

Understanding pharmacokinetics of *ruksha* and *laghu* qualities while using as herbal contraceptives

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Abstract

Rapid increase in population is a serious problem throughout the world. Nowadays birth control become necessity in India because many socio-economic conditions of people have been adversely affected by increasing crimes, illiteracy, diseases, improper food and shelter. As women plays a pivotal role in the family, she is also responsible for the wellbeing of the family so, women's healthcare need to be safe and effective. Modern contraceptives / synthetic anti-fertility agents have various side effects like weight gain, nausea, headache, carcinoma of cervix, carcinoma of breast etc. So it is necessary to use biologically active substance as fertility regulating agents. In *Bhavprakash* and *Yogratnakara*, there are some herbal contraceptive described. *Pippali* (*Piper longum*), *Vidanga* (*Embelia ribes*), *Japakusum* (*Hibiscus rosa-sinensis*) are considered as potent contraceptives. These drugs acts as uterine constrictor in order to act as contraceptives. They

mainly possess *Laghu* and *Ruksha* Guna and *katu vipaka* which increase *Vata dosha* that helps in *Garbhashaya sankocha* causing expulsion of un-implanted fertilized ovum. Several studies on the above mentioned herbs have reported that they contain some active ingredients like saponins, steroids, etc. which are responsible for the antifertility effect like anti-ovulation, anti-implantation and shown minimal side effects in comparison to the chemically synthesized contraceptive which usually contain various combinations of hormones. Here we have concluded that some of the herbs possessing *Ruksha* and *Laghu* qualities can be used as contraceptives. These herbal contraceptives can provide an opportunity for affordable, potential and efficient replacement with having lesser side effects, particularly to the women living in the rural areas.

Key words – Contraceptives, *Piper longum*, *Embelia ribes*, *Hibiscus rosa-sinensis*

Introduction-

Reproduction is a unique property and vital process of the living being. This can produce young ones like themselves after having attained maturity. Thus continuity of life can be maintained¹. In ancient times it was assumed that without having a child, one cannot get *moksha*. Population explosion is creating so many obstructions worldwide day by day. According to World Population Prospects: the 2017 revision, world's population numbered nearly 7.6 billion as of mid-2017 and expected to reach 8551 million at 2030 and 9772 million at 2050. Census reports of India shows that, India has reached 1.2 billion in 2011². There will be no proper check on diseases, crimes, illiteracy, other destructive activities, food and shelter.

A method or a system which allows intercourse and yet prevents conception is called a contraceptive method. Contraceptive measures may be used to avoid pregnancy entirely, to space pregnancies or to temporarily postpone pregnancy.³ The process of conception or fertilisation involves a sperm fusing with an egg, usually occurring in the ampulla of fallopian tube. The result of this union is the production of zygote cell or fertilized egg. Five to six days after fertilisation it moves as blastocyst and attaches and invade on uterus endometrium called implantation process and remain attached till birth⁴.

Since many decades, various types of contraceptives method are being tried on women such as IUCD's, tubectomy, parenteral and oral contraceptives. None of them have proved to be absolutely safe method. Currently available oral contraceptives like Mala -D, Mala-N, Ovral etc. are hormonal contraceptives which are made from artificial hormone like substances. They decrease the effect of natural producing hormones in the body. They act by suppressing the ovulation, by producing the thick cervical mucus or by disrupting the ability of the cilia to move a fertilized egg towards the uterus which causes conception or by inhibiting implantation of a fertilized egg that reaches the uterus. But these hormonal contraceptives may induce obesity, nausea, headache, cancer of cervix and breast, candida vaginitis, trichomonas vaginitis.³ Since all these above side effects does not fulfil basic expectations of woman with contraception, that it should be safe, effective, acceptable with fewer side effects, less expensive, simple to administer, independent of coitus, long lasting enough to obviate frequent administration and requiring little or no medical supervision.

In Ayurveda according to *Acharya Charka* definition of embryo is ⁵–

शुक्रशोणितजीवसंयोगेतु खलु कुक्षिगते गर्भं सञ्जा भवति॥

The combination of sperm, ovum and life –principle implanted in the womb is known as embryo.

In Ayurveda according to *Acharya Sushruta* factors responsible for conception⁶ –

ध्रुवंचतुर्णासान्निध्याद्गर्भः स्याद्विधिपूर्वकम् ।

ऋतुक्षेत्राम्बुबीजानांसामग्र्यादङ्कुरोयथा ॥

As sprout comes out by the aggregate of season, soil, water and seed, conception takes place positively if these four factors are combined properly. Here, *Rutu* means woman's period of ovulation; *Ksetram* means uterus; *Ambu* means pervading *rasa dhatu* formed by digested food and *Bijam* means ovum and sperm of woman and man.

Numerous indigenous drugs are been described in Ayurveda for the management of various reproduction-related purposes. Various plant preparations are accounted to have anti-fertility regulation property and only a few have been tested for such effects. These herbal contraceptives are health friendly, easily available and also pocket friendly even in rural areas. There are several ways in which herbs can impair fertility. Some herbs may affect the uterus, while others act upon the ovary, affect normal hormone production or block certain hormones.

Review of literature:

In Ayurvedic text like *Bhavaprakash* and *Yogratnakara* has mentioned *Pippali*, *Vidanga* and *Japakusum* in *garbhanivarana yoga*.

पिप्पलीविडंगटकणसमचूर्णं या पिबेत्पयसा ।
ऋतुसमये न हि तस्या गर्भः संजातये क्वापि ॥

The woman who use equal quantity of powdered *Pippali*, *Vidanga* and *tankan* with water or milk during *rutukal* never conceives^{7,8}.

आरनालपरिपेशितं त्र्यहं या जपाकुसुममति पुष्पिणी ।

सत्पुराणगुडमुष्टिसेविनी सा दधाति नहि गर्भसंगना ॥

The menstruating woman who uses flowers of *japa* mixed with kanji followed by 100 years old jaggery in the dose of one *pal* (48 g) for three consecutive days never conceives^{7,8}.

1. *Pippali*-



Latin name - *Piper longum*

Family – Piperaceae

Ras panchak of root of *Pippali*,

दीपनं पिप्पलीमूलं कटूश्णं पाचनं लघु ।
रूक्षं पित्तकरं भेदि कफवातोदरापहम् ॥⁹

Ras – *Katu*,

Vipaka- *Katu*

Virya – *Ushana*,

Guna- *Laghu* and *Ruksha*.

Phytoconstituents - piperine, glucosteroid, isobutylamide, steroid, piplasterol.

1. Root powder exhibited anti-fertility activity.
2. According to *Bhavaprakash* women who use equal quantity of powdered *Pippali*, *Vidanga* and *tankan* with water or milk during *rutukal* never conceives⁷.
3. Combination of benzene extract of piper longum and methanolic extract of *Embelia ribes* leads to inhibition of pregnancy in 80% of animals¹⁰.

4. Piper longum were studied for the anti-fertility effect in female rats. The crude extract and its hexane fraction exhibited 100% efficacy and 86% efficacy respectively¹¹.
5. Hexane fraction of fruit of piper longum prolonged the length of estrous cycle and there was a 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 altered¹².

2. Vidanga-



Latin name- *Embelia ribes*

Family- Myrsinaceae

Ras panchak of berries of Vidanga,

विडंग कटु तीक्ष्णोष्णं रुक्षं वह्निकरं लघु //

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Ras – *Katu kashaya*,

Vipaka- *Katu*

Virya – *Ushana*

Guna- *Laghu, Ruksha, Tikshana*.

Phytoconstituents – embelin, quinones, embolic acid, glycoside, saponins, tanins and phenolic compound.

1. Dried berries of *Vidanga* have been reported to possess antifertility activity.
2. One of its active component embelin has been documented to possess significant implantation activity in rats¹³.
3. A clinical trial of oral contraceptive conducted shown that aqueous extract of *Embelia ribes* showed 85% post coital antifertility¹⁴.
4. 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.)¹⁵.

3. Japakusum-



• Latin name- *Hibiscus rosa-sinensis*

• Family- Malvaceae

• Ras panchak of flowers of japakausum,

• Ras – *Kashaya, Tikta*,

• Vipaka-*Katu*,

• Virya – *Shita*,

• Guna- *Laghu, Ruksha*.

Phytoconstituents - in flower of *Japakusum* are steroids, saponins, tanins and flavonoids.

1. According to *Bhavaprakash chikitsasthan* 70 the menstruating woman who uses flowers of *japa* mixed with kanji followed by 100 years old jaggery in the dose of one *pal* (48 g) for three consecutive days never conceives⁷.
2. In *Brahadyogatarangini*, it is mentioned that if taken during the time of delivery of a child, is stated to prevent future conception, if at all there is conception, the foetus will not

grow, by implication, there will be an abortion¹⁶.

3. The anti-implantation and pregnancy interruption study done by Kashinath hadimur et al 2013 indicated the contraceptive activity of *Japakusum*. In this experimental study *hibiscus rosa-sinensis* (*kanji bhavit japakusum*) oral drug has proved temporary contraceptive medicine in albino rats. The presence of saponins, steroids, flavonoids and tanins in *Japakusum* might have contributed in contraceptive activity¹⁷.

<i>Paanchbhautika</i> constitution	<i>Pippali</i>	<i>Vidanga</i>	<i>Japakusum</i>
	<i>Katu- Katu- Ushna</i>	<i>Katu, kashaya - Katu- Ushna</i>	<i>Kashaya, tikta- Katu- Shita</i>
<i>Prithvi</i>	-	+	+
<i>Jala</i>	-	-	-
<i>Agni</i>	+	+	-
<i>Vayu</i>	+	++	++
<i>Aakash</i>	-	-	+
Total	50% <i>vayu</i> , 50% <i>agni</i>	50% <i>vayu</i> , 25% <i>prithvi</i> , 25% <i>agni</i>	50% <i>vayu</i> , 25% <i>prithvi</i> , 25% <i>akash</i>

Table no. 1. *Paanchbhautika* constitution in *Pippali*, *Vidanga* and *Japakusum*

Discussion –

In Ayurveda, herbs used for *Garbhasthapana* or *Prajasthapana* (implantation) possess *guru* and *snigdha* quality and *Madhur Ras* and *Madhur vipaka*. These qualities offer the foetus essential nutrition and energy which is helpful in implantation. On contrary such herbs which possess *Laghu* and *Ruksha* quality and *katu vipaka* are responsible for increase in the qualities of *Vata dosha* that supports in *Garbhashaya*

sankocha causing expulsion of un-implanted fertilized ovum.

Conception needs *guru guna* and *snigdha guna* for the union of cells. To break this condition for the purpose of dismantling the *garbha* from the *Garbhashaya*, opposite attributes of the *guru* and *snigdha* qualities are essential. In such condition *Laghu guna* which is the main source for the work of reduction, along with the *Ruksha guna* are proposed as they can cause separation of the *paramaanu* from each other which is the main concept of dismantling of the *garbha* from the

Garbhashaya. Secondly, the *chala guna* of *vata* initiates the movement of the muscles of *Garbhashaya* resulting in contraction of uterus, ultimately leading in expulsion of foetus. *Paanchbhoutic* constitution of above mentioned herbs reveals that each herbs possess minimum 50 % of *vayu mahabhuta* and absence of *jala mahabhuta*. We are aware of the fact that when *Vayu, Aakash* and/or *Agni* are present in excess percentage in the *paanchbhautika* constitution, it is said to be hydrophobic entity and when *Prithvi* and *Jala* are present in excess percentage in the *paanchbhautika* constitution, it is

said to be hydrophilic entity. Obviously the three drugs in discussion are in possession of *ruksha, laghu, vishad, sūkṣma* attributes due to their constitutional arrangements.

In the above description we have observed that these three medicinal herbs have been shown to be in possession of anti-implantation property. So when discussing about the three herbs mentioned in above table, we can say that these herbs shown by different scientist as contraceptives, are actually working due to their *ruksha, laghu, vishad, sūkṣma* attributes.

Stage of <i>Rutuchakra</i>	Dominance of <i>Mahabhuta</i>	Necessary qualities for continuation of the stage	Opposite qualities to inhibit the stage
<i>Rutukala</i> (if fertilized, called as implantation process)	<i>Prithvi + Jala</i>	<i>Snigdha, Pichchila, Sthira, Guru</i>	<i>Ruksha, Laghu, Vishad, Sūkṣma</i>
<i>Rutuvyatita</i>	<i>Agni</i>	<i>Ushna, Tikshna, Sukshma</i>	<i>Shita, Mrudu, Sthula</i>
<i>Rajakala</i>	<i>Vayu + Aakash</i>	<i>Ruksha, Laghu, Vishad, Sūkṣma</i>	<i>Snigdha, Pichchila, Sthira, Guru</i>

In the description of *rutuchakra* explained in Ayurveda, there are three phases according to the dominance of *dosha*, where *rutukala* is the phase characterised with proliferation of endometrium followed by ovulation. Earlier we have seen that 5 to 6 days after fertilisation, it moves as blastocyst and attaches and invade on uterus endometrium, which is labelled as implantation process. As shown in the above table, this implantation process is in need of *snigdha, pichchila, sthira*, and *guru* qualities for the proper implantation. In ancient texts, medicinal plants from the *Nyagrodhadi* class,

which are in possession of *Kashaya rasa* due to the presence of *Prithvi* and *vayu mahabhuta* in their constitution are used mainly for the appropriate stability of the implantation. So if we want to unstable the implant of blastocyst from the endometrium, obviously the medicinal herbs with opposite qualities of the *Nyagrodhadi* class should be used. *Pippali, Vidanga* and *Japakusum* are in possession of *ruksha, laghu, vishad* qualities and *katu vipaka*. The mention of *katu vipaka* in the context of implantation of blastocyst is very noteworthy, because we are aware of the fact that *Katu vipaka* is responsible for

the enhancement of *Apana vayu*, who among other important activities, controls all the functions in the genital tract. As excretion or movement of any substance from one place to another is the function of *Vayu*¹⁸, the amplified *chala* quality of *Vata dosha* due to the excess *katu vipaka* becomes responsible for the removal of the unstable implant from the endometrium. Another important impact of these three herbs on the *Vata dosha* is that, these herbs triggers the contraction activity of the *Vata dosha*, leading to the expulsion of un-implanted fertilized ovum.

Thus, these herbal contraceptives have the ability to interfere with implantation which makes it difficult for the blastocyst to implant or maintain its grip on the uterine wall. It is also important to note that as implantation occurs about 6 days after the fertilization, for necessary contraceptive activity, the attributes from these three herbs mentioned above should be present in the body in this time-interval.

Conclusion –

1. In ancient texts, it is clearly stated that *Pippali*, *Vidanga* and *Japakusum* should be used for the purpose of avoiding *Garbh-sambhav*.
2. Many modern research studies have revealed that *Pippali*, *Vidanga* and *Japakusum* are in possession of anti-implantation activity.
3. *Pippali*, *Vidanga* and *Japakusum*, shown by different scientist as contraceptives, are actually working due to their *ruksha*, *laghu*, *vishad*, *sūkṣma* attributes

existing in themselves by the presence of *Vayu* + *Aakash* and/or *Agni* mahabhuta in their constitution.

4. The amplified *chala* quality of *Vata dosha* due to the excess *katu vipaka* of *Pippali*, *Vidanga* and *Japakusum*, becomes responsible for the removal of the unstable implant from the endometrium.
5. Another important impact of these three herbs on the *Vata dosha* is that, these herbs triggers the contraction activity of the *Vata dosha*, leading to the expulsion of un-implanted fertilized ovum.
6. As implantation occurs about 6 days after the fertilization, for necessary contraceptive activity, the attributes from *Pippali*, *Vidanga* and *Japakusum* should be present in the body in this time-interval.

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