Critical review of scientific validity of indigenous female contraceptive drugs described in Ayurvedic literature

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Population control is the need of the hour to stabilise the world population growth and to decrease economic burden for almost all the nations on this globe. There are well established contraceptive drugs and measures have been evaluated in existing modern system of medicine. But hormonal contraceptives can not be used for long duration due to their severe side effects. Available local contraceptive measures do not give 100% surety of prevention of conception. Permanent measures are surgical therapies only. Hence, there is a need to evaluate alternate and safe formulations from indigenous systems of medicine for temporary as well as permanent sterilization. Hence in this present article, an attempt has been made to review formulations described in Ayurvedic classics and to throw light on scientific validity of the same.

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Contraception is the prevention of conception by methods other than abstinence from coitus. It is useful to limit the size and structure of the family. Contraception provides a better quality of life by helping families to use their resources for food clothing, housing, schooling and medical care. It is expected that world population is going to touch 11.5 billion /2150 with a fertility rate of 2.1 children per women. Approximately 95% of the growth will occur in developing countries. Through out the world 45% of married women of reproductive age practice contraception, while 69% in East Asia and only 11% in Africa. Population control is the need of the hour in majority of the nations on this earth. India is going to achieve the top position in population strength by next decade. Prevalence of contraceptive use in India is dated back to Vedic period. There are some references in Atharvaveda about the use of contraceptives. Ayurveda, the Upaveda of Atharvaveda, is also advanced in this regard. In Ayurvedic classics number of local as well as oral contraceptive formulations have been described.

In modern times different types of contraceptive measure have been invented and practised. Temporary contraceptive practices include oral and local methods. Oral contraceptive pills contain single or combination of hormones. Local contraceptives include condom (male and female), intra uterine contraceptive devices, diaphragm, etc. Permanent contraceptives include sterilization through vasectomy and tubectomy.

Contraceptive efficacy is generally assessed by measuring the number of unplanned pregnancies that occur during a specified period of exposure and use of a contraceptive method. There are two methods to measure contraceptive efficacy, viz. Pearl index and life table analysis.

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The Pearl index is defined as the number of failures per 100 women years of exposure multiplied by 1200 if the denominator consists of months or by 1300 if the denominator consists of cycles.

Life table analysis calculates a failure rate per month of use. A cumulative failure rate can then compare methods for any specific length of exposure.

Ayurvedic literature is very rich in therapeutic formulations for all sorts of reproductive tract disorders. Likewise references are also available about the contraceptive practises and formulations for permanent as well as temporary sterilization.

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Formulations described in Ayurvedic classics

*Bhavaprakasa* an age old Ayurvedic treatise focussing mainly on the pharmacology of herbal drugs, had described number of contraceptive formulations for the purpose of female sterilization. The details of formulations are given below:

1. Powdered *Pippali* (*Piper longum*), *Vidanga* (*Embelia ribes*) and *Tankana* (*Borax*) along with water or milk is to be given orally during *Ritukala* (Phase I of menstrual cycle).
2. *Japa* flowers (*Hibiscus rosa-sinensis*) is to be given orally in the form of paste along with *kanji* (rice gruel) and 400 yrs old *guda* (jaggery) in the dose one *pala* (48 gm) for 3 consecutive days during menstruation.
3. Paste of *Tanduliyaka* (*Amaranthus spinosus*) root with *tandulodaka* (rice water) is to be given orally for 3 consecutive days after menstruation.

*Yogaratnakara*, another post-Vedic Ayurvedic classic, mentioned about different combinations of herbomineral contraceptive preparations for local as well as oral use in female. The details are given below:

Local contraceptives

1. Moisten the *Saindhava lavana* (Rock salt) with *Tila taila* (Gingly oil) is to be applied in the vaginal canal before the coitus.
2. Fumigation of vaginal canal with *Nimba kashta* (wood of *Azadirachta indica*) before coitus.
3. Filling of vaginal canal with *Dhattura* root (*Datura metel*) powder which is up rooted during 14th day of first fortnight of lunar month.
4. Tying of *Dhattura* root (*Datura metel*) in the waist before coitus which is uprooted during 14th day of first fortnight of lunar month.

Oral contraceptives

1. *Talisapatra* powder (*Abies webbiana*) and *Gairika* (Red Ochre, Fe<sub>2</sub>O<sub>3</sub>) powder in equal parts in the dose of one *karsha* (12 gm) is to be given.
2. Paste of *Chitraka* (*Plumbago zeylanica*) root to be pasted with *Nirgundi* (*Vitex negundo*) juice one *karsha* (12 gm) is to be given with honey.

*Kuchimaratantra* an Ayurvedic treatise focussing mainly on sexual health, described some herbal combinations for permanent as well as temporary contraception.

1. Ashes of *Sehunda* stem (*Euphorbia nerifolia*) which is dried under shade and burnt is to be given orally in one *tola* (12 gm) dose daily for 21 days, which makes the women sterile in her life time.
2. *Haridra* (*Curcuma longa*) rhizome having knot, is to be given one rhizome per day during the 3 days of menstruation and continued for another 3 days.
3. Powder of *Krishna Jeeraka* (*Carum carvi*), *Kachooram* (*Hedychium spicatum*), *Nagakesara* (*Mesua ferrea*), *Haritaki* (*Terminalia chebula*), *Kalonji* (*Nigella sativa*), *Kayaphala* (*Myrica nagi*) is to be mixed and given as pills in the size of *Ziziphus* fruit for 7 days.
4. Powder of *Sharshapa* seeds (*Brassica campestris*), *Tandulam* (*Amaranthus spinosus*), *Sarkara* (sugar candy); pound with *Tandulodaka* (rice water) is to be given along with milk.

*Bhaishajya Ratnavali*, an Ayurvedic treatise of later centuries described two formulations for contraception:

1. Powders of *Dhatri* (*Emblica officinalis*), *Arjuna* (*Terminalia arjuna*) and *Abhaya* (*Terminalia chebula*) along with water make the *rajas* (follicular development) ineffective.
2. *Patha* paste (*Cissampelos pareira*) on the day of bath after menstrual cycle (i.e. on fourth day) is to be given. With this, women will not conceive.

To confirm scientific validity of these herbal and herbomineral preparations, number of pharmacological and clinical studies have been carried out by scientists of different faculties of life sciences. Some of the studies are reviewed here under for the use of scholars working in this area.

Pharmacological studies on single drugs

Many of the single herbal drugs described under contraceptive heading in the classics are found to have anti-ovulatory and anti-implantation activities on pharmacological screening.

1. *Vidanga* (*Embelia ribes*)—This drug has shown 83% anti-fertility activity in female rats treated with Embelin at a dose of 120 mg/kg post coital from D1 to D15 of pregnancy. Root powder of *Embelia ribes* in 100mg/kg, p.o. exhibited 100% inhibition of pregnancy in female albino rats. Embelin, 50 to 100mg/kg, p.o. in rats from D1 to D7 of pregnancy exhibited 85.71% anti-implantation activity, significant antiestrogenic and progestational properties. Oral doses of Embelin (embolic acid) of 15, 30, 60 and 120 mg/kg on proven fertile females administered on D1 to D5 of pregnancy exhibited 55.55-83.33% anti-implantation activity. 50%
alcoholic extract of berries in 200mg/kg/p.o./rat produced 66.5% antifertility effect.

Clinical trials carried out with aqueous extract of berries on 56 fertile women, in 200mg/day dose, starting from 5th day of menstrual cycle, for 10 days exhibited contraceptive effect during trial and side effects like nausea, vomiting, headache, bleeding per vagina are not seen. 

The drug in the doses of 50,100 and 200 mg/kg inhibit ovulation in rabbits at the level of 25, 62.5 and 87.5% and showed anti-implantation activity of 25, 62.5 and 87.5% and showed anti-implantation activity of 16.66, 58.31 and 84.33% in the above said 3 doses.

2. Talisa (Abies webbiana)—Benzene and alcoholic extracts of the Talisa leaf produced 51% anti-implantation activity. The extracts had no effect on post implantation period, oestrus cycle and teratogenicity.

3. Grinjana (Daucus carota)—Extracts of the seeds of the plant showed petroleum, ether, benzene, alcohol & water 85%, 95%, 92%, 50% of anti-implantation activity, respectively. On animal experiments this drug is found to have antifertility property.

4. Nimba (Azadirachta indica)—The drug is having anti-spermatogenicity, purgative. It is found to have spermicidal activity on in-vitro studies. This drug is found to reduce significantly cell nuclear diameter of seminiferous tubule and leydig cell. Sperm motility and sperm density also declined significantly on the use of this drug and fructose concentration of seminal vesicles was significantly reduced. Spermicidal activity of bark extract was also reported on in-vitro studies by the investigators.

5. Arjuna (Terminalia arjuna)—The drug in crude form showed anti-implantation as well as fetus absorption activity. This drug is found to have antizygotic, anti-implantation, abortifacient activities. It did not show any effect on spermatogenesis.

6. Nagakesara (Mesua ferrea)—It has shown anti-implantation activity on animal experiments. Flowers of Mesua ferrea exhibited anti-implantation activity in female rats.

7. Japakusuma (Hibiscus rosa-sinensis)—Alcoholic extract of flower exhibited significant 50-60% inhibition of pregnancy at 200 mg/kg dose. Benzene extract (total) produced 100% anti-fertility effect in 250 mg/kg. Alcoholic extract of leaves and branches caused 30% anti-fertility activity only. Flowers of the plant caused abolition of regular oestrus cycle in rats. The ethanol extract of flower was devoid of anti-fertility effect, i.e. anti-spermatogenic; anti-ovulatory, anti-implantation and abortifacient activity at 400 mg/kg, p.o. day. Benzene extract of flower of Hibiscus rosa-sinensis in 100 mg/kg exhibited post-coital anti-fertility effect in 80% of treated female rats.

The drug is having anti-fertility and anti-spermatogenic and anti-estrogenic activities. Benzene extract of flower in 250 mg/kg from day 1 to day 10 of pregnancy in rats was found most effective to prevent pregnancy.

8. Chitraka (Rakta-Plumbago rosea or Plumbago zeylanica)—Administration of root powder of Plumbago rosea in a dose of 100 mg/100gm, p.o, from D1 to D7 of pregnancy in albino rats exhibited 100% anti-fertility activity. Plumbagin C-2 methyl, 5-hydroxy, 1,4-naphthaquinone) isolated from root was found to possess significant anti-fertility activity, in dose of 20 mg/kg, p.o showed 100% anti-fertility activity. It had exhibited oestrogenic, anti-gonadotrophic and anti-ovulatory activities. It exhibited anti-ovulatory and anti-implantation activity on rabbits in a dose of 200 mg/kg, p.o. It produces 58.33%, 83.33% and 100% anti-implantation effect on rats administered orally in doses of 50,100 & 200 mg/Kg. Different individual authors have also reported its antifertility activity.

Conclusion

Ayurveda like other aspects of health is advanced in the practice of contraception. References about the practice of contraception are available since the period of Vedas. Description about the local as well as oral contraceptives and temporary and permanent contraception is available in abundant in Ayurvedic classics. For oral contraception – Japakusuma, Talisaputra, Arjuna, Sehunda, Nagakesara, Sarshapa, Haridra, Grinjana, Tanduliyaka, etc. herbal drugs and Gairiku (Red Ochre, Fe2O3, Tankana (Borax), etc. metalo-mineral drugs are described in the classics. For local contraceptive purposes – herbal drugs like Nimba, Dattura, mineral drugs like Saindhava lavana are described. On animal experiments and clinical studies these drugs are found to be very effective for the purposes contraception without causing any side effects.

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References