifertility potential are documented.

***Aegle marmelos* (Rutaceae):** *Aegle marmelos* is commonly known as the bael, since ages it is used for the treatment of numerous diseases. For the study of antifertility three different concentration of methanolic bark extracts of *Aegle marmelos* (L.) were evaluated for male antifertility activity on albino wistar rats. Methanolic bark extract of *Aegle marmelos* at the dose of 200, 400, and 600 mg/Kg body weight was administered orally for 60 days. Treatments were stopped thereafter and animals were sacrificed after a recovery period of 30 days. Control animal were administered vehicle (0.5% CMC for 60 days). Lonidamine was used as standard drug to compare the effect of extract.[11]

***Cannabis sativan* (Cannabinaceae):** According to folklore medicine, the plant *Cannabis sativa* (Cannabinaceae) possesses antifertility activity. Aqueous, alcoholic and chloroform extract of *Cannabis sativa* exhibited significant abortificient activity (9% to 42%). The alcoholic extract at a dose of 400 mg/kg body weight was found to be most effective in causing strong abortifacient activity. The extract also showed estrogenic activity and prolonged the estrous cycle in experimental animal. The extract of *Cannabis sativa* caused a significant decrease in the ovarian and uterine weight, while a non-significant increase in the body weight. There was a slight decrease in the serum estrogen level and an increase in serum progesterone level, while the level of LH and FSH were found to be significantly reduced.[3]

***Curcuma longa* (Zingiberaceae):** Turmeric is used as a condiment and also as an herbal medicine in different kinds of illness. It is used by tribes as an antifertility and aborcifacient agent for a long period in different parts of India. Oral feeding of *Curcuma longa* (50% EtOH) extract at the dose of 1 gm /kg body weight orally for 60 days to male rats caused significant reduction in serum lipid profile ($P \leq 0.01$ to ≤ 0.001). It also showed 80% negative fertility, whereas the SGOT and SGPT were in normal range. [4, 5]

***Carica papaya* (Caricaceae):** It has been found that anti-malarial drugs usually possess anti fertility side effects. Different extracts from different parts of *Carica papaya* have been known to be used in the treatment of malaria. Methanol root extract of *Carica papaya* produced no mortalities at the dose of 2000 mg/kg but induced CNS-related symptoms as well as diuresis. The fractions significantly ($P < 0.01$) produced decreases in sperm counts and increased the percentage of defective sperm cells. However, ethanolic leaf extract of *Carica papaya* causes decreased sperm count, sperm motility and seminal pH while sperm mortality and abnormality of spermatozoa increased significantly. The normal range of sperm count, sperm motility, seminal pH and abnormality of spermatozoa are essential factor for fertility. Any disturbance of such normal range of seminal quality may affect the fertility of animals. Thus, these changes in seminal quality of *Carica papaya* leaf treated-animals showed antifertility effects.[6,7,8]

***Piper nigrum* (Piperaceae):** *Piper nigrum* is commonly known as black pepper. Effect of oral administration (25 and 100mg/kg body wt/day for 20 and 90 days) of fruit powder of *Piper nigrum* on the male reproductive organs of mice was investigated. Treated groups show degenerative changes in the seminiferous tubules. Percentage of affected tubules in testes of piper treated mice was dose and duration related. Further, treatment for 20 days did not cause appreciable alterations in the histological appearance of the epididymis, while the treatment for 90 days caused detectable alterations in the duct.[9]

***Terminalia chebula* (Combretaceae):** Aqueous-ethanolic (1:1) extract of fruit of *Terminalia chebula* was administered orally at a dose of 60 mg/0.5 mL distilled water/day for 28 days. Different parameters were studied including body weight, relative weight of reproductive organ, sperm motility, sperm count, testicular cholesterol, plasma testosterone, testicular androgenic key enzymes such as 3β-HSD and 17-β-HSD, bio-markers of oxidative stress, toxicity study and histological analysis of the tissues. The treated group showed a significant diminution in spermatogenic profile. On the other hand testicular cholesterol showed a significant elevation in *Terminalia chebula* treated group and plasma testosterone was decreased significantly in comparison to control. Histological study of testis of treated group exhibited significant reduction in seminiferous tubular diameter. The results of present experiment suggested that the aqueous-ethanolic (1:1) extract of fruit of *Terminalia chebula* exerted a significant anti-spermatogenic effect in male rat. [10]

***Nelumbo nucifera* (Nelumbonaceae):** *Nelumbo nucifera* has been used as an anti-fertility agent in females by the local tribals of Rajasthan, India. Oral administration of *Nelumbo nucifera* extract brought about a significant decline in the weight of ovary, protein, and glycogen level, however, cholesterol level increased significantly. In addition, the diestrous phase of the estrous cycle was found to be prolonged. These results suggest that *Nelumbo nucifera* has the antiestrogenic nature without altering the general physiology of the female rats.[12]

***Barleria prionitis* Linn. (Acanthaceae)** Barleria prionitis Linn (Acanthaceae) commonly known as Vajradanti. Oral administration of root extract of Barleria prionitis L. to male rats (100 mg/rat per day) for the period of 60 days did

not cause body weight loss. The root extract brought about an interference with spermatogenesis. The round spermatids were decreased by 73.6% (P50.001). No significant change was found in the population of secondary spermatocytes. However, the population of preleptotene spermatocytes were decreased by 41.9%. The extract reduced the fertility of male rats by 100%. Cross sectional surface area of Sertoli cells and mature Leydig cell numbers were significantly reduced (36.9%). The total protein, sialic acid contents of the testes, epididymides, seminal vesicle and prostate were reduced. Testicular glycogen contents were low. Antifertility effects of Barleria seemed to be mediated by disturbances in testicular somatic cells functions (Leydig and Sertoli cells) resulting in the physio-morphological events of spermatogenesis.[13]

***Plumbago zeylanica* (Plumbaginaceae):** *Plumbago zeylanica* belongs to the family Plumbaginaceae and its antifertility components include roots and leaves. Its active principles are plumbagin, isoshinanolone, trans cinnamic acid, vanillic acid, beta-sitosterol, 4-hydroxybenzaldehyde, and plumbagic acid and it is used to treat piles, leukcoderma, and other skin diseases. It appears to foster diverse biological activities including antihelicobacter pylori, antidiabetic, antioxidant, and antifertility. A study on rat was undertaken using the plant's ethanol extract. When the applied extract dosage was 159 mg/kg, seminiferous tubules diameters were decreased and spermatocytes and spermatids production was reduced. [14]

***Strychnos potatorum* (Loganiaceae)**: The treatment of *Strychnos potatorum* extract did not bring any body weight loss, whereas, the weight of testes, epididymides, seminal vesicle, and ventral prostate were decreased significantly. Reduced sperm count and motility resulted in suppression of fertility by 91.81%. *Strychnos potatorum* seed possesses suppressive effects on male fertility and could be useful in the development of male contraceptive agent. However, further studies are needed.[19]

***Gossypium herbaceum* (Malvaceae):** *Gossypium herbaceum* belongs to the family Malvaceae and its antifertility components include roots. Its active principles are Gossypol, sugar, gum, tannins, fixed oil The study demonstrated that the methanolic extract could cause atrophic changes in the uterus and disruption of ovarian folliculogenesis by inhibiting further development of the recruited ovarian follicles .[16,17]

***Hibiscus rosasinensis* (Malvaceae):** *Hibiscus rosasinensis* belongs to the family Malvaceae. Its active principles are steroids, carbohydrates, glycosides : flavonoid, fats and alkaloids and it is used to anti-tumor, antifertility, antiovultory, antiimplantation, anti-inflammatory, analgesic, antiestrogenic, antipyretic, antispasmodic, antiviral, antifungal, antibacterial, hypoglycaemic, spasmolytic, CNS depressant, hypotensive. The benzene extract of Hibiscus rosasinensis flowers [100 mg / kg] revealed postcoital antifertility effect in female albino rats, leading to 80 % reduction in the implantation site on the 10th day of pregnancy.[16,18]

***Jatropha gossypifolia* (Euphorbiaceae):** *Jatropha gossypifolia* belongs to the family Euphorbiaceae and its antifertility components include leaves. Its active principles are Carbohydrates, steroids, glycosides, flavonoids, tannins, alkaloids and it is used to treat eprosy, purgative and stomachic. A study on rat was undertaken using the plant's ethanolic aqueous extract. It appears that ethanolic extracts have estrogenic activity at the dose of 400 mg kg−1body weight as evident from the significant increase in the diameter of the uterus, height of the endometrial epithelium, and thickness of endometriumin extract-treated animals compared with control, while the animals treated with aqueous extract showed increased height of luminal epithelium with stimulated uterine glands.[20]

***Achyranthes aspera* (Amaranthaceae):** *Achyranthes aspera* belongs to the family Amaranthaceae. Its active principles are carbohydrates, protein, glycosides, alkaloids, tannins, saponins, flavoides, lignin. A study on rat was undertaken using the plant's ethanol extract. The ethanolic extract of Achyranthes aspera showed promising antifertility activity and it is shown to have blastocystotoxic, antizygotic and antiovulatory activities.[21,22]

CONCLUSION

Current interest in traditional medicine has led to the rapid development and studies of many herbal remedies employed for anti-fertility action. Novel information gathered from the current data is important in preserving folk indigenous knowledge as well as in the discovery of novel potential compounds with promising anti-fertility potential. Therefore, this review has been prepared to provide a new compilation of plants with specific use as anti-fertility agents.

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