



Effects of Herbal Galactagogues on Breast Milk*

Cengel RK¹ and Dogan G^{2*}

¹Dietitian, Beypazarı Hospital, Ankara/Türkiye

²Department of Nutrition and Dietetics, Assistant Professor, Health Sciences Faculty, Lokman Hekim University, Türkiye

***Corresponding author:** Gokcen Dogan, Department of Nutrition and Dietetics, Assistant Professor, Health Sciences Faculty, Lokman Hekim University, Sogutozu Mahallesi, 2179, Sk No:6, Türkiye, Tel: +905345725056; Email: gokcen_iplikci@hotmail.com; gokcen.dogan@lokmanhekim.edu.tr

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Abstract

Breast milk is an indispensable source of nutrition, composed of thousands of components crucial for the growth and development of infants. It is the gold standard for the nourishment of newborns and babies. According to guidelines from the World Health Organization, exclusive breastfeeding should be practiced up to 6 months, with complementary feeding introduced concurrently until the age of 2 years. Breastfeeding is recognized as a crucial stage in women's reproductive processes, benefiting both the mother and the baby. Adequate and balanced nutrition during pregnancy and lactation not only influences the mother's healthy body weight but also affects the content of breast milk. Insufficient production of breast milk can occur due to maternal factors, baby-related conditions, or psychological reasons. To address this, mothers may turn to practices aimed at increasing milk supply, such as applying milk-enhancing recipes learned from their social environment and consuming specific foods and beverages. Commonly believed milk-boosting foods include soups, fruits, vegetables, bulgur, molasses, halva, yogurt, and syrups. Galactagogues are substances that initiate the synthesis of breast milk, aiding in its continuation and enhancement. The mechanisms of many food substances classified as galactagogues are not fully understood. This review examines the positive effects of commonly reported herbal galactagogues, including fenugreek, asparagus, fennel, dates, blessed thistle, milk thistle, anise, and black cumin, on breast milk. This article aims to investigate the effects of herbal galactagogues on breast milk production. The study evaluates the potential of various plants to enhance milk supply. This article employs a review study approach, gathering information from previously conducted research. The selected studies, accessible through PubMed, Google Scholar, YökTez, and BioMed Central, must be peer-reviewed, published within the last 10 years, and focus on the effects of herbal galactagogues on breast milk. Exclusion criteria include studies with insufficient evidence, outdated content, or biased results. The present research emphasizes the need to increase awareness and knowledge levels regarding galactagogues in the community and among healthcare professionals. It also underscores the necessity for further studies to provide evidence-based clarification on unresolved aspects related to galactagogues and their positive relationship with breast milk.

Keywords: Lactation; Breastfeeding; Breast Milk; Galactagogue

Aims and Scope

The aim of this study is to investigate the effects of herbal galactagogues on breast milk production and to explain how these substances may play a role in enhancing milk supply. In this context, the potential of galactagogues to support breast milk synthesis is evaluated, with a focus on various herbal sources, particularly fenugreek, asparagus, fennel, and black cumin. The study also addresses the scientific evidence surrounding the use of these herbs and highlights the need for further research, while considering traditional practices that are widely adopted in society.

Introduction

The word galactagogue derives from Greek and means 'substance that stimulates lactation'. This compound term is made up of the words 'galacta', which means milk, and '-agogue', meaning 'something that boosts secretion' [1]. Galactagogues are substances that induce breast milk synthesis and help produce and increase breast milk. It is not precisely known how most of the nutrients classified as galactagogues have an effect. The mechanisms of these substances for boosting breast milk production remain unclarified. The general use of complementary and alternative medicines including herbal medicines has been increasing globally. Previous studies highlight the popularity of herbs among breastfeeding women. For instance, in a study conducted with breastfeeding women in Western Australia, 59.9% of the 304 women who participated in the survey stated that they took at least one herbal medicine during the breastfeeding period, and fenugreek was reported as the most frequently used herbal galactagogue. In the same study, it was reported that 24% of the participants used herbal medicines to boost breast milk and improve breastfeeding performance regardless of whether they had an insufficient milk problem. Other commonly reported herbal galactagogues include milk thistle, fennel, goat's rue, nettle, and cranberry or shatavari [2].

Materials and Methods

The type of research utilized in the article is a review study. Information has been gathered through the examination of previously conducted studies on the topic. The databases used in the research include PubMed, Google Scholar, YökTez, and BioMed Central. The inclusion criteria for article selection were studies published in peer-reviewed journals within the last 10 years, focusing on the effects of herbal galactagogues on breast milk, and those with full-text access. Exclusion criteria encompassed studies lacking sufficient scientific evidence on the topic, those unrelated to the subject, outdated or obsolete studies, studies containing biased or prejudiced results, and repetitive studies.

Findings

Fenugreek (*Trigonella Foenum-Graecum*)

Fenugreek is used as a spice and medicine in India and some Middle Eastern countries. It has many therapeutic effects, including anti-inflammatory, antidiabetic, anticarcinogenic, and galactagogic effects.

Although it exhibits some side effects, its potential to pass into breast milk and its side effects on the baby are not exactly known [3]. Fenugreek is thought to have lactogenic activity that can be explained by its mechanism to stimulate sweat production. It is considered that since the mammary glands are modified sweat glands, increased milk production is expected [4]. Even though the clear effect of fenugreek on breast milk has not been proven, several studies exist. For example, in one study, 10 mothers were asked to take notes regarding the amount of milk expressed using a pump for 2 weeks. In the first week, normal milk production of the mothers was assessed; in the second week, the mothers were given 3 cups of fenugreek tea daily. While the average breast milk produced in the first week was 207 ml/day, it was 464 ml/day in the second week [3]. In the study conducted by Türkyılmaz and her colleagues in Türkiye, the participants were divided into 3 groups. The first group was given 3 cups of fenugreek tea a day, the second group was given 3 cups of apple juice a day, and the third group was not given any supplements. The results obtained showed that the mothers who consumed fenugreek tea produced a significantly higher amount of milk than those in the other 2 groups. In another study with similar results, the mothers of healthy newborns treated with fenugreek tea 3 times a day produced significantly more breast milk than the mothers in the placebo group. In another study, the mothers of newborns given 600 mg of fenugreek capsules 3 times a day for a month did not show a significant difference in milk production compared to the placebo group [5]. Under the management of a nurse, the effects of commercially available fenugreek capsules on about 1200 women were reported over 6 years. In the report, 2-3 capsules (580 or 610 mg) of fenugreek 3 times a day is recommended. It has been reported that most women experienced an increase in milk production within 24 to 72 h of use and they discontinued use when their milk was considered adequate.

In another study, Western Canadian women were interviewed to determine galactagogue use within the 4 months after birth. Fourteen of 25 women reported that they consumed a galactagogue over a period after birth, while 11 of them stated that they consumed an herbal galactagogue. Four women (29%) reported using fenugreek to stimulate lactation and experiencing positive effects of it [3].

Milk Thistle (*Silybum Marianum*)

With over 2000 years of history, milk thistle is regaining popularity as a lactogenic supplement. The mechanism of its lactogenic effect is not yet fully understood. The commercially available form of milk thistle is the one that includes silymarin [3]. The main active compound of silymarin is silybin, which has a significant biological effect. With its antioxidant, anti-inflammatory, and antifibrotic power, it is used in different liver disorders, especially chronic liver diseases and cirrhosis. Although silymarin is a well-tolerated molecule, there is some scientific evidence indicating its potentially harmful effects [6]. Since it is a member of the ragweed family, allergy is a concern and high doses have been reported to cause stomach cramps, nausea, and vomiting. Elevated liver enzymes have been reported in a woman taking 'breast milk tea' containing blessed milk thistle and other substances [7]. In a placebo-controlled study carried out in Peru, the effect of milk thistle in silymarin form at a dose of 420 mg/day was assessed. Fifty healthy women with similar characteristics were included in the study for 63 days and the amount of milk produced was checked on days 0, 30, and 63. Milk production levels were similar at the beginning (day 0).

However, by day 30, silymarin had increased milk production by 64% compared to the 22% increase in the placebo group. By day 63, milk production had almost doubled, with an 86% increase for silymarin compared to the 32% increase in the placebo group from day 0. During the study, silymarin levels were not detected in expressed milk, nor was there any change in the chemical composition of the milk (water, fat, carbohydrate, and protein levels) [8]. A survey conducted among breastfeeding mothers in Australia showed that 98 mothers used milk thistle as a galactagogue. On average, the mothers rated milk thistle between "mildly effective" and "moderately effective" according to a Likert scale. Eight percent of the mothers who took milk thistle reported adverse reactions, mostly nausea, stomach cramps, dry mouth, and fatigue. Another study compared breast milk tea with lemon verbena tea in nursing mothers. Every breast milk tea bag contained 35 mg of blessed milk thistle in addition to some other herbs. The mothers were instructed to drink 3 to 5 cups of tea a day. There was no difference between the groups in terms of digestive, respiratory, or dermatological problems in the babies and no other adverse situations were reported by the mother. There was no difference in the growth parameters of babies between the two groups taking breast milk tea [7]. Silymarin is considered a safe and effective orally applicable herbal product to increase milk production without affecting milk quality in healthy women in the postpartum period.

Goat's Rue (*Galega Officinalis*)

In another study, the mothers of premature babies were given a galactagogue containing 5 g of silymarin and galega daily from 3 to 28 days postpartum, while the other group of mothers was given 5 g of lactose as a placebo. The 50 mothers included in the study had similar characteristics. Milk production was observed to be higher in the mothers who were given the galactagogue. While the daily average milk production was 200 ml in the galactagogue group, it was 115 ml in the placebo group. During the study period, total milk production was significantly higher in the galactagogue group. In that study, silymarin and galega increased milk production in the mothers of premature babies without causing any significant side effects [9]. In an uncontrolled observatory study conducted with 336 women whose milk production was considered to be lower than usual, goat's rue in an unspecified dose was given to boost milk production, and an increase at a rate of 30% to 60% was observed. Due to the lack of randomization, breastfeeding support, and placebo control, a valid conclusion on the galactagogue effects of goat's rue could not be reached in that study LactMed® [7]. Goat's rue, defined as a "safe and effective galactagogue" by herb expert Weiss, was found to be not only effective in boosting milk supply but also in increasing the compounds of breast milk [10].

Asparagus (*Shavari/Asparagus Officinalis*)

More than 300 species of asparagus can be found worldwide, but it originates from the Eastern Mediterranean and *Asparagus officinalis* is the most widely consumed species. In Ayurvedic medicine (a traditional health system of India), asparagus is recommended as a galactagogue for the prevention and treatment of gastric ulcer and indigestion. Moreover, it is successfully used by some Ayurveda practitioners in nervous system disorders, inflammation, liver diseases, and some infectious diseases as well [11]. Asparagus is rich in folic acid; vitamins A, C, and K; and phytoestrogens. The hormonal effect of phytoestrogens is similar to that of estrogen in milk production. Among the main regulators of prolactin production are estrogens, which increase the growth of prolactin-producing cells and stimulate prolactin production directly as well as stimulating it by suppressing dopamine. They also contain tryptophan, an essential amino acid that can stimulate prolactin production and lead to increased milk production [12].

In a further study, since asparagus is very bitter in flavor, an asparagus bar that was delicious, free from artificial ingredients, and rich in nutrients, was designed and given to mothers. The study showed that the asparagus

bar stimulated breast milk production in nursing mothers more effectively than a placebo. A statistically significant increase in breast milk volume was observed as well. No side effects in the mothers or newborns were observed in the study. Moreover, the study revealed that asparagus bars shorten the time that passes until the breasts refill and may help breastfeeding start early [12]. In another study, the galactagogue effect of asparagus was assessed by recording the changes in prolactin hormone levels in 60 mothers. The asparagus group showed a more than threefold increase in prolactin hormone levels compared to the control group. There was a significant increase in the weight of babies in the study group [13]. The safety profile of asparagus has not yet been reported. Runny nose, eye inflammation, tightness in the throat, and coughing were reported as side effects of asparagus. Furthermore, asparagus may lead to diuretic-like effects. However, in Ayurveda literature, asparagus is described as safe when used for long-term lactation.

For daily consumption, it is recommended to mix 1 g of the root powder into milk or fruit juice [3].

Dates (*Phoenix Dactylifera*)

The date palm, which belongs to the family Arecaceae, is one of the oldest crops cultivated in Asia (Middle Eastern countries) and North Africa. Dates attract worldwide attention not only for their nutritional properties but also as a source of functional compounds. Bioactive compounds in their composition include flavonoids, phenolic acids, carotenoids, and phytoestrogens. These phytochemical components can reduce the risk of developing disease and improve functionality. As such, they are responsible for antioxidant and antimicrobial activities, anti-inflammatory properties, and other health benefits against cancer, diabetes, and cardiovascular diseases [14]. Furthermore, dates contain iron, protein, fiber, glucose, vitamins, biotin, niacin, folic acid, and minerals such as calcium, sodium, and potassium, which can increase breast milk production. Dates also contain steroid alcohol and sterol compounds such as cholesterol. Steroid alcohol is a precursor for estrogen production and, together with progesterone, it plays a role in lactation and proliferation of mammary ducts and alveoli, as well as stimulating the release of prolactin in low doses. Milk production is affected by the oxytocin hormone. Oxytocin can be secreted through oral therapy or food (dates, fenugreek), nasally, intramuscularly, or through massage [15]. In one study, it was aimed to assess the effect of the consumption of fenugreek tea and dates on breast milk production. Seventy-five postpartum women were divided equally into three groups for a 2-week study. The first group was given fenugreek tea, while the second group was given dates. The third group remained as a control group. Breast milk volume was measured by pumping the breasts by hand on the third

day postpartum. The infants were weighed on days 0, 3, 7, and 14 using a baby scale. Percentages of change in breast milk volume and weight were statistically significant in the dates and fenugreek groups on the postpartum day 3. On day 7, newborns in the dates group showed weight gain, while those in the fenugreek and control groups were below their birth weights. On day 14, no significant difference was found between any of the groups. It was concluded that dates and fenugreek were beneficial in increasing breast milk production in the early postpartum period [16]. Another study, conducted in 2021, aimed to determine the effect of dates on breast milk production on days 3 to 9 in 15 postpartum mothers. For 7 days, the mothers were given a total of 100 g of pitted fresh dates, 50 g after breakfast and 50 g after dinner, and observations were made. On day 10, the breast milk production of nearly all participants was higher after consuming dates [15]. In another study, which included 48 mothers and 1- to 3-month-old infants, the effect of dates on breast milk supply and nutritional status was observed. Twenty-five mothers were given 10 dates daily for 4 weeks, while 23 mothers remained as a control group. The breast milk supply of the mothers who consumed dates significantly increased by 11% from the beginning to the second week and by 23% from the beginning to the fourth week. Similarly, the amounts of breast milk were significantly higher compared to those of the control group. However, there were no differences in the nutritional status of the infants [17]. Considering all the studies, dates appear to be beneficial in increasing and supporting the amount of breast milk in breastfeeding mothers. Date fruits may be an alternative galactagogue.

Fennel (*Foeniculum Vulgare*)

Fennel is a licorice-flavored herb that is indigenous to the Mediterranean, and it is known for its use in the treatment of colic disorders in infants. Even though fennel is traditionally used to increase milk, it has estrogenic properties [3]. Although fennel is recommended to lactating women to increase milk production, the galactagogue mechanism of action of fennel is not fully understood and clinical evidence is not satisfactory [1]. Side effects such as hypotonia, lethargy, vomiting, and sucking difficulties were observed in the infants of mothers who excessively consumed a mixture of licorice, fennel, aniseed, and goat's rue [9]. The recommended daily dose of fennel is 5 to 7 g [18].

In a further study the aim was to examine the effect of dates and fennel on breastfeeding adequacy based on 5 studies in the literature. The results of the first study showed that the consumption of fennel herbal tea and dates had a positive effect on increasing mothers' milk production in the early days postpartum, the second study revealed a positive effect of date consumption on mothers' satisfaction

with milk adequacy, and the third study showed that 80% of mothers in the intervention group had a good score in terms of breast milk. The fourth study revealed that a galactagogue drop containing fennel, anise, dill, parsley, and cumin had no effect on breast milk volume or the weight gain of infants, while the fifth study showed a positive effect of fenugreek seed and fennel herbal tea on breastfeeding adequacy and positive changes in infant anthropometric characteristics. As a result of the study, fennel and dates were recommended for increasing breast milk for breastfeeding mothers since they are easily accessible and low cost [19]. Another study was conducted with 78 female infants 0 to 4 months of age feeding exclusively on breast milk. The infants were randomly assigned to the intervention group (the mothers drank herbal tea containing 7.5 g of fennel seed powder in addition to 3 g of black tea three times a day) and the control group (they drank herbal tea containing black tea powder 3 times a day).

Symptoms of breast milk adequacy, growth parameters, frequency of defecation, and duration of breastfeeding were measured and evaluated before and during the 4-week study. While there were no significant differences between the two groups in weight, height, head circumference, or frequency of defecation, the durations of breastfeeding were longer in the control group compared to the fennel group.

The authors concluded that herbal tea containing fennel seeds improves breast milk adequacy symptoms [20]. A study was carried out in Iran with 46 breastfeeding mothers to assess the effect of fennel on blood serum prolactin levels. Mothers took 3 g of fennel seed in six capsules of 500 mg a day. The serum prolactin levels were assessed before the study and 15 days after. While the mean serum prolactin level was 64.55 ± 32.06 ng/mL before the study, it was 95.55 ± 65.90 ng/mL after. This result affirmed the key role of prolactin in milk production and that fennel increases prolactin levels in blood serum [21].

Aniseed (*Pimpinella Anisum*)

Aniseed is an herb traditionally used especially in the breastfeeding period due to its many beneficial effects. It is a one-year plant with white flowers and small seeds, cultivated in Iraq, Türkiye, Iran, India, and Egypt [22]. For the first time, the aim of a study was to determine the effect of aniseed tea on human milk volume and premature infant weight in human populations. A total of 129 participants with premature babies (45 in the intervention group, 45 in the placebo group, and 39 in the control group) were included in the study. The participants in the intervention group were given aniseed tea (2 g of dried aniseed in addition to 1 g of black tea). The participants in the placebo group were only

given black tea containing 3 g of dried black tea. Both groups drank the tea 3 times a day at breakfast, lunch, and dinner for a week. No intervention was applied to the control group. The intervention period was limited to 7 days. A statistically significant difference was found between the intervention, placebo, and control groups in milk volume on days 1, 3, 4, 5, 6, and 7. On day 1, the average volume of milk pumped in the intervention group was significantly higher than that in the control group. There was no statistically significant difference between the groups on day 2. On days 3, 4, 5, 6, and 7, the average volume of milk pumped in the intervention group was significantly higher than that in the placebo and control groups. There was no statistically significant difference between the three groups in terms of premature infant weight on days 0, 3, or 7 [23].

Black cumin (*Nigella Sativa*)

Black cumin is a plant that has various pharmacological properties and has been widely used for medical purposes; it is also effective as a milk booster. A systematic review of 110 articles has reported positive galactagogue effects of black cumin determined by serum prolactin levels, mammary tissue changes, milk production and composition, and infant weight, and has shown that it acts as a milk booster. Black cumin can be developed as an herbal supplement that can be consumed by breastfeeding mothers. However, further studies should be conducted to research the effects of this plant on humans [24].

In one study the aim was to analyze the effect of flaxseed and black cumin cookies on increasing breast milk volume. The participants were 38 mothers who had recently given birth. The cookies were given for 10 days. The results showed that the flaxseed and black cumin cookies were effective in increasing breast milk volume. The highest breast milk volume was observed on day 7 (82.5%) and day 11 (15%) postpartum. The results of that study suggest that flaxseed and black cumin seed cookies are effective in increasing the volume of breast milk [25]. The effects of aqueous and ethanol extracts of black cumin seeds on milk production in rats were analyzed. Milk production was measured by measuring litter weight during lactation. Aqueous and ethanolic extracts significantly increased milk production. The authors concluded that aqueous and ethanol extracts of black cumin seeds can stimulate milk production in rats [22].

Nettle (*Urtica Dioica*)

Nettle is a weed and its seeds, leaves, and even roots are used for medical purposes. It is highly rich in micronutrients and other nutrients. It is used as both medicine and food

in many countries, especially in the Mediterranean region, because its leaves are healthy; it is easy to digest; it is rich in minerals (especially iron), vitamin C, and provitamin A; and widespread and has various biological activities [26-34].

It is considered that the nutritional components and phenolic acid content of nettle can contribute to the breastfeeding process. It is unknown whether nettle has any certain side effects related to its use during breastfeeding [10].

Discussion

Based on the findings presented in the study, the use of herbal galactagogues such as fenugreek, milk thistle, fennel, and black cumin appears to have potential benefits in enhancing breast milk production [1]. However, despite their widespread traditional use, the exact mechanisms through which these herbs influence lactation remain largely unexplored [2]. While many studies report positive outcomes, such as increased milk volume and improved prolactin levels [3,10,19] the evidence is not entirely consistent across all studies and certain herbs may have adverse effects. For example, while fenugreek has shown promising results in several studies, other research has either found no significant differences or raised concerns about side effects for both mothers and infants [3]. Similarly, milk thistle demonstrated notable increases in milk production in controlled trials, yet some reports suggest possible allergic reactions [6].

The variation in study results, sample sizes, and methodologies highlights the need for more rigorous, large-scale research to fully elucidate the safety and efficacy of these herbal galactagogues.

Results

In the present study, although their mechanisms of action are not exactly known, the positive effects of herbs such as fenugreek, asparagus, fennel, dates, goat's rue, milk thistle, anise, nettle, and black cumin on breast milk were compiled. Even if recipes for increasing breast milk are used traditionally, the effects of some plants are unknown. At this point, increasing the knowledge of dieticians, midwives, and lactation consultants on the subject may prevent breast milk malnutrition. Further research could be conducted to analyze the mechanism of action and to discover alternative plants. The controlled use of galactagogues, which are positively related to breast milk, should be expanded, the knowledge level of the community and the responsible health personnel should be increased, and more research should be conducted to base the unclear points on evidence.

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