

Plant as a booster for lactation

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ABSTRACT

Breast milk is a complex physiologic route linking substantial and stimulating factors and the make contact with of quite a lot of hormones. Galactogogues or lactogogues are medications or other substances believed to support initiation, maintenance, or augmentation of milk production in animals and human. Most galactogogues (e.g., medications, foods, herbal therapies etc.) apply their pharmacologic possessions from beginning to end contacts with dopamine receptors, resulting in increased prolactin levels and thereby augmenting milk supply. Frequent botanicals have been used as galactogogues in folk medicine. The most universally used are: *Asparagus racemosus*, Fenugreek, Blessed thistle, Alfalfa. Others include: Anise, Nettle, Fennel, Flax, Red raspberry leaf. The botanical agents from these plants acting as galactogogues include, α -linolenic acid, ascorbic acid, Domperidone, Metoclopramide, Sulpiride (Egonyl) and chlorpromazine (Thorazine), Amentoflavone, cumin, Vanillic acid, Ferulic acid, saponins, glycosides (shatavarin, sarasapogenin, diosgenin), Isoflavones, Asparagamine, Racemosol, This paper describes potent synthetic and herbal galactogogues toxicity and dosage.

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KEYWORDS

Dosage;
Drugs;
Galactogogues;
Herbs;
Lactation;
Prolactin;
Toxicity.

INTRODUCTION

Human breast milk is golden standard for infant nourishment. Breast milk is primary sources of nutrition for newly born baby. Breast milk contains protein, fat, vitamin, minerals, and essential element. Breast milk nutrient is essential for newly born baby as well as young baby^[1-3]. The initial substance (milk) produce by alveolar secretary cell is colostrums which are present during the few days deliver. Colostrums are gradually replaced with the transitional form of milk which contain higher amount of protein, fat, vitamin, minerals, and essential element. The major difference between transitional milk and mature milk is fat content. Minerals

like zinc and iron higher quantity in breast milk fairly constant the whole time course of lactation^[4]. Fat is main source of power breast milk^[5].

The major difference between transitional milk and mature milk is fat content. Mineral like zinc and iron higher amount in the breast milk moderately constant throughout courses of lactation^[4]. Breast milk contains calcium, magnesium but it decline in late lactation^[6]. In addition to calcium is not change constant during two month of lactation. The calcium, magnesium and chloride in mature milk are lower than their level in colostrums^[7]. Breast milk is currently considered as an optimum feeding for all newly born babies. Breast milk feeding is associated with better nutritional value^[8,9].

Breast milk production regulated by the prolactin (PRL) and oxytocin. Prolactin (PRL) is a peptide hormone primarily synthesized and secreted by adenohypophysis. PRL is secreted into blood stream to receptor site on acini cells and beginning to milk production after giving birth. Oxytocin is used in uterine contraction during baby born. If a mother does not breastfeed well it means she possess low level of oxytocin. There is a protein in the milk (called as Feedback Inhibitor of Lactation or FLD) which is causes the acini cell to ignore the signal from prolactin when the breast is full. A reduced breast milk production can occur in many circumstances, such as preterm birth, illness of the mother or the child, mother-baby separation, re-lactation after a prolonged suspension and indirect lactation (breast pump or manual milk expression). Anxiety, fatigue, and emotional stress are also powerful inhibitors of lactation.

Educational programs should be offered to all breastfeed mothers to address problems such as inadequate frequency and duration of breastfeeding, incorrect breast attachment, and inadequate breast emptying during manual or mechanical milk expression. Milk production can be increased in several other ways, such as psychological support and relaxation techniques. On the other hand, many mothers ask quite often their physician for medications or other products to increase their breast milk production^[10].

GALACTOGOGUES OR LACTOGOGUES

Galactogogues are medications or other substances believed to assist initiation, maintenance, or augmentation of the rate of maternal milk synthesis^[10]. A substance or food that has the ability to help increase milk supply is called a galactogogues. Many medications, foods, and herbal therapies, drugs have been recommended as galactogogues^[10-12]. There is less research about how well foods and herbs increase breast milk.

Foods

High fiber foods and grains such as oats (not instant), barley, brown rice, beans, calcium rich food, shady and also green leafy vegetable. Fruits such as apricots and cook green papaya^[13]. This is a food which increased lactation.

Herbs

Some of the most common cooking herbs include anise, black seed, caraway, coriander, dill, fennel, and fenugreek. Nonfood herbs include alfalfa, blessed thistle, milk thistle, nettle, goat's rue, red clover, and shatavari, cumin seed, fenugreek, and fennel^[13].

Drugs

The 2 most common galactogogue drugs are Metoclopramide (Reglan/ maxeran/ Maxolon) and domperidone (Motilium). Currently available pharmaceutical galactogogues are all dopamine antagonists and will increase prolactin levels via this^[12]. A number of older studies documented increased prolactin levels in lactating women who took Metoclopramide or domperidone^[9,14-17]. However, there are only a few randomized, blinded studies on each of these agents, and these studies are small.

SPECIFIC GALACTOGOGUES/DRUG

Metoclopramide

Metoclopramide (Reglan) is the most well studied and most frequently used medication for inducing or augmenting lactation in the United States. It promotes lactation by antagonize the discharge of dopamine in the central nervous system, in this manner increasing prolactin level^[18].

Toxicity

Metoclopramide (*Maxeran*) fatigue, sedation, depression, and pseudo-Parkinsonism Pediatric: prolonged clearance in infants which can result in high serum levels and a risk for methemoglobinemia. Side effects are more common in children^[19].

Domperidone

Domperidone is also a dopamine antagonist that is available outside the United States. Domperidone is the only galactogogues evaluate in a randomized restricted experiment and shown to be safe and successful in rising breast milk creation^[8].

Toxicity

Domperidone (*Motilium*) Possible neurological side effects in infants to dry mouth and headache^[19].

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Sulpiride (Egonyl) and chlorpromazine (Thorazine)

Sulpiride is an antipsychotic (neuroleptic) medication not available in the United States that acts as a galactogogue by increasing prolactin-releasing hormone from the hypothalamus^[20,21].

Toxicity

Sulpiride (*Egonyl*) endocrinological effects Excreted in breastmilk Chlorpromazine (*Thorazine*) SIDS^[25].

SOME IMPORTANT MEDICINAL PLANT FOR LACTATION

Commonly herbal medicinal plants used as a lactogogue. At this time drugs like metoclopramide (Reglan), domperidone, chlorpromazine (Thorazine), Sulpiride (Egonyl) used for the lactation but it having some side effects so that medicinal herbal plant used as a galactogogue. Not all herbs recognized as galactogogue are safe or appropriate for anyone to take. People with certain conditions should not take certain herbs. If you have a family history of allergies use herbs that are not allergens. Individual responses will vary from mom to mom with the type of herb, the dosage and the length of use. The safety of any substance you ingest can never be 100% guaranteed. You may want to consult your health care provider if you have any concerns. Throughout world history women have used certain herbs or foods to enhance their milk supply.

Most of these substances have not been scientifically evaluated but traditional use suggests safety and some efficacy. These are prepared using dried plant material, covering with boiling water and steeping covered for a period of time. Some aromatic seeds such as fennel need to be crushed just before use. In general use about 1 teaspoon to 1 tablespoon of plant material per 1 cup of boiling water steep covered for 10-20 minutes and take about 3 cups per day. The use of natural products believed to be able of increasing milk production has a long history. The most frequently used products include fenugreek, and Mary's thistle. Anise, basil, fennel, cumin, grape, and coffee have also been traditionally used. There are many herbal products out there all claiming to have some lactogenic properties^[22].

Fenugreek seed (*Trigonella foenum-graecum*)

Origin and distribution

It is an indigenous plant of South Eastern Europe and West Asia. Nowadays, it is commercially cultivated in India, Argentina, Egypt and Mediterranean countries (Southern France, Morocco and Lebanon). Fenugreek is cultivated in the following Indian states of Rajasthan, Gujarat, Madhya Pradesh, Uttar-Pradesh, Maharashtra and Punjab.

Family: *Fabaceae*

Plant use for lactation

Fenugreek Seed (*Trigonella foenum-graecum*) is the most ordinary herb used in America and other countries to increase mother's milk. It also fortifies the milk with supplementary vitamins and minerals. Fenugreek is used extensively in countries like India and Mexico to increase mother's milk supply^[13]. Fenugreek is used in India and in some Middle Eastern countries as a flavor and a medicine. It is believed to have a number of therapeutic uses, including anti-inflammatory and galactogogue effect. Fenugreek is considered to be the most popular and utilize herbal galactogogue in the World^[13]. It is not clearly known how fenugreek increases milk flow. It has been reported to be an outstanding galactogogue for some mothers, and has been used as such for centuries^[23,24].

Keep in mind that in almost all cases, non-pharmaceutical result increasing milk supply should be tried first, as there can be major side effects from both herbal remedy and prescription medications used to increase milk supply. Mothers generally notice an increase in production 24-72 hours after starting the herb, but it can take two weeks for others to see a change. Some mothers do not see a change in milk production when taking fenugreek. Dosages of less than 3500 mg per day have been reported to produce no effect in many women. One way reported to determine if you're taking the correct dosage is to slowly increase the amount of fenugreek until your sweat and urine begin to smell like maple syrup. Fenugreek has been used either short-term to boost milk supply or long-term to augment supply and/or pumping yields. There are no studies indicating problems with long-term usage. Per Kathleen Huggins "Most mothers have found that the herb can be discontinued once milk production is stimulated to an appro-

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priate level. Adequate production is usually maintained as long as sufficient breast stimulation and emptying continues^{126]}.

Mechanism

Fenugreek (*Trigonella foenumgraecum*) is the most usually used herbal galactagogue in available literature^[27,28], even if there is at variance support of its value. It is thought that fenugreek stimulates sweat production, and since the breast is a modified sweat gland, fenugreek may change breast milk production in this manner^[29]. It has also been suggested that fenugreek may have estrogenic activity. One study using in vitro assays found that fenugreek seeds contain estrogen-like compounds, and that they stimulate pS2 expression in MCF-7 cell lines^[30] pS2 is frequently used as a marker for assessing the estrogenicity of a compound^[30] The phyto estrogens and diosgenin content (a type of steroidal sapogenin) of fenugreek appear to account for the increase in milk flow observed from its use^[28], but the exact mechanism of action is as yet undefined. Phyto estrogens are similar in chemical structure to endogenous estrogen and can bind to both α and β estrogen receptors. Thus they have the potential to act as estrogen agonists or antagonists, which could alter the structure or functioning of the endocrine system^[31,32].

Toxicity

Fenugreek is most commonly reported are a maple-like smell of the urine, breast milk, and perspiration, diarrhea, as well as the worsening of symptoms in individuals with asthma or hypoglycemia. Fenugreek is contraindicated in pregnancy as it may cause abortion^[33-34].

Fennel seed (*Foeniculum vulgare*)

Origin and distribution

Fennel is a tall perennial herb native to the Mediterranean region, now widely cultivated as an annual or perennial in Bulgaria, Romania, Hungary, Greece, Turkey, Italy, France, Germany, Egypt, India, and China. Fennel is one of Germany's more important medicinal plants.

Family: *Apiaceae*

Plant use for lactation

One of the oldest plants used in herbal medicine, it is now cultivated for medicinal purposes in many parts

of the world, including the U.S., Europe, Asia and Africa. Fennel has been regarded as a lactogogues for centuries. It has estrogen-like properties and is believed to be an herbal treatment that can help increasing milk supply. In use at a high dosage for a few days, fennel seed can increase milk supply and get better both the mother's and baby's digestion, through her mother's milk. However, in Traditional Chinese Medicine, fennel seed is said to have a drying quality that will reduce milk production^[34] if taken at a high dosage over a long period of time. Fennel is a common herbal galactogogues and is used in promoting milk expulsion reaction. The seeds of fennel are related to improve milk supply. Fennel contains essential fatty acids, flavonoids, vitamins, minerals and volatile oils^[34] Fennel is bitter to taste. Seeds and herbs are important for stimulating the release of digestive juices for improving digestibility of nutrients.

Mechanism

F. vulgare has been used as an estrogenic agent for centuries. It has been reported to boost milk secretion^[34] but the exact mechanism of action is as yet undefined. Phyto estrogens are similar in chemical structure to endogenous estrogen and can connect to both α and β estrogen receptors. Thus they have the possible to act as estrogen agonists or antagonists, who could alter the structure or functioning of the endocrine system^[31,32].

Toxicity

Small amounts of fennel are safe when the seeds or fruits from the fennel plant are used. Ingestion of fennel oil in doses greater than a teaspoon can be toxic to both the mother and child and can also induce miscarriage in pregnant women^[35].

Shatavari (*Asparagus racemosus*)

Origin and distribution

Shatavari (*Asparagus racemosus*) is woody climber growing in 2-3 m in length. It found throughout India (Gujarat, Rajasthan, Maharashtra, and Uttaranchal)^[36] Australia, Africa, and America. It is perennial herb.

Family: *Liliaceae*

Plant use for lactation

The galactopoietics effect of shatavari has been reported since long back and it has been reported that

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the supplementation of fresh root of shatavari at the rate of ½ kg per day at the time of milking with concentrate increase milk yield of buffaloes significantly ($p < 0.01$)^[37]. Shatavari (*Asparagus racemosus*) ayurvedic herb is greatly supposed as a galactogogues and lactation herb. Shatavari (*Asparagus racemosus*) at the rate of 300 gm per day the time of milking with concentrate increase the milk yield of cows. This provides nourishment to mother as well as baby. Shatavari can even be used during pregnancy^[38]. The root extract of *A. racemosus* is prescribed in Ayurveda to increase milk secretion during lactation.^[37] *A. racemosus* in combination with other herbal substances in the form of 'Ricalax' tablets (Aphali pharmaceutical Ltd. Ahmednagar) has been shown to increase milk production in females complaining of deficient milk secretion^[39]. Steady decrease in milk secretion, on withdrawal of the drug suggested that the increase in milk secretion was due to drug therapy only and not due to any psychological effect.

Mechanism

Systemic administration of the alcoholic extract of *A. racemosus* in weaning rats increased weight of the mammary glands, inhibited involution of lobuloalveolar tissue and maintained milk secretion^[40]. The identical extract in estrogen-primed rats showed healthy developed lobulo-alveolar tissue and lactation^[41]. Increase in mammary gland weight and enlargement of the lobuloalveolar tissue may be outstanding to the exploit of on the loose corticoids and prolactin^[42]. In other study, *A. racemosus* along with some other herbal substances in the form of a profit-making preparation, lactate (TTK Pharma, Chennai) is reported to augment milk production in women irritable of very little breast milk, on 5th day after delivery^[43]. A noteworthy boost in milk yield has also been observed in guinea pigs and goats after feeding lactate which also enlarged growth of the mammary glands, alveolar tissues and acini in guinea pigs^[44] have also shown galactogogues effect of roots of *A. racemosus* in buffaloes. It enhances the blood prolactin level and stimulates the cellular division of mammary gland.

Toxicity

It did not observe any increase in prolactin levels in females complaining of secondary lactation failure with *A. racemosus* symptomatic of that it has no lactogenic

effect^[41,45,46].

Blessed thistle (*Cnicus benedictus*)

Origin and distribution

It is an annual plant growing to 60 cm tall. Portugal, North to southern France and Iran. It is known in other parts of the world, including parts of North America and India.

Family: *Asteraceae*

Plant use for lactation

Blessed thistle is intermittently found in North America^[47]. The dried acryl parts are used as galactogogues^[47]. It is either used without help or in combination with Fenugreek. It is reported to modify hormone level. Blessed thistle is a bitter herb used for liver and digestive problems and also possesses the capability to increase the flow of milk^[48]. It is thought to employment by motivating the blood flow to the mammary glands and in that way enriches the milk flow^[49]. Thistle increases and enriches mother's milk, especially when taken with red raspberry leaves. It stimulates hepatic and digestive glands and enhances appetite. Blessed thistle has least side effects. In case of women blessed thistle, a bitter herb is useful for liver and digestive problems. It increases and enriches the flow of milk and modifies hormone level. It shows synergistic effects when taken with red raspberry leaves^[50].

Mechanism

The flavorlignans are bioflavonoid phyto-estrogens. They possess a steroid-like structure which might clarify their ability to keep the liver by motivating protein fusion. It is also probable that they could take action on estrogen receptors (ER2) by restrictive the endogenous receptors antagonism of milk invention^[51,52].

Toxicity

The plant is strongly emetic in large doses, so it should not be used in over doses in pregnancy and it promotes sweating. Thus, it may affect thermo-regulation and cardio-vascular physiology^[53].

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