



Medicinal plants with antifertility effects: A review

Rashmi C Yadav*, Gyce Mariam, Vanashree Garghe, Nimarpreet Kaur, Poornima Kakade

Department of Pharmacognosy, AISSMS College of Pharmacy, Pune, India

Received: 27-08-2014 / Revised: 21-09-2014 / Accepted: 23-09-2014

ABSTRACT

Many ethno botanical surveys on medicinal plants used by the local population have been performed in different parts of the world including Morocco, Saudi Arabia, Taiwan and Trinidad and Tobago. Several plant species have been described as antifertility agents. Plants also used as abortifacient and as contraceptive by ancient physicians of India. Various medicinal plant extracts have been tested for their antifertility activity both in male and female animal models activity and the active agent but very little is known about many of the herbs, or about long term side effects or safety concerns and hence many herbal methods were tried with mixed results.. Most modern forms of birth control are 70% to 99% effective depending on the method chosen. For women who can't use modern forms of contraception, herbs can offer alternatives, and reducing fertility would be better than no birth control. Often needing a period of time to establish effectiveness different combinations can be used. This review deals with listing of potent herbals with ethanobotanical claim for their antifertility activity.

Keywords: Herbal contraception, Antifertility, Abortifacient



INTRODUCTION

Control of population is very important in these years. A wide variety of synthetic contraceptive agents are available, but these cannot be used continuously due to their side effects. To prevent conception scientists have made attempts both on male and female counterparts. In male contraception, attempts are being made to find out suitable spermicidal agents. On the female side since conception consist of different stages like ovulation, fertilization of the ovum, implantation of the fertilized ovum and ultimate maturation of the fetus to term, which are more vulnerable to drug action. Therefore, an attempt to interfere fertilization has been directed mostly to affect these stages by various agents, claimed to be antioviulatory, anti-implantation, or abortifacient. Till date, steroidal pills and injections, IUDs, barrier methods, sterilization devices are available for contraception, but the changing life style and increasing population burden telling us that the ideal contraceptive is yet to be discovered[1].

Many ethno botanical surveys on medicinal plants used by the local population have been performed in different parts of the world including Morocco, Saudi Arabia, Taiwan and Trinidad and Tobago. Several plant species have been described as antifertility agents. The practice of traditional

medicine for the control of fertility in most parts of Ethiopia, India and most parts of the world is based on the uses of plant medicines for many years. Several medicinal plants have been used as dietary adjunct and in the treatment of numerous diseases including for inducing infertility without proper knowledge of their function. Although several herbal plants possess different types of antifertility activities such as anti implantation, Abortification, Oestrogenic and Spermicidal, a large number of medicinal plants posses some degree of toxicity[1,2,4].

Herbal contraceptives were used even by the primitive people of ancient civilizations to control fertility and prevent pregnancy. Though, the conventional medicine has discovered some important antifertility agents (Contraceptive) for female, their popularity and utility among women is restricted due to some unwanted and troublesome effects. The common side effects include obesity, cholelithiasis, gastric trouble and carcinoma of breast and cervix, asthma and venous thromboembolism. The medical persons are in search of safe and active contraceptive agents of synthetic or herbal origin. Thorough review literature survey of ancient and modern herbal pharmacology reveals that there are many plants having scientifically proved anti-fertility activity.

*Corresponding Author Address: Mrs. Rashmi C. Yadav, Department of Pharmacognosy, AISSMS College of Pharmacy, Near RTO, Kennedy road, Pune, Maharashtra, India; E-mail: jrashmi18@gmail.com

These plants may be valuable source of herbal contraceptive for women. Now a days fertility control finds a great significance because of rapid population growth and needs a check on it.[2]

Hormonal control of Fertility: The most effective method of contraception, the birth control pill, is based on oral administration of steroids. Estrogens and progestins are used either combined or, as with the “minipill”, progestins are used alone. In addition, various combinations of steroids can also be administered as long-acting injectable preparations or via intrauterine systems. The pills to be effective via the oral route, estradiol and progesterone cannot be used since they are metabolized in the gastrointestinal tract and liver. As a consequence, synthetic estrogens such as mestranol or ethinyl estradiol are used in combination with various synthetic progestins, such as norethindrone, norethindrone acetate, norgestrel, ethinodiol diacetate or norethynodrel. The hormones are given in a cyclic fashion for 21 days, beginning on day 5 of the menstrual cycle, followed by 7 days of placebo treatment or no pills. The elevated estrogen and progestin levels inhibit the midcycle LH surge and ovulation by exerting negative feedback effects on the hypothalamus. Irregular LH peaks are sometimes observed, while FSH levels are usually suppressed. Ovarian progesterone production is diminished, but estrogens continue to be secreted. The effects on the endometrium are variable and depend on the type and dosage of the contraceptive. Rapid progression from proliferation to early secretory changes can be observed within a few days from the start of daily intake, followed by regressive changes.[2,3]

Mechanism of action of Antifertility Plants:

Plant drugs have been used since time immemorial for their effects upon sex hormones particularly for suppressing fertility, regularizing menstrual cycle, relieving dysmenorrhoea, treating enlarged prostate, menopausal symptoms, breast pain and during and after childhood. Specific biological effects under the division of fertility regulating category are non-specific contraceptive or antifertility effects, abortifacient, uterine stimulant and uterine relaxants, labour induction and labour inhibition oxytocic and anti- oxytocic, oestrogenic and anti-oestrogenic, progestogenic and anti-progestogenic, ovulatory and anti- ovulatory, androgenic and anti- androgenic, spermicidal and anti- spermatogenic effects [4,24]. The site of action of antifertility agents in females consists of the hypothalamus, the anterior pituitary, the ovary, the oviduct, the uterus and the vagina. The Hypothalamus controls the action of the uterus via follicle stimulating hormone (FSH) and Luteinizing

hormone (LH) releasing hormones. Antifertility agents may therefore exert their effort at this level either by disrupting hormonal function of the hypothalamus and/ or the pituitary, or by interrupting the neural pathway to the hypothalamus that control the liberation of gonadotrophin releasing hormones. Early researchers in the area of female fertility regulation focused their attention to phytoestrogens following the recognition that excess ingestion of plants containing estrogenic compounds resulted in infertility in animals and humans[3,5,9].

Antifertility actions of few plants are as follows-

1. NEEM OIL: Neem oil is obtained from the plant *Azadirachta indica* family Meliaceae. Intrauterine administration of neem oil in rat results in high contraceptive efficacy. In rats, intra-vas administration of neem oil results in blocked spermatogenesis without affecting testosterone production, sexual behavior, or antisperm antibody production. For women it is used vaginally as a spermicide, and men use it orally as a daily contraceptive to induce temporary sterility.[6,8,11]
2. TURMERIC: Aqueous and ethanolic extract of rhizome of *Curcuma longa*, family *Apiaceae* were administered orally to female rat for 30 consecutive days. They showed significant antifertility activity. FSH and LH level was significantly decreased in both drugs while amount of estrogen in ethanolic extract of both the drugs treated animals was found to be increased [7,10].
3. PAPAYA: Aqueous extracts and benzene extracts of *Carrica papaya* (CARICACEAE) if given orally to female rats causes infertility and irregular oestrous cycles. Ethanol seed extract decreases sperm motility, testis mass and sperm count. Studies with aqueous seed extracts also decreased fertility in male rats. The fertility of the male and female rats returned to normal after withdrawal of treatments [6,9].
4. ALOE VERA: Purified extract from the gel of *Aloe barbadensis*, *Liliaceae* demonstrated a spermicidal effect. Spermicidal activity from Aloe was thought to be due to micro elements (boron, barium, calcium, chromium, copper, iron, potassium, magnesium, manganese, phosphorus, and zinc) that immobilize the tails of sperm without causing vaginal irritation[3,10].
5. ONION: The ethanolic extract of *Allium cepa* showed significant antifertility activity pretreatment with ethanolic extract showed significant inhibition of number of implant site at a dose of 300 mg/kg. There was no change in ovulation, hence the antifertility activity observed in the present study with *Allium cepa* can be attributed largely to its antiimplantation activity[3,12].

6. GUDUCHI: Oral administration of 70% methanolic extract of *Tinospora cordifolia*, *Menispermaceae* stem to male rats at a dose level of 100 mg/d for 60 days did not cause body weight loss but decreased the weight of testes, epididymis, seminal vesicle and ventral prostate in a significant manner. It caused a significant reduction in average litter size, sperm count, number of viable and motile sperm[4,14].
7. BRAHMI: The oral treatment of *Bacopa monnieri*, *Scrophulariaceae* family causes reduction in immotility, viability, morphology, and number of spermatozoa in cauda epididymis. Histologically, testes in mice treated with the plant extract showed alterations in the semiferous tubules, and the alterations included intraepithelial vacuolation, loosening of germinal epithelium, and exofoliation of germ cells and occurrence of giant cells. The treatment had no effect on levels of testosterone, alanine aminotransferase and creatinine in blood serum, hematological parameters. Brahmi treatment causes reversible suppression of spermatogenesis and fertility, without producing apparent toxic effects[7,16].
8. FENUGREEK: *Trigonella foenum graecum*, *Fabaceae*. The biochemical parameters viz., protein, glycogen and ascorbic acid were reduced in ovary and uterus; however the concentration of cholesterol was increased in ovary and uterus; however the concentration of cholesterol was increased in ovary and uterus after fenugreek treatment. It's seed extract exerts antiestrogenic and antifertility activity in female rat[5,15].
9. PUDINA: *Mentha arvensis*, *Lamiaceae*. In male albino mice, the petroleum ether extract of its leaves at the doses 10 and 20 mg/mouse per day for 20, 40 and 60 days, when administered orally, showed a dose and duration dependent reduction in the number of offspring of the treated male mated with normal females. Negative fertility was observed in both dose regimens after 60 days of treatment. The petroleum ether extract of its leaves possess reversible antifertility property without adverse toxicity in male mice[6,20].
10. SNAKE GOURD: *Trichosanthes cucumerina*, *Cucurbitaceae* is one of the commonly used vegetables in south India. Its ethanol extract of at the doses 200 and 400 mg/kg body weight affected the normal oestrous cycle showing a significant increase in estrus and metestrus phase and decrease in diestrus and proestrus phases. The extract also significantly reduced the number of healthy follicles and corpora lutea and increased the number of regressing follicles. Serum FSH and LH levels

were significantly reduced in the treated group. In acute toxicity test, neither mortality nor change in the behaviour or any other physiological activities in mice were observed in the treated groups[8,21].

Numbers of plants are reported till date showing different mode of action and possessing anti fertility. Some of them have been listed in Table no 1.

CONCLUSION

Population explosion is leading cause of poverty and pollution in developing countries. Rising human population throughout the world more particularly in developing and underdeveloped countries has detrimental effects on the life supporting system on earth. The possibility of an effective check on human fertility may soon be realized through biological means. Several potential approaches for induction of infertility have been investigated over a long period. Herbal contraceptives offer alternatives for men and women who have problems with or lack access to modern contraceptives options particularly women living in the rural areas in developing nations with very high population like India, China, Africa (Nigeria) and Bangladesh. Studying the potency and toxicity of local plants that are reputed for birth control in the folkloric medicine of these countries may generate greater confidence in and wider acceptance of herbal contraceptives. However, the search for an orally active, safe and effective plant preparation or its compound is yet to be studied and explored [5,22]. Population explosion is leading cause of poverty and pollution in developing countries. Rising human population throughout the world more particularly in developing and underdeveloped countries has detrimental effects on the life supporting system on earth. The possibility of an effective check on human fertility may soon be realized through biological means. Several potential approaches for induction of infertility have been investigated over a long period. Herbal contraceptives offer alternatives for men and women who have problems with or lack access to modern contraceptives options particularly women living in the rural areas in developing nations with very high population like India, China, Africa (Nigeria) and Bangladesh. Studying the potency and toxicity of local plants that are reputed for birth control in the folkloric medicine of these countries may generate greater confidence in and wider acceptance of herbal contraceptives. However, the search for an orally active, safe and effective plant preparation or its compound is yet to be studied and explored [2,7,3].

Table 1: Indigenous medicinal plants having antifertility activity[2,3,4,5,7,18,19,20,21,24]

Sr. No.	Botanical Name	Family	Parts used	Action
1	<i>Abroma angusta</i>	Sterculiaceae	Roots	Antiimplantation & Abortification activity
2	<i>Abrus precatorius</i>	Fabaceae	Seeds	Abortifacient activity
3	<i>Acalypha indica</i>	Euphorbiaceae	Whole plant	Antioestrogenic activity
4	<i>Achillea millefolium</i>	Asteraceae	Flowers	Contraception Activity
5	<i>Achyranthus aspera</i>	Amranthaceae	Whole plant Stem bark,root	Antiimplantation & Abortification activity
6	<i>Adhatoda vasica</i>	Acanthaceae	Leaves	Antiimplantation & Abortification activity
7	<i>Aegle marmelos</i>	Rutaceae	Leaf	Contraception Activity
8	<i>Aerva lanata</i>	Amaranthaceae	aerial parts	Anti-implantation
9	<i>Afromosia laxiflora</i>	Fabaceae	Stem bark	Antigonadotropic activity, Block oestrous cycle
10	<i>Ailanthus excelsa</i>	Simaroubaceae	Leaf, stem,Bark	Anti-implantation
11	<i>Alangium salvifolium</i>	Alangiaceae	Stem bark	Abortifacient, anti-implantation
12	<i>Albizia lebbec</i>	Mimosaceae	Seeds,Roots,Pods	Antifertility
13	<i>Allium cepa</i>	Liliaceae	Bulb	Antiimplantation activity
14	<i>Aloe vera</i>	Liliaceae	Latex	Spermicidal
15	<i>Amaranthus spinous</i>	Amaranthaceae	Root	Inhibit fusion of sperm & ovum
16	<i>Amaranthus viridis</i>	Amaranthaceae	Root	Contraception Activity
17	<i>Anacardium occidentale</i>	Anacardiaceae	Nut shell	Spermicidal
18	<i>Ananas comosus</i>	Bromeliaceae	Unripe fruit, leaves	Abortifacient
19	<i>Andrographis paniculata</i>	Acanthaceae	Dried leaves powder	Antifertility, Arrest oogenesis & depletes estrogen level
20	<i>Arctium lappa</i>	Asteraceae	Leaves and roots	Abortifacient
21	<i>Ardicia solanacea</i>	Myrsinacea	Plants excluding roots	Spermicidal activity
22	<i>Aristolochia tagala</i>	Aristolochiaceae	Whole plant	Anti-implantation
24	<i>Artemisia vulgaris</i>	Compositae	Whole plant	Spermatogenesis
25	<i>Aspilia africana</i>	Asteraceae	Leaves	Antiovulatory activity
26	<i>Austropanckia populnea</i>	Celastraceae	Pods	Antiimplantation & Abortification activity
27	<i>Azadirachta indica</i>	Maliaceae	Seed oil	Anti-androgenic Activity
28	<i>Bacopa monnieri</i>	Scrophulariaceae	Plant	Contraception Activity
29	<i>Balanites roxburghii</i>	Zygophyllaceae	Fruits	Contraception Activity
30	<i>Ballota undulate</i>	Labiatae	Leaves, flower	Antiimplantation activity
31	<i>Barleria prionitis</i>	Acanthaceae	Root	Antispermaogenic activity
32	<i>Mentha longifolia</i>	Lamiaceae	Leaves	Contraceptive
33	<i>Melia azedarach</i>	Meliaceae	Seed	Antiimplantation activity
34	<i>Momordica cymbalaria</i>	Cucurbitaceae	Root	Anti-implantation activity

35	<i>Mondia whitei</i>	Apocynaceae	Root	Antispermatic activity
36	<i>Nelumbo nucifera</i>	Nymphaeaceae	Seeds	Antioestrogenic activity
37	<i>Ocimum gratissimum</i>	Labiataceae	Leaves	Contraception Activity
38	<i>Ougeinia dalbergioides Bth.</i>	Fabaceae	Stem bark	Spermicidal
39	<i>Ricinus communis</i>	Euphorbiaceae	Seed oil	Spermatogenesis
40	<i>Rivea hypocrateriformis</i>	Convolvulaceae	Aerial parts	Antiovulatory activity
41	<i>Rotalaria juncea</i>	Papilionaceae.	Seed	Abortifacient property
42	<i>Rumex steudeli</i>	Polygonaceae	Root	Contraception Activity
43	<i>Ruta graveolens</i>	Rutaceae	Root,plant powder	Contraception Activity
44	<i>Mentha arevensis</i>	Lamiaceae	Leaves	Contraception Activity
45	<i>Jatropha curcus</i>	Euphorbiaceae	Fruits	Abortifacient
46	<i>Cassia fistula</i>	Caesalpinaceae	Seeds	Anti-fertility
47	<i>Prunus armeniaca</i>	Rosaceae	Kernels	Anti-implantation
48	<i>Gossypium hirsutum</i>	Malvaceae	Bark	Abortifacient.
49	<i>Ferula assafoetida</i>	umbelliferae	Gum	Abortifacient and Anemmenagogue
50	<i>Abrus precatorius</i>	Fabaceae	Seeds	Contraception activity
51	<i>Mentha arevensis</i>	Lamiaceae	Leaves	Contraception activity
52	<i>Achyranthes aspera</i>	Amaranthacea	Root	Anti implantation
53	<i>Cuminum cyminum</i>	Apiaceae	Root	Decreases sperm motility
54	<i>Acalypha indica</i>	Euphorbiaceae	Whole plant	Antiimplantation
55	<i>Abrus precatorius</i>	Fabaceae	Seed	Decreases sperm motility
56	<i>Mentha arvensis</i>	Lamiaceae	Leaves	Anti implantation
57	<i>Trigonella foenum graecum</i>	Fabaceae	Leaves	Anti estrogenic
58	<i>Nelumbo nucifera</i>	Nelumbonaceae	Whole plant	Anti-estrogenic
59	<i>Piper betle</i>	Piperaceae	Leaves	Antiestrogenic
60	<i>Bacopa monnieri</i>	Scrophulariaceae	Whole plant	Decreases sperm motility

REFERENCES

1. Priya G R et al. Medicinal plants with potential antifertility activity- A review of sixteen years of herbal medicine research. International Journal of Pharm Tech Research 2012; 4(Jan –Mar): 481-494.
2. Umadevi M V et al. Medicinal Plants with Antifertility Activity. Journal of Medicinal Plants Studies 2013; 1(1):26-33.
3. Pradhan K B et al. A comprehensive review of plants used as contraceptives. IJPSR 2012; 4(1): 28-32.
4. Gediya S K et al. Herbal Plants Used as Contraceptives. International journal of current pharmaceutical review and research 2011; 2(Feb-April): 96-98.
5. Gupta R, Shrama R. A review on medicinal plants exhibiting antifertility activity in males. Natural product radiance 2006; 5(5): 389-410.
6. Sikarwar M et al. Aloe vera Plant of Immortality. International Journal of Pharma Sciences and Research 2010; 1(1):7-10.
7. Singh A, Kala S. Reversible contraceptive efficacy and safety evaluation of ethanolic extract of *Tinospora cordifolia* in animal model. Archives of Applied Science Research 2011; 3(5): 587-592.
8. Devprakash K et al. *Tinospora Cordifolia*- A Review On Its Ethnobotany, Phytochemical & Pharmacological Profile. Asian Journal of Biochemical and Pharmaceutical Research 2011; 1(4): 68-69.
9. Ittiavirah S, Habeeb R. Evaluation of spermicidal and antiandrogenic activities of aqueous extract of *Tinospora cordifolia* (Willd.) stem. African Journal of Pharmacy and Pharmacology 2013; 7(34): 2392-2396.
10. Ghosh A et al. Studies on antifertility effect of rhizome of *curcuma longa linn*. Asian Journal of Pharmacy and Life Science 2011; 1(4):349.
11. Singh R B et al. Reversible contraceptive efficacy and safety evaluation of ethanolic extract of *Curcuma longa* in animal model. Archives of Applied Science Research 2011; 3(5):587-592.
12. Garg S et al. Immunocontraceptive activity guided fractionation and characterization of active constituents of neem (*Azadirachta indica*) seed extracts. Journal of Ethnopharmacology 1998; 60:235–246.
13. Riar S, Devakumar C. Volatile fraction of neem oil as a spermicide. Contraception 1990; 42: 479–487.
14. Bardhan J, Riar S. Neem oil—A fertility controlling agent in rhesus monkey. Indian J Physiol Pharmacology 1991; 3(5):278–280.
15. Upadhyay S, Dhawan S. Antifertility effects of neem (*Azadirachta ndica*) oil in male rats by single intra-vas administration: An alternate approach to vasectomy. Journal of Andrology 1993; 14:275–281.
16. Compton J, Culham A. Phylogeny of Actaea including Cimicifuga (Ranunculaceae) inferred from nrDNA ITS sequence variation. Biochem Syst Ecol 1998; 2(6):185-197.
17. Compton J, Culham A. Reclassification of Actaea to include Cimicifuga and Souliea (Ranunculaceae): phylogeny inferred from morphology, nrDNA ITS, and cpDNA trrD-F sequence variation. Taxon 1998; 4 (7):593-634.
18. Kaur R, Sharma A. Rising Trends towards Herbal Contraceptives. Journal of Natural Products and Plant Resource 2011; 1(4): 5-12.
19. Pathak A, Mallurwar V. A Review of Plants with Anti-Fertility Activity. Nig J Nat Prod and Med 2005; 09: 4-10.
20. Ahmad S, Jamal Y .A: Review of Some Medicinal Plants with Anti-fertility Activities. Unani Research 2011; 1(2): 24-28.
21. Qureshi A, Sanghai D. Herbal options for contraception: A review. Pharmacognosy Magazine 2006; 2(8): 204-215.
22. Badami S, Aneesh R. Antifertility activity of *Derris brevipes* variety Coriacea. Journal of Ethnopharmacology 2003; 8(4): 99-104.
23. Kamboj V, Dhawan V. Research on plants for fertility regulation in India. Journal of Ethnopharmacology 1982; 6(2):191-226.
24. Goonasekera M, Gunawardana V. Pregnancy terminating effect of *Jatropha curcas* in rats. Journal of Ethnopharmacology 1995; 4(7): 117-123.