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Lactogenic activity of selected medicinal plants: A review

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Abstract

Breast milk is the elixir of life for a new born. It provides nutrition and immunity to the child. Lack of milk production is one of the most common reasons for discontinuing breast feeding. In order to avoid the side effects, plant sources that possess galactagogue activity are better choices for safety and potentiality. "The medication or substances which assist initiation, maintenance and augmentation of lactation is called galactagogue." The present study aims to provide a comprehensive review of lactogenic activity of selected medicinal plants like *Asparagus racemosus*, *Nigella sativa*, *Pimpinella anisum*, *cyperus rotundas*, *Pueraria tuberosa*, *Teramnus labialis* that are found to be mentioned in classical text books and also folklore practices. Thorough literary search has been carried out through various databases like Pub med, Science direct, Ayush portal, DHARA, Google scholar using the keywords such as medicinal plants, milk production, lactogenic activity, galactagogue. Out of the 3410 collected articles 3403 were excluded due to non-relevance or lack of access to the original article.

Keywords: Medicinal plants AND Lactogenic activity, Medicinal plants AND Milk production, medicinal plants AND Galactagogue activity

Introduction

Milk- is the primary source of nutrition for the new born. The milk produced or secreted just after the child birth is Colostrum, which is also known as 'liquid gold', not only due to its yellowish orange colour, but also due to its importance in nourishing and protecting the new born. Colostrum has a very high concentration of IgG, lacto albumin, lactoferrin, growth factor and lacto protein which conform passive immunity to the new born. Colostrum has a laxative effect which help the infants to pass the early stools aiding in the excretion of excess bilirubin [1]. After the 3rd or 4th day of child birth breast milk is secreted and is the most valuable gift given by mother to her off spring, as it imparts positive benefits in terms of physical and psychological health aspects. Feeding the baby with breastmilk is recommended since it provides the required nutritional benefits and, the natural antibodies in it helps the infant to fight against infections and boost up their immune system. Every year with increase of breast feeding, death of about 820000 children under the age of five could be prevented globally [2]. Breast milk production is influenced by hormonal changes during pregnancy. During lactation the sucking by baby causes stimulation of signals, transmitted through sensory nerves to the hypothalamus, which causes release of prolactin and oxytocin from the pituitary gland. These hormones are then carried by the blood to the breast where it stimulates the glandular tissue to secrete milk and by the contraction of myoepithelial cells of the mammary gland, leads to ejection of the milk from the glands. "Galactagogue are the medications or substances that assist initiation, maintenance and augmentation of maternal milk production" [3]. Many galactagogues like Metoclopramide, Domperidone, Chlorpromazine, Sulpiride etc. are available in modern system of medicine. But on the basis of side effect and toxicity of these drugs, now a day's people are turning towards alternative herbal galactagogues for overcoming the situation. In several areas of the world, particularly in developing nations with a heritage of folklore, herbal medicinal plants are being used by practitioners of the traditional system of medicine and others for increasing milk secretion in lactating mothers.

Objective

To review articles related to lactogenic activity of selected medicinal plants, that has been proved clinically or experimentally.

Methodology

Papers related to lactogenic activity of medicinal plants were searched from different classical texts like Samhitas, Nighantu and databases, including, PubMed, Science

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direct, Ayush portal, Dhara, Google scholar, using the keywords, such as medicinal plants AND milk production, Medicinal plants AND lactogenic activity, Medicinal plants

AND galactagogue activity, out of the 3410 collected articles 3403 were excluded due to non-relevance or lack of access to the original article.

Keywords : Medicinal plants AND Lactogenic activity, Medicinal plants AND Milk production , medicinal plants AND Galactagogue activity

Pubmed ,Dhara, Agri, Science direct, Ayush Research portal, Google scholar, Google

Combined result n=3410

filters used : Title/
Abstract

Papers taken up for evaluation
n=30

Relevant Papers : 7

Results

Medicinal plants with lactogenic activity

1. Satāvari (*Asparagus racemosus*, WILLD)

Asparagus racemosus belongs to Liliaceae family, is a tall, climbing, undershrub with annual woody terete stems. It distributed in tropical and sub-tropical regions of India, including the Andamans. Many studies are proved that the drug have pharmacological actions such as immunomodulatory, antimicrobial, antioxidant, antitumor and hepatoprotective.

In *Bhāvaprakāśa* it is mentioned as a *stanyavardhak* [4]. In *Yōgaratnākara*, Acharya mentioned that satāvari pounded and taken with milk increases the flow of breast milk [5]. It has been investigated by so many researchers and finally they reach the conclusion as its root tuber and its extract shows lactogenic effect. This was found tested in guinea pigs, buffaloes, goats and finally evaluated in humans [6, 7, 8]. Now the review paper is randomized double blind clinical study to evaluate the galactagogue action in sixty lactating mother, by measuring the changes in their prolactin level during the study period, other parameters namely: mother's Weight, babies weight and subjective satisfaction of mothers regarding the state of lactation and the well beings. The oral administration of study drug lead to more than threefold increase in the prolactin hormone level of the trial group as compared to control. Experimental review found that alcoholic extract of *Asparagus racemosus* increases milk production concurrent with increased growth of mammary glands. The phytochemical study of the *Satāvari* extract reveals the presence of shatavarins I-V, the steroid saponins. The presence of steroid saponins and sapogenins is responsible for the lactogenic activity [9].

2. Kälājāji (*Nigella sativa* Linn)

Nigella sativa, belongs to Ranunculaceae family, it is an annual herb with nectarial petal, native to south and south west Asia. Many studies are proved that the drug have pharmacological effect such as anti-inflammatory, anti-

ischemic, antioxidant, anticonvulsant, antibacterial, anti-histaminic, antitussive, antihypertensive and hepato protective. According to Ayurveda classical text, nigella is *stanya vardaka*. Hence an *in vivo* study is conducted to see the effect of aqueous and ethanolic extract of *Nigella sativa* seed on milk production, and they reached the conclusion that the crude extract of *Nigella sativa* produce a significant increase in serum prolactin level. The study reveals that aqueous and ethanolic extract of *Nigella sativa* can increase milk production in rats. The phytochemical analysis of this drug reveal that T-anethol, one of the various estrogenic constituents of *Nigella sativa* seed, increase milk production. Structurally anethol is similar to dopamine and exerts a competitive antagonism at the dopamine receptor site. Thus may help in increase milk production and stimulate prolactin release [10].

3. Pimpinella anisum

Pimpinella anisum is belonging to Apiaceae family. It is an annual herbaceous plant with white or yellow flowers and small green to yellow seeds, which is cultivated in Iraque, Turkey, Iran, India and Egypt. According to previous study the intake of aniseed in lactating women shows that, increases milk production also relieves their infants from gastrointestinal problems [11]. Many studies are proved that the drug is have pharmacological effect such as Fungicidal, Antibacterial, Anti convulsant, relaxant and Anti-oxidant effect. The milk production was assessed by weight difference of pups before and after feeding. The aqueous extract increases the milk production up to 68% and ethanolic extract increases the milk production about 81% as compared to control. Phytochemical analysis of *Pimpinella anisum* reveals that it contains anethol, estragoli, Coumarin. Active constituents such as anethol which helps to increase the stimulation of prolactin and milk production, because structurally the t- anethol is similar to dopamine and shows a competitive antagonism at the dopamine receptor site [12].

4. Musta (*Cyperus rotundus* Linn)

It is a perennial plant belongs to Cyperaceae family, many studies are proved that the rhizome of the drug is have pharmacological effect such as diuretic, digestive stimulant, anthelmintic, anti-inflammatory, antidiarrheal, Hepatoprotective, hypolipidaemic. In Ayurveda, various Acharya's elaborately discussed the medicinal use of the rhizome of *Cyperus rotundus* Linn. Charaka is included it under stanya shōdaka dasemani [13]. So for evaluating the lactogenic effect, an *in vivo* study is done with the help of certain parameters like mother and pups body weight, serum prolactin and cortisol level, and also glycogen and protein content of mammary tissue, were assessed and all parameters were compared with control. The result reveals "that administration of 300mg and 600mg of *Cyperus rotundus* extract about increased 23% and 40% more milk in trial group of animals, increase of prolactin and balance the cortisol level, also increase the protein and glycogen content of mammary tissue as compared to the control group of animals," The mammary gland tissues of trial group showed lobulo-alveolar development with milk secretion. Among the chemical constituents of musta, the active principle which is responsible for the lactogenic activity is still unknown [14].

5. Māsha Parni (*Teramnus labialis* (Linn))

Teramnus labialis belongs to Fabaceae, is an annual herb and is described as *māshaparni* in Sanskrit. It is very useful in treating rheumatoid arthritis, fever, tuberculosis, nerve disorders, paralysis, and leucorrhoea [15, 16]. Previous researches suggested that the whole plant, as well as roots, possess as an antioxidant [17], anti-inflammatories [18], anti-hyperglycemic [19], and hypolipidemic activity [20]. The major bioactive phytoconstituents are fraxidin and galactomannan [21]. Result of an experimental study shows "The methanolic extract of *Teramnus labialis* fruit dose at 200, 400, 600 mg/kg and domperidone group produced 22%, 53% 75% and 58% increase of milk production respectively as compared to control. The Pups body weight was doubled at the 15th day of the lactation, and the rate of weight gain in methanolic extract of *Teramnus labialis* fruit group was significantly higher than the control and standard groups. Similarly, body weight of mother rats also shows high as compared to the placebo control groups. Other parameters like serum prolactin and cortisol level and protein and glycogen content of mammary gland shows significant increase as compared to control and standard group and also shows the prolactin and cortisol level, and protein and glycogen content of mammary gland increased more than two fold in methanolic extract of *Teramnus labialis* fruit at 600mg/kg group as compared with control [22].

6. Vidāri (*Pueraria tuberosa*)

Pueraria tuberosa belongs to Fabaceae family, It is a perennial climber with very large tuberous root. Vidari is one among the ingredient in many formulations used for the treatment of stanya kshaya. *Yogaratnākara* has mentioned it in *kshīradōsha chikitsa kshīra bhāvita chūrṇa* of bhūmi kūshmānda with milk and sugar increases the breastmilk [23]. on the basis of this statement the clinical study was designed to evaluate the lactogenic activity of *Pueraria tuberosa*. For the study 30 patient were selected and divided into two group, group A is administering with study drug and group B is administering with standard Ayurvedic drug satāvari chūrṇa, the result showing the parameters like weight of the baby,

breast engorgement, milk ejection, and serum prolactin level are highly increased as compared to group B [24].

Discussion

In our classics and in folk lore practice many drugs are told for the production and purification of the stanya. In this paper lactogenic activity of *Asparagus racemosus*, *Nigella sativa*, *Pimpinella anisum*, *Cyperus rotundas*, *Teramnus labialis*, *Pueraria tuberosa* are reviewed. Papers related to experimental study shows the milk production of trial drug was increased as compared with control group. It was observed that there was increased proliferation of cells of mammary gland in all the trial drugs and has been considered as indicator of their lactogenic action. It was also noted from the animal experimentation studies that there was significant increase in body weight of pups and mother rats as compared to control, indicating that the drugs are good health promoter too.

Reviewed papers showed that there was significant increase in serum prolactin which stimulate the development of mammary gland and increase in the size of breast. Prolactin is a protein hormone of the anterior pituitary gland that was originally named for its ability to promote lactation in response to the suckling stimulus. Glycogen, stimulates the lactogenic hormone Prolactin, which is increased by activation of the enzymes involved in the glycogenesis. The increased level of prolactin observed in the plasma showed that there was glycogenic activity which resulted by the increased activity of enzyme involved in glycogen metabolism (or glycogenesis) inside the tissue.

In most of the studies cortisol level was found to be balanced or within limits, indicating that drugs have a positive influence in decreasing the stress hormone, cortisol and thereby helpful in preventing the undesired psychological factors that interferes with milk ejection [25].

In *Āyurvēda*, *Stanya*, considered as *Upadhātu* of *Rasa dhātu*, and is a complete food that promotes growth of the child. The affliction of stanya are described by Acharyas as *stanyavikṛuti*, *stanya nāśa*, etc. The factors like *Vātavridhi*, *apatarpana*, and *dhatukṣaya* also contributes to the reduction of stanya. The treatment modalities of stanya Nasa comprises the use of *Stanya janana*, *Stanyavardhaka*, *Stanyōpaga*, and *Stanyaśōdhaka* drugs and should possess *Dhātuvardhaka*, *Agnidīpana*, *Vātahara*, and *Rasa prasādana* karmas. Most of the reviewed drugs has madhura, *tikta rasa*, *guru snigdha guna*, *usna virya*, and *katu vipaka*. These drugs are *dipana pācana*, *pitta śāmaka* and their by improves the quality of *rakta dhātu* also. *Tikta rasa* helps in *Āmapacana*, and *usna virya* helps for the proper functioning of agni and thereby prevents the production of *Sāmarasa*. *Madhura rasa* and *vipāka* helps in the nourishment of *rasa dhātu*, which inturn nourishes other dhatus also. *Rasadhātu vridhi* helps in the production of stanya - the *upadhatu* of *rasa*. *Usna vīrya* of the drugs pacifies *vāta* and thus prevents *srōtorodha* and vitiation.

Conclusion

The review article had been presented, compiled and reported based on some classical and folklore medicinal plants with respect to lactogenic activity of selected medicinal plants. Lactogenic preparations made from plant sources have lesser side effects and also it is cost effective treatment of agalactia. The commonly used drugs like *Asparagus racemosus*, *Nigella sativa*, *Pimpinella anisum*, *Teramnus labialis*, *Pueraria tuberosa*, *Cyperus tuberosa* are reviewed here. Although the

active chemical constituents were found to be responsible for the lactogenic action of these drugs, their mechanism of action as galactagogue was not found to be clear in most of the papers, and it is advisable to do further research in this area.

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