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Journal of the Chinese Medical Association 78 (2015) 382–388

www.jcma-online.com

Review Article

# Antifertility activity of medicinal plants

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Received October 1, 2014; accepted November 25, 2014

**Abstract**

The aim of this review was to provide a comprehensive summary of medicinal plants used as antifertility agents in females throughout the world by various tribes and ethnic groups. We undertook an extensive bibliographic review by analyzing classical text books and peer reviewed papers, and further consulting well accepted worldwide scientific databases. We performed CENTRAL, Embase, and PubMed searches using terms such as "antifertility", "anti-implantation", "antiovulation", and "antispermatogenic" activity of plants. Plants, including their parts and extracts, that have traditionally been used to facilitate antifertility have been considered as antifertility agents. In this paper, various medicinal plants have been reviewed for thorough studies such as *Polygonum hydropiper* Linn, *Citrus limonum, Piper nigrum* Linn, *Juniperis communis, Achyanthes aspera, Azadirachta indica, Tinospora cordifolia,* and *Barleria prionitis.* Many of these medicinal plants appear to act through an antizygotic mechanism. This review clearly demonstrates that it is time to expand upon experimental studies to source new potential chemical constituents from medicinal plants; plant extracts and their active constituents should be further investigated for their mechanisms. This review creates a solid foundation upon which to further study the efficacy of plants that are both currently used by women as traditional antifertility medicines, but also could be efficacious as an antifertility agent with additional research and study.


*Keywords:* antifertility agent; efficacy; literature review; medicinal plants

## 1. Introduction

Antifertility agents are drugs that control fertility[1] and are also called oral contraceptives. These drugs affect and are involved in the menstrual cycle and ovulation in females. Estrogen and progesterone in combined form are given as birth control pills. The antifertility substance is deemed to be active in females when it prevents fertilization, prevents ovulation, implantation, and destroys the zygote or causes abortion. In males, it prevents spermatogenesis, inhibits testosterone, or affects the gonadotrophin of the organs or the mortality of sperm. Currently, population size is being controlled in many developing countries.[2] Oxyphenbutazone, indomethacin, and acetyl salicylic acid inhibit prostaglandin formation and manifest antifertility activities in albino male and female rabbits. The reproductive process is affected by indomethacin and oxyphenbutazone in male rabbits. Significant anti-ovulatory activity was exhibited by acetyl salicylic acid 300 mg/kg and indomethacin 3 mg/kg in the rabbits. Additionally, indomethacin exhibited anti-implantation activity. This shows that reproduction in female animals is affected by nonsteroidal anti-inflammatory drugs.[3] Antifertility activity in antimalarial drugs has been observed, because amodiaquine blocks ovulation and disrupts the oestrous cycle.[4] It has also been observed that many plants may have spermicidal activity. Medicinal plants are a great gift of nature as a cure-all for a plethora of human problems. Various institutes in South Asia have long-established traditions of cultivating the faculties of

Conflicts of interest: The authors declare that there are no conflicts of interest related to the subject matter or materials discussed in this article.

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http://dx.doi.org/10.1016/j.jcma.2015.03.008

the younger generation in the emerging field of science and technology. Currently, many scientists in that region have an ongoing mandate to educate and train the younger generation to facilitate future innovation and advancement in the field, while also working with venture capital elements and the corporate sector at the same time to optimize their research opportunities. It goes without saying that modern scientific investigation has proven the medicinal value of medicinal plants. Herbal medicines and their derivatives have been incorporated into traditional medicine virtually since the beginning of recorded history. But it is only in recent times that the broader use of medicinal plants is beginning to garner acceptance in the more expansive international domain. There are certain bottlenecks in the process, including but not limited to the lack of quality control and toxicological studies, the imperative to increase product shelf life, and compliance with international regulatory standards that need to be overcome before their full market potential can be realized. Various medicinal plants have antifertility activities (Table 1).[16,31–50] The Unani system of medicine is an indigenous treatment, very prevalent in South Asia and popular among large populations in India, Pakistan, Bangladesh, and Sri Lanka. More specifically, Unani medicine is part of the South Asian culture where it is practiced among a large segment of the population. Due to its regional popularity, Unani medicine has achieved an exponential growth over the past 5 decades in South Asia. On a practical basis, Unani medicine is innovative in that its practitioners have accepted and managed to avoid many of the challenges that practicing professionals make, including issues with practice–patient relations, forms of intervention, and disease conceptualization itself. Unani medicine has maintained its popularity in a number of South Asian countries, and is used by > 65% of the total population in Pakistan alone. This knowledge that is presently used to control conception, though still in use among tribal populations, requires further scientific examination, so that the active components present in such plants which are capable of obstructing the reproductive cycle can be properly delineated and utilized. The global herbal medicine sector is expected to reach close to $115 billion profit by 2015, according to the Global Industry Analyst Market and such growth is fueled by a trend towards herbal and nature-based products based on the presumption these products cause fewer side effects than modern medicines. Approximately 75% of the population in emerging nations receive herbal medical health care, compared with over half of the population in developed nations, particularly for lifestyle-related diseases. The herbal medicine market is also benefiting from a structural change in how it can generate financial gain for different countries and their business sectors, which is why more companies are providing medical coverage

Table 1
List of antifertility medicinal plants.

| Plant | Type | Dose/body weight (mg/kg) | Activity | Refs |
|---|---|---|---|---|
| *Cichorium intybus* | 50% ethanolic extract | 50 | Anti-implantation | 16 |
| *Cuscuta reflexa* | Ethanolic extract | 800 | Anti-implantation | 16 |
| *Rubia cordifolia* | Ethanolic extract | 250 | Anti-implantation | 16 |
| *Urtica diocia* | Ethanolic extract | 250 | Anti-implantation | 16 |
| *Abroma augusta* | Petroleum ether | 50 | Anti-implantation | 16 |
| *Curcuma longa* | Petroleum ether | 200 | Anti-implantation | 16 |
| *Plumbago rosea* | Acetone extract | 200 | Anti-implantation | 16 |
| *Aloe barbadensis* | Aqueous extract | 100 | Anti-implantation | 16 |
| *Abutilon indicum* | 50% aqueous methanolic extract | 500 | Anti-implantation | 16 |
| *Artemisia vulgaris* | Methanlic extract | 300 and 600 | Anti-implantation | 31 |
| *Striga orobanchioides* | Ethanolic extract | 200 | Anti-implantation | 32 |
| *Acalypha indica* Linn | Ethanolic extract | 600 | Estrogenic activity | 33 |
| *Enicostemma axillare* | Ethanolic extract | 375 and 750 | Antispermatogenic | 34 |
| *Mondia whitei* Linn | Ethanolic extract | 400 | Antispermatogenic | 35 |
| *Moringa oleifera* | 90% ethanol extract | 175 | Abortifacient | 36 |
| *Curcuma longa* Linn | 70% alcoholic extract | 500 | Antispermatogenic | 37 |
| *Abrus precatorius* Linn | 70% methanolic extract | 20 and 40 | Antifertility | 38 |
| *Aegle marmelos* | 50% ethanolic extract | 100, 200, and 300 | Antifertility effect | 39 |
| *Albizzia lebbeck* | Methanolic extract | 50, 100, and 200 | Antifertility effect | 40 |
| *Bacopa monnieri* | Dry powder | 250 | Antispermatogenic | 41 |
| *Cannabis sativa* | Alcoholic extract | 20 | Antispermatogenic | 42 |
| *Dendrophthoe falcata* | 70% methanolic extract | 100 | Antispermatogenic | 43 |
| *Fadogia agrestis* | Aqueous extract | 18, 50, and 100 | Adverse effects on male rat testicular function | 44 |
| *Juniperus phoenica* | Ethanolic extract | Intraperitoneal injections of 400 | Antifertility activity | 45 |
| *Leptadenia hastata* | Aqueous extract | 100, 200, 400, and 800 | Antispermatogenic activity | 46 |
| *Ocimum sanctum* | Benzene extract | 300 | Antifertility property | 47 |
| *Quassia amara* | Chloroform extracts | Single daily intramuscular injections of the extract for 15 d | Antifertility effect | 48 |
| *Syzygium aromaticum* | Hexane extract | 15, 30, and 60 | Degenerative changes in the seminiferous tubules | 49 |
| *Terminalia bellirica* | Alcoholic extracts | 50 mg/d | Antifertility effect | 50 |

for herbal medical care. One major obstacle to industry growth is the lack of herbal medicine education institutions and the relatively moderate amount of resources devoted to research and development. The degree of risk associated with alternative therapies is perceived as a sort of elevated or higher education of herbal medicine institutions, which is not yet fully understood by many medical professionals in the mainstream medical community. The antifertility properties of medicinal plants and their utility in human diseases for which plants have now achieved a global reputation have been experimentally confirmed around the globe over a substantial number of years. Medicinal plants have been studied for their antifertility activity, for example, various parts of different plants contain estrogen and have their own effects on different life processes. Phytoestrogens are novel agents found in a variety of plants. They have noxious effects leading to impaired fertility in domestic animals by disturbing the normal gestation process. Day by day, the world population inevitably increases due to a global lack of family planning and support. There are various methods of family planning, though all of these methods generally have some side effects. Some methods used for antifertility permanently arrest spermatogenesis and cause irreversible sterility. The extent of fertility in females and males are also being controlled by vaccines. The active mechanism in such a vaccine is typically the production of antibodies against human chorionic gonadotropin, though this vaccine causes sterility in male animals.[5] Additionally, the progression of spermatogenesis is suppressed in males by antifertility drugs. At this time, various drugs such as triptolide, tamoxifen, gossypol, and testosterone are being used as antifertility agents.[6] Clinicians working in Europe, North America, and other industrialized countries are taking an interest in research dealing with ethnopharmacology. Some of the medicinal plants discussed appear promising and may possibly lead to the development of products equally as effective as their corresponding existing drug. Furthermore, in an allopathic system, an effective abortifacient (misprostol) can be administered orally or sublingually, and is extremely cheap but does have side effects. Consequently, due to existing side effects of allopathic medicines, people are afraid of using these medicines. A review of the literature indicated the potential benefits of the use of a number of plants/preparations for fertility regulation. Some local contraceptive agents have also been described in traditional medicine. An attempt has been made to document medicinal plants that are usually prescribed as antifertility agents or have been tested for their activity *in vitro* or *in vivo*.

## 2. Methodology

A bibliographic investigation was carried out by analyzing classical text and reference books, articles, and peer-reviewed papers, as well as a thorough consultation of worldwide accepted scientific databases. We performed CENTRAL, Embase, and PubMed searches using terms such as “antifertility”, “anti-implantation”, “antiovulation”, and “antispermatogenic” activity of plants.

## 3. Medicinal plants used as antifertility agents

### 3.1. Antiovulation activity

*Polygonum hydropiper* Linn belongs to the family Polygonaceae, which is in part valued for its roots and leaves and includes such active ingredients as formic acid, acetic acid, beldianic acid, tannin, essential oil, and oxymethylanthraquinones. It is used in cases involving diarrhea, skin problems, hemorrhoids, and dyspepsia. Biologically, these ingredients can have antioxidant, antimicrobial, anti-inflammatory, and antifertility effects in humans. In one study, Kapoor et al[7] have reported on the antiovulatory activity in this plant. Their study using three types of extracts (petroleum, aqueous, and alcohol) was conducted to investigate the antifertility activity of this particular plant. Antifertility activity was observed in rabbits with copper-induced ovulation. Petroleum ether extract of the roots of *Polygonum hydropiper* was found effective in inhibiting ovulation in 60% of the animals. Additionally, $\leq$ 40% inhibition was observed by all other extracts.

### 3.2. Anti-implantation activity

*Calotropis gigantea* Linn belongs to the family Asclepiadaceae. Here, the plant part primarily used in antifertility treatments is the leaves, which operate within the active principles of glycosides and cardenolides. It is used for cases of colic, flatulence, asthma, cough, and whooping cough. The biological activities associated with this plant facilitate wound healing, have anticancer and hypoglycemic effects, as well as antifertility properties. Antifertility activity arising from *Calotropis gigantea* root has been reported in rats.[8] In one study, ethanolic extract was administered to albino rats to investigate its antifertility effect; this extract showed strong anti-implantation activity at the dose level of 250 mg/kg.[9] Another plant, *Hibiscus rosa-sinensis* belongs to the family Malvaceae, the active parts of which are believed to be its flowers. Its active principles include quercetin-7-O-galactoside, polyphenolic compounds, kaempferol, and scutellarein and it is used to treat bacterial infection, hyperlipidemia, and depression. Its asserted biological activity is antibacterial, antioxidant, hypolipidemic, and antispermatogenic. In another study, Neeru and Sharma[10] investigated the antifertility and estrogenic activity of *Hibiscus rosa-sinensis* Linn by utilizing an ethanolic extract of this plant. The plant extract exhibited strong anti-implantation and uterotropic activity (inhibition was 100%) at a dose level of 400 mg/kg.[10] Women and local physicians use *Hibiscus rosa-sinensis* for its benzene extract-related antifertility activity, which was observed to cause an 80% decrease in implantation site activity on the $10^{th}$ day of pregnancy.[11] The extract from another plant, *Butea monosperma,* was fed to female mice and decreased fertility was observed.[12] Khanna et al[13] reported that *Butea monosperma* has antifertility activity that was revealed in its hot alcohol extract. There were no implantation sites found in rats that were fed *Butea monosperma* extract at a dose of 300 mg/kg.[13]

From another plant, the aqueous extract of *Ocimun sanctum* has anti-implantation activity that was revealed in >50% of the subject rats.[14] Additionally, *Striga orobanchioides* has anti-implantation activity that is also observed in rats. It was noted that epithelial cell height, thickness of endometrium, increase in diameter, and increase in uterine weight were observed in rats after administration of two flavones, luteolin and apigenin, from *Striga orobanchioides* as compared to control rats.[15] Maurya et al[16] reported that the ethanolic extract of seeds of *Ricinus communis* (80 mg/kg), fruits of *Punica granatum* (1.82 mg/kg), roots of *Calotropis procera* (30 mg/kg), roots of *Polygonum hydropiper* (150 mg/kg), leaves of *Mentha arvensis* (100 mg/kg), leaves of *Lawsonia inermis* (134 mg/kg), seeds of *Juniperus communis* (200 mg/kg), roots of *Hagenia abyssinica* (120 mg/kg), seeds of *Crotalaria juncea* (300 mg/kg), and roots of *Cicer arietinum* (1900 mg/kg) all have anti-implantation activity. *Citrus limonum* belongs to the family Rutaceae, where its ripe fruit, root, and leaves are all used to promote antifertility outcomes. Its active principles include limonoid glycosides, limonene, geranial, neral, ichangin 4-beta-glucopyranoside, nomilinic acid, and 4-beta-glucopyranoside. The derivatives arising from this plant are used to treat scurvy, arthritis, and uterine hemorrhage. Its biological activity is stomachic, carminative, and anthelmintic. Kulkarni et al[17] reported in their study about the antifertility effect of lemon seeds (*Citrus limonum*) in female albino mice. This study was performed using female albino mice and petroleum ether, alcohol, and aqueous extract were administered to gauge antifertility activity. The extracts were administered orally for 7 days after insemination (i.e., post-ovulatory test) and 4% gum acacia was given to mice in the control group. On the 10$^{th}$ day of pregnancy, animals were investigated for implantation sites. It was determined that the activity of alcoholic extract exceeded that of both the petroleum ether and aqueous extracts. Alcohol extract was fractionated and these fractions were further evaluated to assess their antifertility properties. Overall the most significant activity was observed by fraction of ethyl acetate. Furthermore, alcoholic extract and ethyl acetate fraction were investigated to more accurately ascertain their possible mechanism of action. Ultimately, they both were confirmed to have antizygotic agent characteristics. When the test drug was withdrawn, there was a complete restoration of fertility. This study indicated that ethyl acetate fraction of alcoholic extract of lemon seeds exhibited reversible antifertility activity in female mice due to its antizygotic activity.[17] *Achyanthes aspera* belongs to the family Amaranthaceae, where those parts used consist of its leaves and seeds. It has been demonstrated that its active principles include calcium, potassium, saponins, ecdysterone, achyranthine, and inokosterone. Currently, it is used to treat asthma and cough. Previously, Shibeshi et al[18] reported on the antifertility effect of *Achyranthes aspera* Linn, indicating that its biological activity is antimicrobial, hypolipidemic, and antifertility. In one study, the antifertility activity in fertile female albino rats of *Achyranthes aspera* Linn was investigated. The orally administered dosage of ethanolic extract of this plant was 200 mg/kg, with a treatment duration of 1−7 days of pregnancy. Most notably, an 83.3% anti-implantation activity was exhibited by the ethanol extract of plant at a dose of 200 mg/kg body weight, anti-implantation and abortifacient activity was 100%.[19]

## 4. Antispermatogenic activity

*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. An earlier rat study 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. Furthermore, a reduction in immature and mature Leydig cells occurred and degenerating cells were significantly increased. Lastly, the testicular cell population was decreased. Overall, this study showed palpable plant based antifertility activity.[20] *Piper nigrum* Linn belongs to the family Piperaceae, where the parts used are fruits. The active principles are thujon, piperettine, piperolin A, piperolin B, terpene, volatile oil, starch, piperine, calcium, phosphorus, iron, thiamine, riboflavin, nicotinic acid, vitamin C, carotene, and piperidine. Derivatives of this plant are used in cases of arthritis, inflammation, asthma, dyspepsia, flatulence, nervous debility, liver affections, urine retention, amenorrhea, sexual weakness, enteritis, intermittent fever, toothache, piles, leucoderma, leprosy, neuralgia, constipation, abdominal pain, paralysis, general weakness, fever, and baldness. Its biological activity has been observed to be abortifacient, antipyretic, and antiasthmatic. In an article by Mishra and Singh[21] in 2009, the authors reported on the antispermatogenic and antifertility effects of the fruits of *Piper nigrum* Linn in mice. In this study, the drug was administered orally at a dose of 25 mg/kg/d and 100 mg/kg/d, for 20 days and 90 days and the efficacy of this plant was investigated, associated with their impact on the reproductive organs of male mice. The end points for assessments were fertility indices, organ weight, fructose content, sialic acid, histopathology, and sperm parameters. There were significant degenerative changes after 90 days of treatment with *Piper nigrum* and sperm parameters were also affected.[21] *Azadirachta indica* belongs to family Meliaceae and those parts suspected of having antifertility properties are the seeds and leaves. The active principles are margosic acid, azadirachtin, polysaccharides, nimbine, nimbidinate, nimbidol, oil, and nimbidin. Extracts from this plant are sometimes used to treat skin disorders and the biological activities are hypoglycemic, antioxidant, antiviral, and spermicidal. In one study performed on male rats, *Azadirachta indica* extract was investigated for antifertility activity. The study duration was 30 days with a drug dosage of 10 mg. A 50% ethanol extract of *Azadirachta indica* given subcutaneously, which when administered for 30 days arrested spermatogenesis.

Furthermore, the size of epididymides, Leyding cell nuclei, and semineferous tubules also were significantly reduced and the reduction in sperm motility was significant as well. It would appear that the arrest of spermatogenesis and androgen depletion was due to reduced testicular and accessory organ protein, sialic acid, and vesicular fructose content.[22] *Striga lutea* belongs to the family Orobanchaceae, and all parts of the plant have antifertility activity. Here, active principles are acacetin, luteolin, and flavones. It is used as an anti-implantation agent with its principle biological activity being its antifertility activity. Hiremath et al[23] undertook a study which reported on the antifertility capacity of this plant. Chloroform and petroleum ether extracts were used as part of the investigation. The results showed significant antifertility activity of *Striga lutea* in mice. An effective dose of chloroform extract was 50 mg/kg and petroleum ether extract was effective at 100 mg/kg. Antifertility activity was confirmed upon histological examination of the subject's uterus and ovary.[23] *Barleria prionitis* belongs to the family Acanthaceae. Parts of the plant that were used included the roots, leaves, and stem. Active principles are iridoid glycosides, barlerin, and verbascoside. It is used by people to address body ache, tooth ache, and bleeding gums. The suspected biological activity is hepatoprotective, antifertility, anti-inflammatory, immunomodulant, and antidiabetic. One recent antifertility study of the root extract of *Barleria prionitis* Linn in male albino rats has been reported. *Barleria prionitis* L. was given orally to male rats (100 mg/d). The duration of study was 60 days and the extract reduced the fertility of male rats by 100%.[24] *Tinospora cordifolia* belongs to the family Menispermaceae, and the plant stem was alleged to be the active part. Active principles are berberine, gilion, gilosterol, columbin, chasanthin, palmarin, tinosporin, alkaloid, tinosporic acid, and tinosporol. It is used to treat tuberculosis, fever, and wounds. The asserted biological activity is antifertility, antioxidant, hypoglycemic, immunomodulant, and cardioprotective. In that study, the antifertility effect of *Tinospora cordifolia* (Willd.) stem extract in male rats has been reported. Overall, 70% methanolic extract of *Tinospora cordifolia* stem was given orally to male rats at the dose level of 100 mg/d. The study's duration was 60 days during which time there was 100% suppression of spermatogenesis and reduction of male fertility.[25]

### 4.1. Effect on hormones

*Martynia annua* Linn belongs to the family Martyniaceae and its fruits and seeds are those parts which may have antifertility properties. Its active principle is luteolin and is used to treat skin infection and eczema. With this plant, the biological activity is wound healing and antifertility. In a study, 50% ethanol extract of *Martynia annua* was used to investigate its effects on male rats. There were four groups of rats and each group comprised of five animals. The first group served as a control group. An extract of 50 mg/kg was given to the second group, and 100 mg/kg of extract was administered to the third group. Lastly, a 200 mg/kg extract was administered to the fourth group. This extract was given daily for 60 days. The weights of testes, ventricle vesicles, epididymides, and seminal vesicle were significantly reduced accompanied by a reduced testicular sperm count. The severity of seminiferous epithelium lesions was dependent on the dose of the extract. Also, seminiferous tubules became reduced in size. At the secondary stage, spermatogenesis was arrested and pachytene spermatocytes degeneration was observed. Immature germ cells were damaged and sloughed. Atrophy of Leydig cells was observed. There were no morphological changes in Sertoli cells but luteinizing hormone and testosterone were reduced significantly. Concentration of follicle-stimulating hormone was not altered significantly. There were no changes in the parameters of hematology. This study indicates that extracts produce dose-related effects on male reproduction without altering the metabolism of the general body.[26] *Juniperis communis* belongs to the family Cupressaceae which has potential antibacterial properties contained in the roots. Its active principles are glycosides, formic acid, acetic acid, diterpine acid, resin, volatile oil, juniperin, vitamin C, and tannins. This plant is used in cases of urine retention, bladder problems, leucorrhea, gonorrhea, vaginal infections, scarlet fever, smallpox, and cholera. Primarily, its biological activity is diuretic and a digestive tonic. In an earlier study, Sandhya et al[27] reported on the antiprostaglandin activity of this plant which accounts for its antifertility effect. Additionally, *Juniperus communis* was investigated for its antifertility properties. Its several activities such as those promoting estrogenic, antiestrogenic, progestagenic, and anti-progestagenic mechanisms were investigated. Ultimately, its activity as an antiprogestational was significant in that it is attributed to its antifertility effect. *Andrographis paniculata* also arrests the spermatogenesis in male albino rats which is due to the andrographolide present in *Andrographis paniculata*.[27] Alpha-chlorohydrin is a male contraceptive. Oral use of alpha-chlorohydrin causes antifertility and reverses after withdrawal of alpha-chlorhydrin. Nephrotoxic and neurotoxic affects has been observed at higher doses of alpha-chlorhydrin.[28] Additionally, a reduction in weight of the seminal vesicle, epididymis, and testis and an increase in the anterior pituitary gland was observed in male rats given *Quassia amara* extract. The plant extracts of *Quassia amara* reduce follicle-stimulating hormones, luteinizing hormones, serum levels of testosterone, and epididymal sperm counts.[29]

### 4.2. Abortifacient activity

*Spondias mombin* belongs to the family Anacardiaceae where its leaves are the suspected antifertility part of the plant. Active principles are flavonoids, quercetin, ellagic acid, and rutin. It is used in the treatment of insomnia, epilepsy, and psychosis and is endowed with biological activity including antioxidant and antibacterial. In an earlier study, authors investigated the *in vivo* efficacy of this plant extract on the reproductive performance of female rats. The plant was evaluated for anticonceptive and abortifacient activity. Ovariectomized rats were used to test estrogenic activity. Acute toxicity activity of this plant was also assessed and it was found to be relatively nontoxic. Although, this plant exhibited

anticonceptive activity, it had no abortifacient activity evident from the number of pregnant animals at the end of the third trimester of pregnancy. Additionally, estrogenic activity was not exhibited by the extract. However, the study indicated that aqueous ethanol extract of the plant has significant anti-conceptive activity.[30]

In conclusion, this review aims to promote the use of plants and their extracts arising from their antifertility activities. Already, medicinal plants have a proven efficacy as antifertility agents. The mechanism of action of many herbs has been identified. Further research is required to better ascertain the bioactivity of other compounds in crude extracts and to exploit their activity as antifertility agents. As such, new and efficacious drugs can be developed by way of comprehensive investigation of the bioactivity of various compounds.

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