



## Review Article

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### A REVIEW ON SCIENTIFIC VALIDITY ON MEDICINAL PLANT USED AS FEMALE CONTRACEPTIVES

Varshney Shalini <sup>1\*</sup>, Verma Sheetal <sup>2</sup>, Arya Rishi <sup>3</sup>

<sup>1</sup>Associate Professor, P.G Department of Dravyaguna, Rishikul Campus Uttarakhand Ayurveda University, Haridwar, Uttarakhand, India

<sup>2</sup>Associate Professor, Department of Samhita Sanskrit evam Siddhant, Gurukul campus, Uttarakhand Ayurveda University, Haridwar, Uttarakhand, India

<sup>3</sup>P.G. Scholar, P.G Department of Dravyaguna, Uttarakhand Ayurveda University, Rishikul Campus, Haridwar, Uttarakhand, India

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#### \*Corresponding author

E-mail: drshalinivarshneyayu@rediffmail.com

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#### ABSTRACT

Ever increasing world's population has severely depleted the natural resources and has forced mankind to developed new fertility regulation methods. Though considerable progress has been made in the development of effective method of fertility control but most the methods developed include chemical formulation being non herbal have several side effects. It has, therefore become necessary to screen and use biologically active botanical substances as fertility regulating agents which are safe and interfere with the natural patterns of reproduction. India harbours several medicinal plants associated with traditional anti-fertility activity.

**Keywords:** Contraception, Antiovulation, Antiestrogenic agents, Abortifacient agents

#### INTRODUCTION

Rapid population growth (96% in developing countries) is burning problem worldwide. Family planning save women's lives and prevent unintended pregnancies. Slower population growth conserves resources, improves health and living standard.

Contraception, are method or devices used to prevent pregnancy. Planning provision and use of birth control is called family planning. Contraception and Fertility control are not synonyms - Fertility control includes both fertility inhibition (contraception) and fertility stimulation. While fertility stimulation is related to the problem of the infertile couples, the term contraception includes all measures temporary or permanent, designed to prevent pregnancy due to the coital act.

In our society men are never interested to use contraceptive methods. In a survey 61% male who uses contraceptive methods because of problems to female partner, while 35% are those who had experience of contraceptive failure, rest uses because of having desire to share responsibility so female contraceptive method is always used for family planning hence female contraceptive methods are always on higher priority. Contraceptive method should be effective, reversible, non-irritating, cheap and highly expectable.

Hormonal contraceptives are made from artificial hormone-like substances. These substances mimic the effect of naturally occurring hormone in the body. These hormones like substances may act as suppressing the ovulation, by producing the thick cervical mucus; Disrupting the ability of the cilia to move a fertilized egg toward the uterus that causes conception; Preventing build-up of the uterine lining and thereby inhibiting implantation of a fertilized egg in the event that one arrives in the uterus. The mere possibility that conception could occur and then the fertilized egg could be prevented from implanting is

enough to keep from ever wanting to use hormonal contraceptives (along with a host of other reasons), but it turns that the artificial hormones are harmful for women. The common side effects include obesity, cholelithiasis, gastric trouble and carcinoma of breast and cervix.

No single universally acceptable methods have yet been discovered. An ideal contraceptive should be widely acceptable, inexpensive, simple to use safe, highly effective and requiring minimal motivation, maintenance and supervision.

Numerous herbs have been used historically to reduce fertility, and modern scientific research has confirmed anti-fertility effects in at least some of the herbs tested. Herbal contraception may never reach the level of contraceptive protection as the pill, but it offers alternatives for women who have difficulty with modern contraceptive options or who just want to try a different way. Through review literature, survey of ancient and modern herbal pharmacology reveals that there are many plants having scientifically proved antifertility activity. These plants may be valuable source of herbal contraceptive for women.

#### Herbal plants for contraception in females

##### 1. *Piper longum* (S.N. *Pippali*, E.N. Indian long pepper) Piperaceae

Ras panchak of pippali, Ras (taste) is katu (pungent), Vipak (metabolism) is madhur (sweet), Virya (potency) anushnasheet, Guna (quality) laghu (light) snigdha (unctuousness), tikshna (fast acting)<sup>1,2</sup>. On phytochemical screening glucosteroid, isobutylamide, piperine, chavisine, pipartine, sesamin, piplasterol, steroid, glucosteroid, piperlonguminine are found. Piperine is major alkaloid of peppers. Root powder exhibited antifertility activity.

According to Acharya Bhavaprakash women who use equal quantity of powdered Pippali, Vidang and Tankan with water or milk during ritukal never conceives<sup>3</sup>.

#### **Evidenced based effect of pippali on female contraception**

The crude extracts, its different fraction and the major pure compound from the active fraction of the powdered fruits of *Piper longum* were studied for the anti-fertility effect in female rats. The crude extracts and its hexane fraction exhibited 100% and 86% efficacy respectively (day 1-7 post coital schedule). On the other hand, 1-butanol soluble, 1-butanol insoluble and chloroform fractions were inactive<sup>4</sup>.

Hexane fraction of fruit of *Piper longum* (PLHF) at doses 150mg and 250mg/kg were given to mature female rats for thirty days. PLHF treatment prolonged the length of estrous cycle and there was drastic reduction in the number of implantation sites, marked suppression in the ovarian cytokines, cyclooxygenase-2 and nitric acid level, histopathological degeneration of uterine glands and endometrial epithelial cells. The serum level of LH, FSH and estradiol were altered<sup>5</sup>.

It seems that hexane fraction is potent contraceptive, further work is suggested to carried out to know the specific phytochemical ingredients causing antifertility effect.

Benzene extract of *Piper longum* in combination with methanol extract of *Embelia ribes* berries lead to inhibition pregnancy in 80% of animals<sup>6</sup>.

#### **2. *Embelia ribes* (S.N. Vaividang, E.N. Embelia) Myrsinaceae**

Ras panchak of *Embelia ribes* are Ras Katu kashya (astringent), Vipak Katu, Virya Usna, Guna Laghu, Ruksha (rough), Tikshna<sup>7</sup>. On phytochemical analysis Berries gave quinones, embelin, embolic acid, glycosides, saponins, tannins, and phenolic compounds. Active principles are found to be oestrogenic and weakly progestogenic.

As stated above it is potent contraceptive with pippali.

#### **Evidenced based effect of vaividang on female contraception**

Embelin, isolated from the berries, shows significant anti-implantation and post-coital antifertility activity. (Successful trials have been carried out at the National Institute of Immunology, New Delhi on human beings.)<sup>8</sup>

Embelin (embelic acid; 2,5-dihydroxy-3-undecyl-1,4-benzoquinone), has been investigated for its activity, It provoked remarkable anti-implantation activity when administered at 50 and 100 mg/kg doses and also reduced significantly the number of implantations ( $P < 0.01$ ) applied on 4th day of pregnancy) was 300 mg/kg ( $P < 0.01$ ). Its MED (50 mg/kg) exhibited a significant antiestrogenic and progestational properties ( $P < 0.01$ ) but could not elicit any antiprogestational activity<sup>9</sup>.

#### **3. *Plumbago zeylanica* (S.N. Chitrak, E.N. Lead wort.) Plumbaginaceae**

Raspanchak of chitrak is Ras katu, Vipak katu, Virya usna, Guna laghu ruksha tikshna<sup>10</sup>. Phytochemical constituents present in chitrak are plumbagin, alkaloids, glycosides, reducing sugar, simple phenolics, tannins, lignin, saponin and flavonoids.

In Kuchimartantra and Anangaranga, root of chitraka is described to be boiled with rice wash, and after filtration, the decoction is to be taken consecutively for three days after cessation of menstrual flow. It makes the women barren forever. In Pancasayaka, this decoction is said to make the women barren<sup>11</sup>.

According to Yog Ratnakar, Widow Woman of high family gets herself aborted by using one Karsa (12g) root of chitraka (*Plumbago zeylanica*) petted with juice of nirgundi (*Vitex negundo*) and mixed with honey<sup>12</sup>.

Its root is used as abortifacient<sup>13</sup>.

Fresh root (3-4inch) is used as intra vaginal insertion device for 15minute act like abortifacient. Five to six pieces of fresh root are dipped in 20-30 ml of cold water for ten minutes and two tea spoon of decoction is taken twice a day for a single day, act like abortifacient<sup>14</sup>.

#### **Evidenced based effect of chitrak on female contraception**

A study reveals that the Plumbagin free alcohol extract (PFAE) of *Plumbago zeylanica* root exhibit significant anti-implantation and abortifacient activity at the tested dose levels (300mg and 500mg/kg)<sup>15</sup>.

#### **4. *Azadirachta indica* (S.N. Nimba, E.N. margosa tree) Meliaceae**

Raspanchak of nimba are Ras Tikta, Kshaya, Vipak Katu, Virya sheeta, Guna Laghu<sup>16</sup>. On phytochemical analysis chemical constituents present are nimbin, nimbidin, nimboesterol, nimbidol, Volatile oils, tannins, margosin, glucoside, amino acid, calcium, Potassium, Iron.

According to Yog ratnakar, the woman who after ritukala properly fumigates her vaginal canal with the wood of Nimba (*Azadirachta indica*) never conceives<sup>17</sup>.

#### **Evidenced based effect of nimba on female contraception**

Neem oil, a traditional plant product, for long term and reversible blocking of fertility after a single intra uterine application is described. In this study neem oil, a single dose (100 $\mu$ l) was given to fertile female Wistar rats by intrauterine route and control group animals received the same volume of peanut oil. The rats treated with neem oil remained infertile from 107 to 180 days even after repeated mating with males of proven fertility, whereas all control animals become pregnant. Unilateral administration of Neem oil in the uterus blocked pregnancy only on the side of application whereas the contralateral uterine horn treated with peanut oil had normally developing foetuses; no sign of implantation or foetal resorption was noted in the Neem oil treated horn. No effect of treatment on ovarian functions was found<sup>18</sup>.

Another study reveal that Neem oil is pressed from the bark of *Azadirachta indica* is considered as spermicidal agent when used intra vaginally. It also has antimicrobial and antifungal properties. *Azadirachta indica* flower alcoholic extract given to rats at dose level of 1g/kg body weight produced an irregular pattern of oestrous cycle with prolonged diestrus phase. Also subsequently lower the frequency at which the estrus phase occurs with partial block in ovulation<sup>19</sup>.

#### **5. *Datura metel* (S.N. Datura, E.N. thorn Apple) Solanaceae**

Ras panchak of datura metel Ras Tikta, Katu, Vipak Katu, Virya Usna, Guna Laghu, Ruksha, Vyavayi, Vikashi<sup>20</sup>. On phytochemical analysis hyoscimine, scopolamine, hysciamine, atropine, meteolodine, nor hyosciamine constituents are found.

According to Yog Ratnakar there is no chance of conception to the women having coitus after tying in the waist the root of datura uprooted on 14<sup>th</sup> day of first fortnight of lunar month. Once she removes this root she conceives<sup>21</sup>.

Filling of vaginal canal with the powder of above mentioned root of datura before coitus also prevents conception.

Fresh root paste decoction of *Datura metel* should be prepared and 2 tea spoon decoction is taken once a day for five days in empty stomach act as abortifacient<sup>14</sup>.

#### **Evidenced based effect of datura on female contraception**

A study on the acetone extracts of *Datura metel* seed administered orally in the concentration of 0.5%, 1% and 2% respectively for 15 days in female albino rats shows 2% seed extract cause cent percent anti-implantation activity.

#### **6. *Hibiscus rosa sinensis* (S.N. Japa, E.N. Hibiscus) Malvaceae**

Ras Panchak of hibiscus Ras kshaya, Tikta, Vipak Katu, Virya Shit, Guna Laghu, ruksha<sup>22</sup>. On phytochemical analysis the constituent present in hibiscus are steroids, tannins, saponins and flavonoids.

According to Bhav Prakash Chikitsa sthan 70 the menstruating woman who uses flowers of japa (*Hibiscus rosa sinensis*) mixed with Kanji followed by 100 years old jaggery in the dose of one pal (40 g) for three consecutive days never conceive<sup>23</sup>.

*Hibiscus rosa sinensis* possess anti-implantation activity.

Flower of japa is described in *Bhava* prakash, brhan nighantu ratnakar and Yogaratnakar to produce sterility in the women. In Brhadyoga tarangini, it is mentioned that if taken during the time of delivery of a child, is stated to prevent future conception and, if at all there is conception, the fetus will not grow, by implication, there will be an abortion<sup>24</sup>.

Paste of 5 flowers of japa is prepared and mixed with one tea spoon honey. 2 tea spoonful of this paste is taken every day in empty stomach for 3 days' act as abortifacient<sup>25</sup>.

#### **Evidenced based effect of japa on female contraception**

In an experimental study *Hibiscus rosa sinensis* (kanji bhavit japa kusum) oral drug has proved temporary contraceptive medicine in albino rats<sup>26</sup>.

#### **7. *Sapindus trifoliatus* (S.N. Arishtak, E.N. soap nut tree of south India) Sapindaceae**

Ras Panchak of arishtak Ras Tikta, Katu, Vipak Katu, Virya Usna, Guna Laghu, Tikasan<sup>27</sup>. On phytochemical analysis - Saponin, sugar, oil, mukoroside, proteins are present.

#### **Evidenced based effect of arishtak on female contraception**

Saponins from *Sapindus trifoliatus* are known to be spermicidal. This spermicidal property has been used in contraceptive cream<sup>28</sup>.

Fruits of *Sapindus trifoliatus* are used as traditional medicine for birth control purpose. The present study is performed to evaluate its acclaimed post-coital pregnancy interception, along with associated toxicity profiles and to assess its effects on reproductive hormones.

A study reveals that the butanol extract of fruits of *Sapindus trifoliatus* at a dose of 20 mg/kg body weight inhibited fetal implantation 100% and also exhibits antiestrogenic activity. Significant variations found in gonadal and gonadotrophic hormone in serum<sup>29</sup>. Toxicity studies reveal nontoxic nature of the extract.

#### **8. *Daucus carrota* (S.N. Grinjana, E.N. carrot) Apiaceae**

Ras panchak of ducas carrota Ras madhur, kashaya, Vipak madhura, Virya usna<sup>30</sup>.

On phytochemical analysis protein, carbohydrate, carotoin, vitamin B, D and C, phosphorus, iron are present.

According to Rajnighantukar the seeds of *Daucus carrota* are garbhpaatkrita<sup>31</sup>.

Women have used the seeds from *Daucus carrota*, commonly known as wild carrot or queen Anne's Lace, for centuries as a contraceptive.

#### **Evidenced based effect of grinjan on female contraception**

Extract of seed of plant showed petroleum, ether, benzene, alcohol and water 85%, 95%, 92%, 50% of anti-implantation activity, respectively. On animal experiments this drug is found to have antifertility property<sup>32</sup>.

#### **9. *Carica papaya* (S.n. Erandkarkati E.n. papaya) Caricaceae**

Raspanchak of papaya are Ras katu tikta, Vipak katu Virya usna, Guna laghu ruksha tikshna<sup>33</sup>. On phytochemical analysis papain, caricine, carposide glycoside, myrocine, carpasemine are present.

Shri bapa lal Vaidya said that the seeds of *Carica papaya* act as abortifacient<sup>34</sup>.

Fresh or dried seeds paste is prepared, 2 tea spoon paste decoction taken every day after menstrual period till commencement of next menstrual period. It acts as contraceptive<sup>14</sup>.

#### **10. *Cucuma longa* (S.n. Haridra, E.N. turmeric) Zingiberaceae**

Ras panchak of haridra Ras katu and tikta, Vipak katu, Virya usna, Guna ruksha laghu<sup>35</sup>. Chemical constituents present in haridra are curcumin, flavonoids and aminoacids and alkaloids.

According to kucimartantra one piece of the node of the rhizome of haridra should be taken every day, for six days (three days during menses and three days thereafter) produce sterility<sup>36</sup>.

#### **Evidenced based effect of haridra on female contraception**

In a study, it indicated that the aqueous extract of *Curcuma longa* possesses postcoital contraceptive efficacy by virtue of anti-implantation activity<sup>37</sup>.

The aqueous extract of rhizome of *Curcuma longa* possesses anti-plantation activity and the mild estrogenic nature of the extract may be responsible, at least partly, for this anti-conceptive effect<sup>38</sup>.

*Curcuma longa* was given to albino rats caused suppression of the oestrous phase and suppression of ovulation.

The petroleum and aqueous extract showed 100% anti-implantation in rats at a dose of 200mg/kg body weight when fed orally on days 1 to 7 of pregnancy<sup>39</sup>.

#### **11. *Gloriosa superba* (S.n. Langli, E.n. malabar glory lily) Liliaceae**

Ras Panchak of langli, Ras Katu, Vipak katu, Virya usna, Guna Laghu, tikshna Prabhav Garbhpatan<sup>40</sup>. Chemical constituent present in langli are Colchicine, Gloriosine, superbine, benzoic acid, Salisilic acid, Colin, and Sugar.

The root of langli act as abortifacient (garbhapatni)<sup>41</sup>.

#### **Evidenced based effect of langli on female contraception**

In a study, Oral administration of hydroalcoholic extract of *Gloriosa superba* at two different doses (30 and 60 mg/kg body wt) showed most significant dose dependent anti-fertility activity. The treated animals showed anti-implantation activity in postcoital study (administered from days 1 to 7). This study clearly reveals that the extract is effective before and after the implantation occurred. Hence, the drug indicated the highest anti-fertility activity. The loss of implantation may be due to

their anti-zygotic, blastocytotoxic, anti-implantation or by early abortifacient activity<sup>42</sup>.

There are too many more plants used as contraceptives, we can classify them according to their activity such as estrous cycle disruptors, antiestrogenic, anti-implantation, abortifacient.

**Table 1: Herbal Plants acts as Antioestrogenic Agents**

S.N.	Ayurvedic Name	Latin Name	Family	Parts
1.	Aragvadh	<i>Cassia fistula</i>	Caesalpinioideae	Seeds
2.	Palash	<i>Butea monosperma</i>	Fabaceae	Root
3.	Tambul	<i>Piper betel</i>	Piperaceae	Petiole
4.	Tulsi	<i>Ocimum gratissimum</i>	Labiataeae	Stem

**Table 2: Herbal Plants acts as Abortifacient Agents**

S.N.	Ayurvedic name	Latin name	Family	Parts
1.	Aristhak	<i>Sapindus trifoliatus</i>	Sappindaceae	Seeds
2.	Datura	<i>Datura metal</i>	Solanaceae	Seed
3.	Erandkarkati	<i>Carica papaya</i>	Caricaceae	Seed
4.	Grinjana	<i>Daucus carota</i>	Apiaceae	Seed
5.	Hingu	<i>Ferula narthex</i>	Apiaceae	Oleo gum resin
6.	Kalihari	<i>Gloriosa superba</i>	Liliaceae	Roots
7.	Karpas	<i>Gossypium herbaceum</i>	Malvacea	Root Bark
8.	Kumara	<i>Aloe vera</i>	Liliaceae	Fresh Leaves
9.	Indrayan	<i>Citrulus colocynthis</i>	Cucurbutaceae	Fruit

**Table 3: Herbal Plants acts as Anti-implantation agents**

S.N.	Ayurvedic name	Latin name	Family	Part
1.	Arka	<i>Calotropis procera</i>	Euphorbiaceae	Root
2.	Erand	<i>Ricinus communis</i>	Euphorbiaceae	Seed
3.	Haridra	<i>Curcuma longa</i>	Zinziberaceae	Rhizome
4.	Madyantika	<i>Lawsonia inermis</i>	Lythraceae	Leaves
5.	Japa	<i>Hibiscus rosa-sinensis</i>	Malvaceae	Flower
6.	Palandu	<i>Allium cepa</i>	Liliaceae	Bulb
7.	Tulsi	<i>Ocimum sanctum</i>	Labiataeae	Leaves
8.	Uruman (khumani )	<i>Prunus armeniaca</i>	Rosaceae	Kernels

**Table 4: Herbal Plants acts as Estrous Cycle Disruptors Agents**

S.N.	Ayurvedic name	Latin name	Family	Parts
1.	Vaividang	<i>Embelia ribes</i>	Myrsinaceae	Berries
2.	Nimb	<i>Azadirachta indica</i>	Meliaceae	Flowers and Seeds
3.	Karvellak	<i>Momordica charantia</i>	Cucurbitaceae	Seeds
4.	Haridra	<i>Curcuma longa</i>	Zinziberaceae	Rhizome
5.	Vyaghraerand	<i>Jatropha gossipifolia</i>	Euphorbiaceae	Seeds
6.	Durva	<i>Cynodon dactylon</i>	Graminaeae	Whole plant
7.	Amlavetas	<i>Garcinia cola</i>	Guttifereae	Seeds
8.	Patha	<i>Cissampelos pareira</i>	Menispermaceae	Leaves
9.	Chitrak	<i>Plumbago zeylanica</i>	plumbaginaceae	Leaves
10.	Shatpushpa	<i>Anethum graveolens</i>	Umbellifereae	Seeds

These are some medicinal plants having contraceptive activity, but here are some formulations described in Ayurvedic literature for contraception. The ingredients of these formulations may potentiate each other and synergistically act as contraceptives.

Powders of vidanga (*Embelia ribes*) powder of pippali (*Piper longum*) and tankan in a dose of 2 g twice a day, after meals for six months continuously show no pregnancy even after 2 years of follow up<sup>43</sup>.

Japa flowers (*Hibiscus rosa sinensis*) is to be given orally in the form of paste along with kanji (rice gruel) and 400 years old guda (jaggery) in the dose one pala (48 g) for 3 consecutive days during menstruation<sup>43</sup>.

Paste of tanduliyak (*Amaranthus* sp.) root with tandulodak (rice water) is to be given orally for 3 consecutive days after menstruation<sup>43</sup>.

Talispatra powder (*Abies webbiana*) and gairik (red ochre, Fe<sub>2</sub>O<sub>3</sub>) powder in equal parts in dose of one karsha (12 g) is given<sup>43</sup>.

Paste of chitrak root (*Plumbago zeylanica*) with nirgundi (*Vitex negundo*) juice one karsha (12g) is given with honey<sup>43</sup>.

Powder of krishnajeerak (Carumcarvi) kachooram (*Hedichium spicatum*), nagkesar (*Mesua fereae*), Haritaki

(*Terminalia chebula*), kalonji (*Nigella sativa*), kayaphala (*Myrica negi*) is to be mixed and given as pills in size of ziziphus fruit for 7 days.

## CONCLUSION

This review is summarised some medicinal plants used as contraceptive in Ayurvedic literature, their properties, phyto-constituents, scientific researches on these plants. Other than these, many plants such as *Tectona grandis*, *Garcinia cola*, *Aspilla africana* (wild sunflowers), *Jasmine*, *Anethum graveolans*, *Stachys lavandulifolia*, *Guaiacum officinale* are also described having contraceptive activity. It is suggestive to find out the specific phytochemical causing the specific effect on reproductive organs and hormone levels for contraception, and also to find out how they act such as abortifacient, estrous cycle disruptors, antiestrogenic, anti-implantation etc. Researches are advised to evaluate the efficacy, safety of formulations described in Bhavaprakash and Yogratnakar and also make new preparations in scientific manner that they can be proven an effective, acceptable, inexpensive, simply to use, safe, herbal having no side effects

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