

**PHARMACOLOGICAL ACTION OF SUKHA PRASAVAKARA DRUGS – A REVIEW**Haindavi Manthani<sup>1</sup>Mahesh Boddu<sup>2</sup><sup>1</sup>Dept. of Prasuti evam Stree Roga, Dr. BRKR Govt. Ayurvedic College, Hyderabad, India<sup>2</sup>Laxmi Kousalya Hospital, Mancherial, Adilabad Dist, Andhra Pradesh, India**ABSTRACT**

*Ayurveda*, the science of life, has abundant knowledge to give to the human kind so that they lead a healthy life as designed by nature. But as time goes on, there was a deviation from the law of nature. Among various lifestyle disorders, women delivering by caesarean section can also be considered one of it. *Ayurveda* has described many drugs for the sake of natural vaginal delivery. Most of the plants claimed to be oxytocics are used to induce and maintain labor, aid the removal of retained placenta, regulate post-partum bleeding and so on. The plant extracts increase the spontaneous activity of the uterus causing increase in contractions. Medicinal plants used to speed the birth process are usually administered towards the end of the gestation period or at the onset of labor pains. Plants that produce uterine contractions have a similar action to that of oxytocin and prostaglandins which stimulates the uterus, causing strong contractions, and thus producing necessary sequential events for delivery. Traditional birth attendants, mother-in-law, mothers and the expectant mother mostly prescribe herbal remedies to induce labor. Hence to enlighten the use of these drugs routine in the medical practice by obstetricians a step was laid down by giving the pharmacological action of the drugs mentioned in the classics indicated for *sukha prasava*.

**Keywords:** *Sukha Prasava*, Oxytocics, induce labor, Vaginal delivery, Pharmacology

**INTRODUCTION**

Motherhood is a crowning act in a woman's life. Every woman seeks to enter this new world of Mother with minimal pain, agony and operative aids. In this modern era, even though man has conquered the world with vast science and technology, there are certain things where the age old *shastras* and *Vedas* rule. Pertaining to the gynecology and obstetric practice, it seems that the *Ayurvedic* medications and medical practice holds good than the allopathic way of managing the cases. For instance, if we compare the nature of delivery of women in

olden days and the present era, it will be clear that most of women in present days are being delivered by operative method i.e C-section where as in past, women used to deliver naturally. Thus, they were healthy with their healthy genital organs without any complications. So, we can assume the women delivering by any method other than vaginal are considered as the delivery was against nature.

Women today are suffering from various kinds of lifestyle disorders which include fibroids, cancers and lesions. The etiology for all these is unknown but may lie in the changed lifestyle of nature of deli-

very. Man is considered as a social animal. The law of nature is equal to all the animals. The animals deliver naturally still in this era as designed by nature but the human race is running against the law of nature. Ayurveda is the science of life of *purusha*. It has abundant knowledge embedded in it. It also gives information about the *sukhaprasavakara yogas* and herbs which supports woman and helps her in delivering vaginally and naturally. Thus, an effort was made to enlighten the *sukhaprasavakara yogas* described in the *Ayurvedic* classics according to the pharmacological action on labor so that they can be used in common practice and help women to have a happy delivery.

#### Review of *sukha pravakara* drugs:

##### Medications for inhalation

- A woman in labor after the initiation of labor pains should inhale the powders of *Kusta* (*Saussuria lappa*), *Ela* (*Elettaria cardamomum*), *Langali* (*Gloriosa superba*), *Vacha* (*Acorus calamus*), *Chavya*, *Chitraka* (*Plumbago zeylanica*), *Cirabilwa* (*Holoptelea integrifolia*) each separately or in combination of all.<sup>1</sup>
- Inhalation of smoke of *Bhurja patra* (*Betulauilis*), resin of *Simsipa* (*Dalbergia sissoo*) and *sarjarasa* induces labor.<sup>1</sup> According to *Indu*, the inhalation was advised to be given in the period in between the contractions.
- *Kashyap* has added the use of *Guggulu* (*Balasmiodendron mukul*) for inhalation as *sukha prasavakara*.<sup>2</sup>

Hypothetical explanation gives that the drug may initiate systemic absorption usually considered to act through the vast plexus of blood vessels which line the nasal

cavity, or may give reflex action to the nerves and act centrally.

##### Internal medications

- *Bhela* says that decoction of *Danti* (*Baliospermum montanum*), *Dravanti* (*Croton tiglium*), *Vrschikali* (*Pergularia extensa*), *Punarnava* (*Boerhavia diffusa*) and *Vanatikataka* should be given for drinking in cases of prolonged labor.<sup>3</sup>
- *Bhela* also suggested drinking one *aksha* boiled red *sali* rice mixed with sour drinks and cow urine.<sup>3</sup>
- *Matulunga moola* (*Citrus medica*), *Madhuka* (*Glycyrrhiza glabra*) powders mixed in equal quantity along with ghee taken internally.

##### Topical medication

- *Pinditaka* (*Randia dumetorum*) *yonidhoopana* fastens labor.<sup>4</sup> It may help in cervical dilatation and also is known to relieve inflammatory barrier obstruction in the pathway of birth canal when topically used.
- Fumigation of slough of black snake was described as *sukhaprasavakara yoga*.<sup>4</sup> Although now-a-days it is not practiced; it lies in the matter of research.
- Anointment of *Potaki moola kalka* with *tila* inside the vaginal canal.<sup>5</sup> This may be correlated as the prostaglandin vaginal application which dilates cervix.

##### Amulets

- Root of *Hiranyapushpi* (*Euphorbia thomsoniana*) tied over arms and legs.<sup>6</sup>
- Root of *Vishalya* (*langali/dravanti*) or *Suvarchala* (*Gynandropsis pentaphylla*) can be tied over arms or legs.<sup>7</sup>
- Roots of *Ikshu* (*Saccharum officinarum*) or *Tala* (*Borassus flabellifer*) grown on northern side knotted in a thread measuring to the length of the women should be tied in waist.

• Roots of *Apamarga* (*Achyranthus aspera*), *Paaribadra* (*Erythrina indica*), *Kakajanga* (*Leeahirta*) should be tied in waist.

According to *Ayurveda*, all the drugs which are given to tie on the body act through the *Prabhava* concept. Mere contact of the drug with the body surface may trigger the necessary hormones or reflexes required for proper expulsion of fetus. The scientific explanation is a difficult thing to explain.

### **Lepas and Mantras**

• Anointment of *Pippali* (*Piper longum*), *vacha* (*Acorus calamus*), pestle with water and mixed with *eranda taila* (*Ricinus communis*) over the umbilicus induces labor pains. It may act by local stimulation of abdominal muscles and there by the uterine muscles to contract well.

• Use of *chyavana mantra* will induce labor. The mantra effect upon the labor might possible by influencing posterior pituitary gland via hypothalamus which in turn increases the amount of oxytocin required for the uterine contractions.<sup>8</sup>

Many drugs were prescribed by the *acharyas* for the *sukhaprasava*. Phytochemical action of all the drugs in relation to oxytocic effect is a big deal of process to explain. Thus, some of these classical drugs were picked up and their pharmacological action in relation to the uterine contractions and action on the birth process is described.

### **Brief introduction to the drugs**

#### **1. APAMARGA**

Latin name : *Achyranthus aspera*

Family name : *Amaranthaceae*

*Ganas* : *sirovirechanopaga, krimighna, vamanopaga*

Synonyms : *kapipippali, pratyakpushpi, mayuraka, sikhari, kinihi, adhahsalya, kubja*

*Gunas* : *katutikta rasa, laghu ruksha teekshna guna, ushnavirya, katuvipaka*

Parts used : root, seed, leaf, whole plant, *kshara*

#### **2. PIPPALI**

Latin name : *Piper longum*

Family name : *Piperaceae*

*Ganas* : *sirovirechanopaga, triptighna, Deepaniya, kasahara, hiccanigravana, sulaprasamana, kantya*

Synonyms : *kana, krsna, kola, capala, tikshnatandula, magadhi, vaidehi, ushana, soundi*

*Gunas* : *katu rasa, laghusnigdha, teekshnaguna, ushnaveerya, madhuravipaka*

Parts used : root, fruit

#### **3. VACHA**

Latin name : *Acorus calamus*

Family name : *Araceae*

*Ganas* : *sirovirechanopaga, triptighna, asthapanopaga, lekhaniya, arsoghna, sitaprasamana, saghnastapana*

Synonyms : *ughraganda, golomi, sataparvika, sadgrandha*

*Gunas* : *katutikta rasa, laghuteekshnaguna, ushnavirya, katuvipaka*

Parts used : rhizome

#### **4. ERANDA**

Latin name : *Ricinus communis*

Family name : *Euphorbiaceae*

*Ganas* : *Bhedaneeya,*

*Angamardaprashamana, Swedopaga*

Synonyms : *Gandarvahastaka, Urubuka, Vyagrapuccha, Panchangula, Vardhamana, Vyadambaka*

*Gunas* : *Katu-Madura-Kashaya Rasa, Snigdha-Teekshna-SukshmaGuna, Ushna-Virya, MadhuraVipaka*  
*Parts Used* : Root, Leaf, Seed, Oil

### 5. YASTIMADHU

*Latin name* : *Glycyrrhiza glabra*  
*Family name* : Fabaceae  
*Ganas* : *Jeevaneeya, Kantya, Koko-lyadi, Sarivadi, Anjanadi*  
*Synonyms* : *Madhuka, Klitaka*  
*Gunas* : *Madhura Rasa, LaghuSnig-daGuna, SeetaVirya, MadhuraVipaka*  
*Parts used* : root

### 6. CHITRAKA

*Latin name* : *Plumbago zeylanica*  
*Family name* : Plumbaginaceae  
*Ganas* : *Deepaneeya, Arsoghna, Su-laprashamana, Lekhaneeya*  
*Synonyms* : *Anala, Dahana, Pithi, Vahnisanjnaka, Agni, Agnika, Jyoti, Huta-shana*  
*Gunas* : *Katu Rasa, LaghuRuksha-TeekshnaGunas, UshnaVirya, KatuVipaka*  
*Parts Used* : Root Bark

### 7. LANGALI

*Latin name* : *Gloriosa superba*  
*Family name* : Liliaceae  
*Synonyms* : *Kalihari, Agni Sikha, Garb-hanut*  
*Gunas* : *KatuTikta Rasa, Laghu-Tikshna Guna, Ushna Virya, KatuVipaka*  
*Parts Used* : Root

### 8. KUSTA

*Latin name* : *Saussuria lappa*  
*Family name* : Asteraceae  
*Ganas* : *Lekhaneeya, Asthapano-paga, Sukrashodana*  
*Synonyms* : *Utapala, Kasmira, Vapya, Gada, Agada, Ama, Amaya, Rogahva, Kou-beram, Durnama*

*Gunas* : *Tikta Madura Katu Rasa, Laghu Ruksha Teekshna Guna, UshnaVirya, KatuVipaka*  
*Parts Used* : Root

### 9. ELA

*Latin name* : *Elettaria cardamomum*  
*Family name* : Scitaminae  
*Ganas* : *Sirovirechanopaga, Swasa-hara, AngamardaPrashamana*  
*Synonyms* : *Korangi, Dravidi, Tuttha, Triputa, Trti*  
*Gunas* : *Katu Madura Rasa, Laghu-RukshaGuna, SitaVirya, KatuVipaka*  
*Parts Used* : Seeds

### 10. CHIRABILWA

*Latin name* : *Holoptelea integrifolia*  
*Family name* : Ulmaceae  
*Ganas* : *Lekhaneeya, Bhedaneeya*  
*Synonyms* : *Putika, Karanji, Udakirya, Karabhanjika*  
*Gunas* : *TiktaKashaya Rasa, Laghu-RukshaGuna, UshnaVirya, KatuVipaka*  
*Parts Used* : Bark, Leaf, Seeds, Leaf Buds

## DISCUSSION

*Katu rasa* is known to increase *vata*. The process of labor i.e *prasava* is the wholesome result of the *karma* of *Apana* and *Vyana vata*. As all the drugs were of *Katu* rasa except *madhuka*, can be assumed to support the action of *vata* in *prasava*. The very definition of *ruksha dravyas* includes the *gunas* of *ruksha, khara, teekshna, ushna, sthira, apicchila, vishada* and *Katina*. These drugs with the *ruksha guna* may accelerate the initiated uterine contractions. Except the *Madhuka* and *Ela*, all the drugs have *ushna veerya*. This *veerya* may also have necessary contribution in the cervical dilatation and myometrial contractions. Most of the drugs were included in *shiro*

*virechana gana*. This can be assumed to have their action over the hypothalamus and pituitary gland and known to secrete the necessary hormones.

1. **APAMARGA:** The use of Apamargais versatile. It is used in various conditions of gynecological and obstetric disorders. In *Ayurveda* it was mentioned in *pumsavana*, *sukhaprasava* and *prasavottararaktsrava*. The presence of alkaloids, glycosides, proteins, free amino acids, lignin, carbohydrates, flavonoids, tannins and a phenolic compound were identified in *Apamarga*. The phytosteroids, polyphenols and saponins are known to increase the prostaglandin activity helping the conception products to evacuate irrespective of the gestational age. The inner meaning also exhibit that it can be for initiating labour as well as in the form of an abortifacient agent. The methanolic leaf extract is the major potent content in it which has an important action in this process. The chloroform soluble basic fraction showed spasmolytic action against various spasmogens on intestine and uterine muscles of guinea pigs.<sup>9</sup>

2. **PIPPALI:** The varied studies of *Pippali* show that the crude extract, its different fractions and the major pure compound from the active fraction of the powdered fruits of *Piper longum* were studied for the antifertility effect in female rats. The crude extract and its hexane fraction exhibited 100 and 86% efficacy respectively (day 1-7 post-coitum schedule). On the other hand, 1-butanol soluble, 1-butanol insoluble and chloroform fractions were inactive. As the studies were further evaluated, the action seems to be similar in cases for myometrial contraction required for the expulsion of fetus at term.

3. **VACHA:** Calamus root contains high levels of essential oils with decadienal, caryophyllene, humulene, curcumene and B-asarone and bitter agents such as acorone, neoacorone, acorine, tanning agents and mucilage. The essential oil of *Acorus Calamusvar-americanus* is devoid of B-Asarone. Plants from Indian contain especially high concentrations of asarone. These all are oxytocic in nature which accelerates the contractility of the muscles. It is also known to increase the receptors of oxytocin in the myometrium.

4. **ERANDA:** Castor oil, a potent cathartic, is derived from bean of the castor plant. Dated back to history, ancient Egyptians were in the practice of the use of castor oil to stimulate labour. Castor oil has been widely used as a traditional method of initiating labour in midwifery practice in India & various countries.

The effects of castor oil are mediated by ricinoleic acid, a hydroxylated fatty acid released from castor oil by intestinal lipases. The EP-3 (E-prostanoid 3) receptor is specifically activated by ricinoleic acid in the castor oil and that it mediates the pharmacological effects of castor oil to target uterus. In mice lacking EP(3) receptors, the laxative effect and the uterus contraction induced via ricinoleic acid are absent. Although a conditional deletion of the EP(3) receptor gene in intestinal epithelial cells did not affect castor oil-induced diarrhea, mice lacking EP(3) receptors only in smooth-muscle cells were unresponsive to this drug. Thus, the castor oil metabolite ricinoleic acid activates intestinal and uterine smooth-muscle cells via EP(3) prostanoid receptors in humans. Thus it induces labour by increasing the uterine contrac-

tions. To determine effects of castor oil-diet on the synthesis of prostaglandin E<sub>2</sub>(PGE<sub>2</sub>) and explore the mechanism of labor induced by castor oil-diet in pregnant rats, pregnant rats were gavaged castor oil-diet in 18 and 19 days of gestation. The results shown that there was increased synthesis of PGE<sub>2</sub> in the intrauterine tissues is a key of the initiation of labor induced by castor oil-diet. Ricinoleic acid in castor oil-diet is the active component which induced the initiator of labor.

A study conducted in 100 women with singleton pregnancies with 40 wks gestational age with gynecoid pelvis. All of them were given 50-60ml of castor oil. Fifty-two women received castor oil and 48 were assigned no treatment. Following administration of castor oil, 30 of 52 women (57.7%) began active labor compared to 2 of 48 (4.2%) receiving no treatment. When castor oil was successful, 83.3% (25/30) of the women delivered vaginally. When applied locally it stimulates the nerve pathway resulting in delivery. The contractile response is initiated through the alpha- receptors of the post ganglionic nerve fibers in and around the cervix.<sup>10</sup>

**5. MADHUKA:** The active component of the *Yastimadhu* is the Glycyrrhizin. As the licorice root was used to chew its juice in the active labour by the women in routine, many researchers studied the actual process intended in it. They found glycyrrhizin as the important compound as a functional one in this process. A detail study was not carried out.

**6. CHITRAKA:** Administration of ethanolic crude extract of the root decoction of *P. zeylanica* to female Wistar rats, doses of the extract, equivalent by weight to normal

adult human doses of 1.0g/kg, 2.0 g/kg and 4.0 g/kg were administered orally to female rats in the study of the prenatal parameters. The median dose of 2.0 g/kg and a high of 4.0g/kg revealed a significant ova loss ( $P>0.05$ ) when the extract was administered prior to and during pregnancy. There were no significant changes in the foetal weight, length, gait and stature. Neither were there any structural deformity in any of the maternal ovaries, uterus and the visceral organs. Thus the various doses of extract administered to the rats revealed no teratogenic and/or foetotoxic effect.

The ethanol extract of the root has shown spontaneous motility in rats with a concomitant increase in dopamine and a metabolite homovanillicacid level in striatum, indicating a dopaminergic pathway for stimulatory action on the CNS<sup>11</sup>. The assessment of the uterine stimulant activity was performed on normal isolated uterine horns of pregnant and non-pregnant uterus primed with stilboesterol 24 hours before experimentation. Various doses of the extract, acetylcholine, nor- Adrenaline, and antagonist required to produce a contractile response were administered. The extract produced a dose-related contractile response as the standard spasmogens. However, the response was about 40% that of acetylcholine. The response produced by the extract and the acetylcholine were inhibited by atropine, but to a different extent. The study therefore revealed that, the root extract of *P. zeylanica* has muscarinic action possibly by stimulating alpha-adrenoceptors in the rat uterus.

**7. LANGALI:** Phytochemical analysis of the aqueous extract of *Gloriosa superba* showed presence of flavonoids, tannins, al-

kaloids, and glycosides. When the extract was studied on female wistar rats, The extract was safe up to a dose of 550 mg/kg which is approx. 10 times higher than the minimum dose at which the extract effectively reduced the number of pups produced. While the extract had significant anti-implantation and early abortifacient activities, gestation period and pregnancy index were not altered, the extract did not show any apparent teratogenicity as the pups born seemed normal and no death occurred during the 7-day observation period.

The uterine contractility of the extract may be due to its oxytocic effects. The effect was fast in onset and could be totally eliminated by washing with extract-free DeJalon solution, thus suggesting the presence of low molecular weight active compound(s) in the extract, which may have penetrated rapidly to the site of action.

However, the extract demonstrated spasmogenic activity, which was not as strong as that of oxytocin; Thus, its anti-implantation and early abortifacient activity may be due to its oxytocic property. The ability to cause uterine contractility raises the possibility of its being developed as a medicine for induction of labour. Since many pregnancies are associated with gestational hypertension, it is worth noting that the extract had no effect on blood pressure and other cardiovascular parameters measured. The absence of any effects on the cardiovascular parameters enhances the plant extract's safety profile in pregnancy.

**8. KUSTA:** The costus root when inhaled accelerates and stimulates the pituitary gland. It possesses a strong stimulatory effect on the nerve axons to act shortly and promptly. It may cause the release of the

oxytocin hormone from the pituitary and thus helps in the uterine muscle stimulation for contractions.

**9. ELA:** The chemical constituents in the *Elettaria cardamom* stem bark are beta-sitosterol and friedelin. Also the aqueous extract of the stem of the *Ela* consists of Glucose, Mannose myo-inositol glycerol, erythritolthreitol, fucitol, glucitol, mannitol and sucrose. According to the research work conducted the alcoholic extracts of the root of the drug exhibited 40% of anti-implantation effect in rats. Also oxytocic activity was noted on isolated uteri of the guinea pigs, rats and uterus of dogs in situ. It was observed that the roots exhibited utero tonic activity on isolated rats, guinea pigs, rabbit and dog uterus in situ. Ether, benzene, chloroform & alcoholic extracts of the root administration in the dose of 50mg/kg P.O on D1 to D6 on pregnant uterus in albino mice exhibited 95%, 30% and 40% of abortifacient activity respectively. Both leaf juice 250mg/100g P.O & root powder 200mg/100g P.O x 5days on immature female albino rats of 20-30 days old exhibited best estrogenic activity. Along with uterine action the cold water extract of the root was found to cause increase in growth of mammary gland and significant galactotrophic effect on the albino rats.

By the pharmacological action on the uterus of non pregnant and pregnant uterus of various animals it can be observed that the various extracts of *Ellettaria cardamom* can be used as to induce labour or as an abortifacient as it increases the uterine contractions in order to expel the conceptional products irrespective of the gestational age. Raja Narahari for the first time

documented the abortifacient property of *Ela*.<sup>12</sup>

**10. CHIRABILWA:** The active chemical constituents' of *Chirabilwa* are hexacosanol, beta-amyrin. The bark of the plant contains friedelin, beta sitosterol, 2-aminonaphthaquinone. Decoction of the bark has oxytocic effects upon the pregnant uterus. The beta sitosterol may have its action upon the receptors of oxytocin, along with its effect upon the uterine muscle which supports the contractions.

### CONCLUSION

All the drugs which were described for the sake of *sukhaprasava* i.e natural vaginal delivery seems to have oxytocic action on the term uterus to initiate and stabilize the uterine contractions. These drugs can maintain the power, passage and the passenger in a co-ordinate way so that the outcome result will be a fruitful one. The age old classic texts hold well now days when presented in a root level of cellular phytochemical action although a deep and recurrent research is necessary in this field.

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