



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(8): 596-600
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www.thepharmajournal.com
Received: 15-05-2023
Accepted: 18-07-2023

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Role of plant herbs in initiating and establishing milk production in lactating women

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Abstract

For expectant women, pregnancy can be the most thrilling and paranormal moment of their lives. Nature gives us numerous resources to help the mother and the child during this period of development and rejuvenation, to uplift the spirits and body, and to support a healthy pregnancy and delivery process. Due to incomplete information, pregnant and lactating women need to be informed about the need for caution when using herbs during pregnancy and lactation. The World Health Organization (WHO) recommends breastfeeding because it may reduce the incidence of acute lymphocytic leukaemia and acute myeloid leukaemia if it is sustained for more than six months. Breast milk is believed to include bioactive substances that support gastrointestinal growth, give the brain a substrate for development, and lower rates of sepsis and necrotizing enterocolitis, all of which have been shown to have a deleterious effect on neurodevelopment. This review paper examines the results of recent pharmacological and clinical studies to examine the medicinal plants that are said to be useful in raising breast milk production. One of the main causes of inadequate breastfeeding is inadequate breast milk production. Special herbs and certain foods are frequently utilized in rural regions (known as lactagogue/galactagogues) to encourage the formation of breast milk. When these measures by themselves might not be sufficient to assist mothers in their endeavour, the use of galactagogues is taken into consideration. This review will concentrate on the function of plant herbs in starting and maintaining milk production in breastfeeding women, despite the existence of non-pharmacologic chemicals.

Keywords: Galactagogues, breastmilk, lactogenesis, postpartum haemorrhage

Introduction

In recent years, women have been increasingly focused on herbal supplements to boost the production of breastmilk, which 76% of women worldwide rely on to provide their children with an adequate diet. Additionally, it has been seen that herbal remedies are utilized to cure conditions like headache, constipation, cough, and cold in addition to conditions like engorgement, mastitis, and sore or cracked nipples (Zheng *et al.*, 2019) ^[1]. The American Academy of Paediatrics (AAP) and the World Health Organization (WHO) both agree that breastfeeding is the best form of nourishment for infants under one-year-old. Additionally, the risk of developing acute lymphatic leukaemia and acute myeloid leukaemia is reduced if breastfeeding is continued for longer than 6 months (Forinash *et al.*, 2012) ^[8].

In high-income nations, more than one in five babies are never breastfed, while in low- and middle-income countries, one in twenty-five babies are never nursed, according to a new UNICEF research ranking countries by breastfeeding rates. In India, 95.5% of children are nursed at some time, but 99.1% of children in Nepal, which has a low income (Per World Bank Income Category). With the aid of relaxation techniques, psychological support, and medicines, breastmilk production can be boosted. Galactagogues are drugs like metoclopramide, oxytocin, domperidone, chlorpromazine, and sulphiride that are used to induce, maintain, and augment the production of breastfeeding.

Additionally, breast milk boosts a baby's cognitive skills, neurological intelligence, and immunity, and lowers their risk of obesity and allergies. (Javan *et al.*, 2017) ^[3]. Tanase *et al* claim that at least 5% of women experience lactation failure and 15% of breastfeeding women have hypogalactias, or insufficient milk production, three weeks after giving birth. Galactagogues also contribute in a little way to the increase of prolactin secretion, physiological relief, and the creation of breast milk. (Tānase *et al.*, 2021) ^[4]. Breast milk is acknowledged as the first naturally occurring food for newborns; it contains all the nutrients a kid needs for the first six months of life, nearly half of those needed for the first year, and one-third of those needed for the second. (Franz 2015) ^[5].

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The production of milk is crucial to providing newborns with the best nourishment possible, and it directly affects both mothers' and infants' growth, development, and health. Breastfeeding is influenced by both nutritional factors, such as the mother's daily intake and nutritional reserves, and non-nutritional factors, such as the environment, management, and health. Breastfeeding failure is primarily brought on by the mother's or the child's illness, the mother and child being apart, a preterm birth, anxiety, exhaustion, and mental stress. The most popular treatment options for healthy moms include galactagogues including oxytocin, domperidone, metoclopramide, and sulfide. Psychological support and relaxation techniques can also enhance milk supply. (Javan *et al.*, 2017) [3].

Breastfeed as a fortified food/as a complete food for the infant baby

Human breastmilk is also referred to as the "gold standard" food supply for the first few months of postnatal life since it not only gives newborn babies the best nutrition possible but also has a big impact on mothers' and babies' cognitive, behavioral, and emotional health. According to the Bayley Scales of Infants Development, longer periods of exclusive breastfeeding during the first stage of infancy were found to positively impact an infant's development. (Krol *et al.*, 2018) [9]. Human Milk Oligosaccharides (HMOs), an immune-related substance found in breastmilk, have several additional advantages, including the ability to control neonatal immunity and protect against allergens as well as cognitive impairment (see Figure 1.1). Studies conducted by (Morrow *et al.*, in 2004 and Stepan *et al.*, in 2006) [11, 34] have also suggested that HMOs may help avoid catastrophic outcomes including sepsis

and mortality as well as diarrhea, respiratory tract infections, and other common illnesses (Triantis *et al.*, 2018) [10]. LAM, or lactational amenorrhea, is a natural and simple type of contraception that is on the list of effective family planning strategies maintained by the World Health Organization. No lactating woman has reportedly given birth during the first six months following delivery, and only 4% of mothers have no proof. (Tiwari *et al.*, 2018) [29]

The Global Nutrition Targets 2025, which were adopted by the World Health Assembly in 2012, call for the full implementation of nutritional goals for mothers, new-borns, and children. Only 38% of new-borns aged 0 to 6 months receive nothing except breast milk globally. Only 42% of new-borns in Indonesia who are under 6 months old are exclusively breastfed, according to a UNICEF assessment of the country. The perception of personal happiness and breastfeeding success by moms is known as maternal breastfeeding satisfaction. Even though the period is less than the advised 6 months, moms who exclusively breastfed for up to 2 months (84.6%) and 4 months (69.8%) report higher levels of satisfaction (Awaliyah *et al.*, 2019) [15]. Breastfeeding acts as a stimulation that can trigger the release of oxytocin and help to contract uterine walls, both of which will help to minimize postpartum hemorrhage, which is one of the primary causes of maternal mortality (Sentilhes *et al.*, 2016) [30]. Breastfeeding gives newborn babies all the nutrients they require to start a healthy life, and it has advantages for both the mother and the child. For example, it helps mothers manage their weight, improve their bone density, prevent lactational amenorrhea, and manage many other conditions like type 1 diabetes and hypertension (Grube *et al.*, 2015) [16]

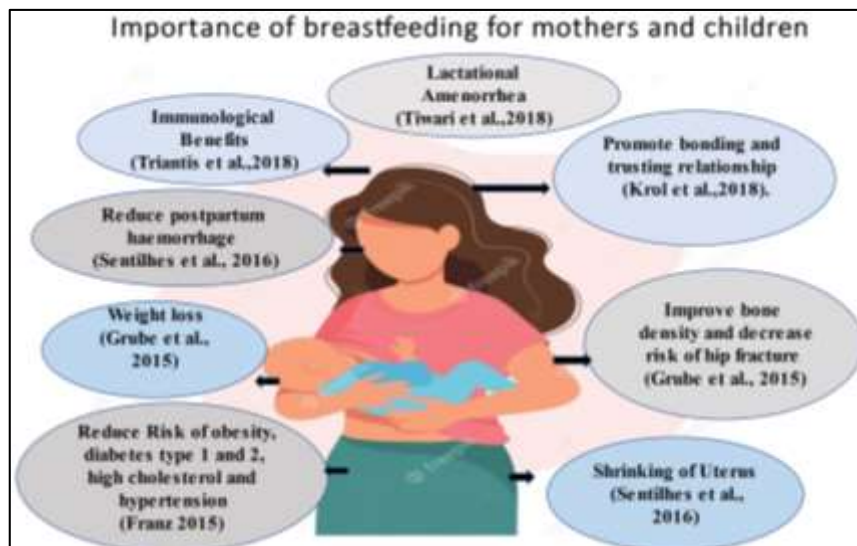


Fig 1: Importance of breastfeeding in lactating mothers and children

Fortified foods for the pregnant and lactating women:

During the critical period from conception to the start of supplementary feeding, when nutrition is most important, a mother's food decisions can affect both the baby's early health status and risk of acquiring lifelong disorders. But not all fruits and vegetables are considered to be "nutrient-rich," as there are large differences in both the amount and concentration of nutrients in them. (Comerford *et al.*, 2016) [19].

The development of two nutrient-rich fish-based foods in Bangladesh for chutney for expectant and nursing mothers

(PLW) and a complementary food (CF) for babies and young children (6-23 months), as well as their processing methods, nutrient composition, and potential contributions to advised or ideal nutrient intakes in the first 1000 days. (Bogard *et al.*, 2015) [20].

This essay clearly outlines the advantages and disadvantages of food fortification, as well as the reasons why it is typical in low- and middle-income countries for people to be deficient in one or more micronutrients, such as iron, zinc, and vitamin A, endangering the physical and mental health of millions of people. It has been demonstrated that food augmentation

improves social, economic, and health results. The strategy provides significant benefits for all of the main food fortification vehicle notwithstanding ongoing debates regarding the effectiveness and safety of food fortification on a global and national level. (Olson *et al.*, 2021) [26].

Enriched Food Supplements

Docosahexaenoic acid (DHA) supplementation affected nursing women's and their babies' plasma concentrations of DHA as well as the fatty acid content of breast milk. 89 breastfeeding women who were 4-6 weeks postpartum were given a placebo, 200 mg, or 400 mg of DHA during 6 weeks along with their regular meals. At the beginning and conclusion of the trial, fatty acids in breast milk, mother plasma, and new-born plasma were all measured. 200 mg and 400 mg of DHA significantly increased the amount of DHA in maternal plasma and breast milk compared to placebo (50% and 123% of breast milk at 0.05; 71% and 101% of plasma at 0.0001) (Sherry *et al.*, 2015.) [22].

The purpose of this study is to evaluate the nutritional value of traditional food supplements (TFS) and their impact on the nutritional status of lactating mothers and infants' weight gain in the first six months following delivery. However, despite a well-defined survey of lactating mothers' diets using 24-hour recall on three randomly selected days, socioeconomic factors, lactation history, and the infant's birth weight and current weight were also collected. The findings showed that out of 18 distinct TFS, 50% of them were high in calcium, 33% in iron, 38% in zinc, and just 13% in vitamins. When compared to mothers who did not use TFS supplements (NTS; n = 50), mothers who took TFS (n = 75) consumed considerably more fat (Kajale *et al.*, 2014) [24].

The report highlights how micronutrient deficiencies, such as those in vitamins and minerals, have contributed to several ailments, particularly in children and women around the world. The daily consumption of staple foods might be fortified to fight this malnutrition. Therefore, flours-particularly wheat, maize, and rice-are a prevalent staple in the diets of people all over the world and are attracting significant attention as a potential method for micronutrient fortification. The tactics for flour fortification are intended to suit the populations' nutritional and health demands. Some studies demonstrate the efficacy of flour fortification in preventing micronutrient deficiencies and many diseases. Food fortification, with a particular emphasis on flour

fortification, health advantages, and legislative difficulties are the key topics covered in this review (Cardoso *et al.*, 2019) [27].

The fortification of wheat and maize flour with folic acid is done in this study. Folic acid has been added to wheat and maize (corn) flour in around 80 countries, two fundamental foods that are extensively consumed worldwide and help prevent neural tube abnormalities. Fortification with folic acid may be used to improve the folate status of the entire population as well as other health outcomes. These studies, which have greatly aided my study on the relationship between folate status and health outcomes in the general population, compare the health benefits and safety of folic acid-fortified wheat and maize flour to wheat or maize flour without folic acid. (Tablante *et al.*, 2019) [35].

From preterm infants, lactic acid bacteria that can produce folate were isolated and tested. IFM4 (35 ng/ml) was the isolate that produced the most folate out of all the others. According to the isolate's HPLC chromatogram, 5-methyl tetrahydrofolate was produced (one form of folate). Sequencing of the 16S rRNA gene revealed a 98% similarity between the isolate and *Lactobacillus rhamnosus*. The isolate displayed nonhemolytic activity on 5% sheep blood agar, 50% survivability at very acidic conditions (pH 2.0), and 95% survivability at 0.5% (w/v) bile salt concentration. It was also responsive to several common antibiotics (Panda *et al.*, 2018) [31].

Galactagogues plants in traditional medicine

Galactagogues are artificial or herbal substances that stimulate, sustain, or boost the production of breast milk. Significant hormones that function as galactagogues include prolactin (PRL), which is particularly important, as well as somatotropin, cortisol, insulin, leptin, estrogen, progesterone, medroxyprogesterone, oxytocin, recombinant bovine somatotropin (rBST), and thyroid hormone-releasing hormone (TRH). Due to the low risk of complications, they bring, natural products, especially herbal ones, are becoming more and more popular throughout the world (Aleandri *et al.*, 2014) [32]. Galactagogues are meals, medications, or herbal supplements that help in the start-up, maintenance, or enhancement of breast milk production (Hayati *et al.*, 2019) [36]. Since ancient times, anise, an annual plant with white flowers and seeds, has been grown.

Table 1: Classification of Galactagogues

Normal foods Items	Pharmaceuticals	Medicinal herbs
Banana flower Lemon basil Thai basil Chicken Fish Pumpkin Almond	Metoclopramide Domperidone Chlorpromazine Sulpiride Oxytocin Recombinant bovine somatotropin (rBST) Thyrotropin-releasing hormone (TRH) Medroxyprogesterone	<i>Foeniculum vulgare</i> Mill. (Fennel) <i>Anethum graveolens</i> L. (Dill) <i>Pimpinella anisum</i> L. (Anise) <i>Nigella sativa</i> L. (Black cumin) <i>Medicago sativa</i> L. (Alfalfa) <i>Vitex agnus-castus</i> L. (Chaste tree) <i>Anethum graveolens</i> L. <i>Malva sylvestris</i> L. (Marshmallow) <i>Trigonella foenumgraecum</i> L. (Fenugreek) <i>Cicer arietinum</i> L. (Chickpea) <i>Hordeum vulgare</i> L. (Barley)

Phytoestrogen is a plant-based compound that mimics estrogen in the property, it helps people who have estrogen deficiency and benefits for premenopausal and post-menopausal women (Louis *et al.*, 2019) [37]. In the 1940s the first report for galactagogues was published although the exact mechanism is unknown 2 mechanisms for increasing breastmilk production with the help of fenugreek. The first mechanism is that it increases sweat production and the second is that fenugreek helps to secrete phytoestrogen and

diosgenin (Javan *et al.*, 2017) [3]. The annual blooming plant *Nigella sativa* is also referred to as "black cumin" in the West. It is an annual plant that is primarily grown in Pakistan, India, and Iran, countries that border the Mediterranean Sea. Asthma, cough, dysentery, bronchitis, constipation, headache, rheumatism, allergies, influenza, and as a diuretic and galactagogue have all been treated using black cumin seeds in Traditional Chinese Medicine (TPM). (Tanase *et al.*, 2021) [38].

Table 2: Common Galactagogues Food Items.

Botanical Name	Common Name	Functions	References
<i>Foeniculum vulgare</i> Mill	Fennel	Fennel is a common medicinal plant with various pharmacological activities such as lowering blood sugar, promoting healthy digestion, relieving menstrual problems, and most importantly it has galactagogues properties.	Taberes <i>et al.</i> , 2014 [39]
<i>Pimpinella anisum</i> L.	Anise	<i>Pimpinella anisum</i> and ethanolic extracts increase milk production in rats and their research also confirms that intake of Anise during lactating phase act as a lactogenic agent for mothers	Tanase <i>et al.</i> , 2021 [38]
<i>Nigella sativa</i> L.	Cumin	It is also used as a galactagogue in traditional medicines that mainly affects the aqueous and ethanolic extracts of these seeds.	Drugs and Lactation Database 2021
<i>Medicago sativa</i> L.	Alfalfa	Medicago is used to increase sexual function, and semen quantity, prevent cholesterol absorption, help in digestion, and enhance lactation	Javan <i>et al.</i> , 2017 [3]
<i>Trigonella frenum graecum</i> L.	Fenugreek	Many civilizations use its seeds as a staple element in foods and as a popular remedy. Fenugreek is used in TPM to boost milk production.	Ghasemi <i>et al.</i> , 2015 [14]
<i>Cicer arietinum</i> L.	Chickpea	It is a good source of carbohydrates and proteins also it is cholesterol free and a good source of dietary fibre, calcium, and iron.	Katiyar <i>et al.</i> , 2015 [33]

Conclusion

Some of these herbs, particularly fenugreek, are frequently used as galactagogues due to their long history of use as galactagogue drugs, their proven pharmacological actions, and the lack of any significant negative effects. Special foods and carefully chosen herbs are frequently utilized to increase breast milk production in various parts of the world and are a significant component of breastfeeding mothers' diets. These findings may aid in understanding breastfeeding practices and encourage additional studies into these products' security and scientific effectiveness. The potency of herbs should be recognized, or in other words, they should be used, as this review study demonstrates how they can significantly relieve typical problems and worries that develop throughout pregnancy, childbirth, and lactation.

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