An Overview of Breastfeeding and the use of Nutraceuticals and Lifestyle Factors to Support Milk Production

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RESEARCH

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ABSTRACT

Breastfeeding provides the greatest benefits during the first six months of an infant's life and is highly recommended for the first year postpartum, according to both the American Academy of Pediatrics and the World Health Organization. Despite this, many women prematurely discontinue breastfeeding for a variety of reasons. One reason often cited is a lack of adequate milk production. While pharmaceutical options are available to increase breast milk supply (e.g., domperidone, metoclopramide and metformin), these are met with mixed success, and some women are weary of consuming medications while breastfeeding, preferring natural alternatives instead. To this end, there is an emerging interest in the use of nutraceuticals, as new mothers seek optimal nutritional strategies to enhance breast milk supply. Specific agents of interest include fenugreek, milk thistle, moringa, and goats rue, with other galactagogue supplements and foods such as brewer's yeast, fennel seed, oats, and flax seed also suggested as possibly beneficial. We review the scientific basis for the use of such agents, with consideration for clinical relevance, and provide suggestions for future directions in this line of research.

Keywords: Breastfeeding, lactation, nursing, galactagogue, nutraceuticals, dietary supplements.

ABBREVIATIONS

ALA - alpha-linolenic acid
ACTH - Adrenocorticotrophic Hormone
β-LPH - beta lipotropin
BC – Before Christ
CAMs - complementary and alternative methods
CDC – Center for Disease Control
DHA - docosahexaenoic acid
EPA - eicosapentaenoic acid
FDA – Food and Drug Administration
HCS - human chorionic somatomammotropin
hPL - human placental lactogen
NEC - necrotizing enterocolitis
NICU – Neonatal Intensive Care Unit
PCOS – polycystic ovarian syndrome
POMC- pro-opiomelanocortin
SDG - secoisolariciresinol diglucoside
sIgA - secretory immunoglobulin A

WHO – World Health Organization

UNICEF - United Nations International Children's Emergency Fund

INTRODUCTION

According to the American Academy of Pediatrics and the World Health Organization, breastfeeding provides the greatest benefits during the first six months of life and is highly recommended for the first year postpartum. The Center for Disease Control (CDC) 2022 Breastfeeding Report Card indicates that 83.2% of infants in the U.S. received breast milk at birth in 2019. However, that number declined by over half, to 35.9%, at 12 months postpartum (CDC, 2024) [1]. Mothers report weaning prematurely due to pain, lack of milk supply, and poor latching [2]. This can be further attributed to larger community-based issues such as insufficient training for healthcare workers in lactation counseling, inadequate paid maternity leave, workplace barriers, lack of familial and partner support, limited investments in breastfeeding support programs, and exposure to the marketing efforts of formula providers [3,4]. Thirteen percent of the women surveyed in the above study reported poor breast milk supply [5]. Despite these findings in the United States, the United Nations International Children's Emergency Fund (UNICEF) reports a 10% global increase in breastfeeding as of 2024, with an expected 50% increase by 2025 [6]. Therefore, it is essential mothers are provided with the environment and resources necessary to allow for successful breastfeeding. For many women, one such support comes in the form of nutraceutical use, as new mothers seek optimal nutritional strategies to support their nursing infants.

The use of natural products to increase human milk production is an ancient practice expected to increase 50% by 2025 [6]. Therefore, it is essential mothers are provided with the environment and resources necessary to allow for successful breastfeeding. For many women, one such support comes in the form of nutraceutical use, as new mothers seek optimal nutritional strategies to support their nursing infants and has resurged over the past few decades. This resurgence is ascribed to convenience and the desire to improve infant health, as well as certain cultural norms. Nutraceuticals are food-derived products that provide a variety of health benefits. They include functional foods, fortified foods and dietary supplements. Nursing mothers may choose to consume nutraceuticals purported to support lactation and breast milk production as part of their regimen. Postpartum mothers may also choose nutraceuticals to support breastmilk production over available pharmaceuticals such as domperidone, metoclopramide, and metformin due to perceptions of greater safety [7]. Galactagogues are foods and substances that promote breast milk production and include herbal, dietary, and pharmaceutical options. Certain herbal galactagogues such as fenugreek, milk thistle, fennel, goat's rue and moringa have gained popularity in recent years and are often touted as natural alternatives to aid breastmilk production. These, coupled with other lifestyle factors such as whole food nutrition, adequate hydration, and regular exercise, are viewed as natural alternatives to traditional medications and, for some women, may enhance milk production.

Many nutraceuticals and galactagogues have been purported to increase breastmilk production, although scientific support is only available for a few. Nutraceuticals alone do not guarantee an increased human milk supply and should be considered a complementary strategy to be used only in addition to other lactation-supportive practices. Specifically, and most importantly, it is essential to provide nursing mothers and healthcare professionals with the most current, evidence-based guidelines to inform their decisions and actions. In this brief review, we first present an overview of breastmilk production, followed by a discussion of the various nutraceuticals claimed to support this process. This review provides valuable insights into the scientific understanding of galactagogues and nutraceuticals for lactation. It equips both mothers and healthcare providers with the knowledge needed to assess the potential use of nutraceuticals as a tool to enhance and extend breastfeeding outcomes. Additionally, recommendations for future research are suggested to further inform this field.

Data was obtained from the following sources: PubMed, ScienceDirect, LactMed, CDC, UpToDate, Academy of Breastfeeding Medicine, Cleveland Clinic, Women's Health, and Healthline.

Lactation Physiology

Lactation is a biological and hormonal process that occurs during the postpartum period, in which mammals produce milk from the mammary glands. Each breast contains glandular tissue, organized into 15 to 20 sections known as lobes, which are surrounded by adipose tissue and connected to lactiferous ducts [8]. The breasts contain blood vessels that transport lymph from the lymph nodes through lymphatic vessels. Alveolar units form within the mammary glands, and the cells lining the alveolar lumen differentiate into secretory cells capable of producing milk, such as lactocytes. Each alveolus consists of a lumen, where milk accumulates, surrounded by a single layer of lactocytes and a layer of myoepithelial cells. Myoepithelial cells contract to squeeze the alveolus, facilitating the ejection of milk.

During pregnancy, estrogen and progesterone levels rise, leading to an increase in the number and size of milk ducts, a process known as lactogenesis. Following the delivery of the placenta and infant, the rapid decline in progesterone levels triggers an increase in prolactin levels, as lactocytes are no longer inhibited from producing milk [9]. This transition marks the initiation of the lactation process, which typically begins 30 and 72 hours postpartum. Prolactin secretion is stimulated, and oxytocin is released each time the infant removes milk from the breast, as suckling stimulates nerve endings in the nipple, signaling the release of prolactin from the posterior pituitary and the release of oxytocin from the hypothalamus. The combined effects of prolactin and oxytocin cause contractions in the myoepithelial cells, facilitating the movement of milk from the ducts to the alveolar lumens, a process known as the milk ejection reflex or "letdown." Additionally, oxytocin plays a crucial role in inducing a state of calmness and stress reduction in the mother. Known for its anxiety reducing properties, oxytocin helps buffer against emotional overload, while supporting emotional regulation in breastfeeding mothers [10]. Studies have demonstrated that oxytocin counteracts the psychological effects of stress by reducing cortisol levels; in turn, helping mothers cope with the physical and emotional challenges of motherhood [11,12].

Composition of Breast milk

Breast milk is composed of numerous vital components that are essential for the survival and health of infants. The first milk produced after birth is called colostrum. Colostrum is a thick yellow fluid produced during pregnancy and immediately after birth. Colostrum is highly concentrated, in both nutrients and antibodies. Within three to five days after birth, colostrum transitions to mature milk. Notably, the composition of breast milk evolves as infants grow and their nutritional needs change. According to WHO, breast milk contains a variety of components including fats, carbohydrates, protein, vitamins, minerals, and anti-infective factors such as white blood cells, oligosaccharides and secretory immunoglobulin A (sIgA) [13]. These anti-infective factors play a critical role in protecting the infant from infections by killing microorganisms such as bacteria, viruses, fungi, and by preventing harmful pathogens from entering the cells or attaching to mucosal surfaces. Additionally, sIgA coats the intestinal mucosa, providing further protection against pathogens.

The fat content in breast milk is approximately 3.5 g per 100 mL and provides a key source of energy for the infant. Fat in breast milk is also rich in docosahexaenoic acid (DHA), an omega-3 fatty acid that is essential for brain development and neurological health. The fat concentration increases in the hindmilk, which is delivered towards the end of the breastfeeding session [13,14]. Lactose, a disaccharide, is the predominant carbohydrate in breast milk, providing approximately 7 g per 100 mL. The protein content of breast milk is balanced in amino acids and contains alpha-lactalbumin, which helps regulate lactose production. Protein is present at an amount equal to approximately 0.9 mg per 100 mL [13,15]. Human breast milk also provides adequate amounts of vitamins and minerals, including vitamin D, zinc, and iron, during the first four to six months of life. However, if the mother has a deficiency in any of these nutrients, supplementation may be recommended at the discretion of a healthcare provider—which is usually the reason why women are recommended to supplement a vitamin/mineral product during the breastfeeding years.

Term and preterm infants exhibit differences in nutrient absorption and physiological needs. The differences arise from the immaturity of various organ systems of preterm infants, including the GI tract, liver, kidneys, and immune system [16–18]. According to The World Health Organization, preterm infants have higher requirements for zinc, vitamin D, and iron compared to term infants. Supplementation of these nutrients may therefore be necessary for preterm infants.

Benefits of Infant Breastfeeding

Breastfeeding is widely recognized as a safe and effective means of promoting infant survival and optimal health and development. Human milk provides superior nutrition, as well as essential antibodies that support the immune system and protect against short and long-term illnesses. Additionally, breast milk aids in development of the infant's digestive system [19]. Breastfeeding has been shown to reduce various negative health conditions, including type II diabetes, childhood obesity, childhood leukemia, ear infections, eczema, diarrhea and vomiting, respiratory infections, necrotizing enterocolitis (NEC), and sudden infant death syndrome (SIDS) [20–24]. A case-controlled study further supports this by showing breast feeding at time of hospital discharge is associated with a reduced risk of type II diabetes in adolescents [24]. Breastfeeding for at least six months has been linked to a 19% reduced risk of childhood leukemia and appears to have a protective effect against other childhood cancers [21,23].

In addition to supporting physical health, breastfeeding benefits infant mental health by heightening emotional attachment and security, as well as encouraging cognitive and social development. Studies have shown that children who are breastfed for longer durations have a lower incidence of anxiety, depression, and aggression later in life [25].

Breastfeeding also has significant health benefits for the mother, including reducing the risk for type II diabetes, certain types of breast cancer and ovarian cancer, acting as a natural contraception, and aiding in postpartum recovery (including weight loss). Furthermore, breastfeeding offers psychological benefits for both the mother and the infant [26]. The process promotes emotional bonding through the release of oxytocin, which encourages caregiving behaviors in the mother [27]. It has also been shown to reduce stress, with the anxiolytic effects of breastfeeding lowering cortisol levels, the primary stress hormone. The release of oxytocin and prolactin during breastfeeding enhances mood and may contribute to improved mental health, potentially reducing the risk of postpartum depression [28]. Research suggests that mothers who are successful at breastfeeding often report increased self-esteem, confidence, and emotional well-being, which can further improve their psychological health [29].

In addition to a myriad of health benefits, breastfeeding can reduce the financial burden on families. Exclusively breastfeeding can eliminate or significantly reduce the need for infant formula, which continues to be expensive [30]. Breastfed infants typically have fewer sick doctor visits due to the lower incidence of illness, reducing healthcare costs [31,32]. While breastfeeding can be more economical compared to formula, there are associated costs including increased food cost, potential for lost wages when pumping breastmilk, and nursing supplies [33,34].

Challenges and Alternatives to Breastfeeding

Postpartum mothers often encounter challenges with milk production, a phenomenon documented as early as 2000 BC [35]. Historical accounts during this period indicate that multiple alternatives to breastfeeding were utilized including feeding animal milk through terracotta pots or clay feeding vessels, using artificial milk prepared by steeping barley bread in water and boiling the mixture in milk, or employing wet nurses (discussed below). While the historical therapeutic practice of applying warmed sword fish bones in oil to a woman's back is not recommended, other ancient remedies of potential use included dietary treatments, such as fragrant bread made from soused durra with aromatic seasonings [36]. Additionally, colostrum was often deemed unsuitable or indigestible in some ancient societies and was replaced with alternative substances, including honey [37,38].

Women have historically faced universal challenges with breastfeeding, leading to the practice of wet nursing. Wet nursing can be traced back to 2000 BC in Ancient Egypt. This practice was also popular amongst women in Greece, Rome, England, France, and 19th and 20th century America [39]. Women who experienced lactation failure hired wet nurses to help provide human milk for infants during the postpartum period [40,41]. Originally, wet nursing was an informal exchange between mothers and enslaved or under-privileged women. Over time, informal exchanges began to occur between family, friends and acquaintances. Sometimes, wet nurses were paid for their services. In addition to lactation failure, wet nurses were used for infants whose mother may have died during childbirth or surrogacy [39,42,43]. During the Victorian era, wet nursing became a profession, and women were employed by hospitals and facilities for abandoned children to provide breast milk [44]. By the early 1900s in America, wet nurses earned five times more than a pediatric nurse, reflecting the socioeconomic significance of their role during this period. The ability to employ a wet nurse was a sign of wealth in 20th century America and could not be afforded by many. The ideal wet nurse appeared mentally and physically healthy [39]. According to The La Leche League International, informal wet nursing is not recommended due to viruses, diseases, alcohol and medications consumed that can be transmitted through breast milk of the lactating mother [45]. Wet nursing in the 21st century has been replaced with alternative methods such as the use of infant formula and donor breast milk, mainly used for babies in the Neonatal Intensive Care Unit (NICU) [39].

In a survey of women who reported their determination to breast feed, mothers expressed the need to protect and increase the bond with their babies [46]. Breastfeeding gives some mothers a sense of purpose and fulfills the role of a mother while caring for her infant. According to the CDC, approximately 84% of infants in the U.S. are breastfed at the time of hospital discharge. However, mothers face many obstacles that may lead them to terminate breastfeeding. Significant challenges include low milk supply, pain during nursing, latching difficulties, maternal exhaustion, postpartum emotions, early postpartum, type of childbirth delivery, work-related scheduling conflicts for pumping, and lack of support within the healthcare system [47,48]. Other challenges include mother and infant separation that inhibits bonding time [49].

WHO and UNICEF are two global collaborative organizations established to improve health and well-being, especially for women and children, while strengthening health systems [50]. The Baby-friendly Hospital Initiative for Neonatal Wards is an extension of WHO/UNICEF and was established to address the biggest barriers while promoting a successful breastfeeding journey: the healthcare system and misinformed health care providers who may provide inconsistent advice on breastfeeding, including expressing milk and pumping, due to lack of knowledge, training, and skills, as well as prejudices due to personal experiences and attitudes. The healthcare system appears to lack time and resources to support breastfeeding efforts due to inadequate staffing with heavy workloads, as well as poor hospital policies. The Baby-friendly Hospital Initiative for Neonatal Wards outlined ten steps to address the breastfeeding barrier: 1) ensuring that the staff is knowledgeable and competent, 2) having a written policy and protocol in place, 3) teaching mothers on how to recognize and respond to infant cues for feeding, 4) not supplementing with food or fluids unless medically necessary, 5) supporting mothers on how to manage difficulties, 6) focusing on breastfeeding management with woman and support system, 7) encouraging mothers to room-in with their new infant during hospitalization, 8) counselling mothers on the use and risks of feeding bottles, 9) providing pacifiers, and 10) coordinating ongoing care and support after discharge [49].

Mothers face various medical challenges, including side effects from medications such as birth control and diuretics, as well as hormonal endocrine disorders like thyroid gland disorders and polycystic ovarian syndrome (PCOS) [51–53]. Additionally, concerns about their infant's weight, nutrition, and lack of support at home or within the workplace are common. For mothers particularly concerned with milk supply, increasing lactation to prevent premature cessation of breastfeeding is a priority. They often consider advice from peers and healthcare professionals, weighing factors such as safety, convenience, and cost. Many turn to nutraceutical and pharmaceutical methods to achieve success [46,54].

Regarding infant feeding, cultural changes over time have led to artificial milk (formula) and the practice of bottle feeding [55]. Artificial milk (formula) was first introduced in Germany in 1865 by Justus von Leibig, a chemist specializing in organic compound analysis and biochemistry. Prior to Leibig's work, indigenous groups such as the Wabanaki and Native American tribes created early forms of infant formula using ingredients like nuts and cornmeal [56].

Artificial milk (formula) is generally introduced for a variety of reasons, including insufficient breast milk supply, concerns of infant malnutrition, convenience, personal beliefs and experiences, infant's health (e.g., birth defects or diseases), mother's health (e.g., chronic or communicable diseases, or physical conditions), or a lack of milk supply [35,53]. In addition to artificial milk, mothers with insufficient supply historically relied on wet nurses or feeding bottles [35,57].

While both breast milk and formula provide essential nutrients (carbohydrates, fats, proteins, minerals, vitamins), breast milk is generally better absorbed in the infant's gut [58]. Furthermore, breast milk contains digestive enzymes and natural antibodies, making it less likely that infants will develop conditions such as necrotizing enterocolitis (NEC). Breastfeeding is also associated with improved human growth and development, particularly, brain development. As mentioned earlier, it has been shown to reduce the risk of sudden infant death syndrome (SIDS), respiratory and ear infections, childhood obesity, leukemia, and type I and II diabetes mellitus compared to babies fed with formula [58–60].

Women struggling with supply may seek out methods to increase their milk production. Dr. Lam with Independence Family Health Center suggests that the focus on increasing milk supply should be implemented after two weeks postpartum in order to establish a baseline for breast milk supply [61]. Multiple pharmaceuticals are available to support lactation, specifically domperidone, metoclopramide and metformin. Women may also consider incorporating nutraceuticals such as fenugreek, milk thistle, moringa, and goats rue or other galactagogue supplements and foods such as brewer's yeast, fennel seed, oats (release oxytocin), and flax seed to their diet [62,63]. Research on these agents is discussed in the following text. Women should first consult their healthcare provider or lactation consultant to determine the best and safest options before initiating any changes.

Pharmaceuticals

Domperidone is an antiemetic and prokinetic medication commonly used for treating dyspepsia and reflux esophagitis. It has also been clinically shown to increase prolactin levels when administered at doses of 10 and 60 mg, three times daily [64,65]. Supported by clinical evidence, it has been used off-label for many years to support breastfeeding. A 2012 study reported that 59 mothers of preterm infants experienced an increase of 99 mL of breast milk per day after receiving domperidone at a dose of 30 mg daily for seven to fourteen days [66]. In another study of 45 women, 22 participants showed an increase in breast milk production following the administration of 30 mg of domperidone daily after cesarean section delivery [66]. Additionally, a study of 15 women comparing the effects of 60 mg versus 20 mg of domperidone daily over four weeks found, while not statistically significant, 60 mg group collectively produced 300 mL more milk than the lower dose group [65,67].

A survey study revealed 45% of mothers reported extreme effectiveness, 47% women reported a slight to moderate increase in breast milk production, and 8% reported no effect [64]. It is important to note that self-reported effectiveness in surveys may differ from clinical outcomes, as subjective factors can influence survey responses.

In a clinical trial, domperidone was administered at a dose of 20 mg three times daily for four weeks, then tapered to twice daily at week five and once daily at week six. Participants reported significant increases in milk supply during the first four weeks, with no further significant changes during the tapering phase. Interestingly, doses of domperidone of 20 mg three times daily were not found to be significantly more effective than 10 mg three times daily [65].

Mothers and infants with a cardiac history should be monitored while using domperidone due to the risk of arrhythmias and sudden cardiac death in adults with chronic underlying health comorbidities [68]. Studies on galactagogues and cases reported to the Food and Drug Administration (FDA) have noted side effects such as dry mouth, headache, dizziness, nausea, abdominal cramps, diarrhea, palpitations, malaise, and shortness of breath. Higher dosages, particularly those exceeding 30 mg daily, were associated with a greater frequency of some of these effects [69]. While domperidone has been shown to increase prolactin levels, it is recommended to discontinue its use if milk supply does not increase within seven days, with a gradual tapering of the dosage to prevent side effects [70].

Metoclopramide is an antiemetic medication that has been shown to increase prolactin levels and is sometimes used off-label at a dosage of 10 mg three times daily to enhance milk supply [71]. Although, the exact mechanism of action is not fully understood, metoclopramide is known to sensitize tissues to acetylcholine, stimulate upper gastrointestinal tract motility, and antagonize central and peripheral dopamine receptors, thereby producing antiemetic effects. Common side effects associated with metoclopramide include restlessness, drowsiness, fatigue, nausea, vomiting, headaches, confusion and [71,72]. However, the drug has been reported to be undetectable in breast-fed infants, with concentrations remaining below therapeutic levels when consumed via breast milk [73]. A double-blind, placebo-controlled study involving 13 women one day postpartum demonstrated a 50% increase in milk production in those treated with metoclopramide compared to the placebo group, while the amino acid composition of the milk remained [72].

Metformin has been identified as a potential galactagogue; however, there is no strong evidence to support its effectiveness. Metformin primarily lowers blood glucose levels by reducing hepatic glucose production, decreasing intestinal glucose absorption, and improving insulin sensitivity [74]. In women with polycystic ovarian syndrome (PCOS), metformin improved insulin sensitivity leading to a reduction in luteinizing hormone and androgen levels, which has been hypothesized to improve milk supply [75–77]. PCOS is closely associated with obesity and insulin resistance, conditions that affect lactation due to the mammary glands' sensitivity to insulin during pregnancy and breastfeeding. Maintaining optimal insulin function is essential during lactation, and metformin is often prescribed as an insulin sensitizer.

Breastfeeding outcomes were evaluated in 164 postpartum women with PCOS, who received daily doses of 500 to 2,000 mg of metformin in either immediate- or extended-release feed formulations. Among these women, 59% successfully breastfed, while 17% were unable to do so due to low milk production or complications such as the demands of multiple births, infant deformities, inflammation of the breast, or other issues. Additionally, 27% did not attempt breastfeeding. Of the 124 women who attempted breastfeeding, 78% were successful [78]. Another smaller study examined women with insulin resistance and low milk supply who were randomly assigned to receive 750 to 2,000 mg of metformin extended release daily or a placebo. After two to four weeks, the placebo group experienced an average decrease of 58 mL in daily milk supply, whereas the treatment group showed an average increase of eight mL [76]. Collectively, the overall evidence does not support metformin to increase milk production in women with PCOS. The conflicting results highlighted above may be attributed to variations in study design, sample sizes, and dosage regimens.

Metformin is generally considered safe for use during breastfeeding, provided the relative infant dose remains below 10 mg/kg/day [74]. A separate study sought to determine whether maternal metformin in seven women taking metformin (median dose 1500 mg orally daily) use is safe for their breastfed infants. Metformin was either undetectable or present in very low concentrations in the plasma of four infants studied. Furthermore, no health issues were observed in the seven infants evaluated [79]. The concentrations of metformin in breast milk were consistently low, resulting in a mean infant exposure of only 0.28% of the weight-normalized maternal dose. This level is significantly below the 10% threshold of concern for breastfeeding safety. Based on the findings along with the absence of adverse effects in the infants studied, it was concluded that metformin use during breastfeeding is safe. However, it is important to conduct a risk-benefit analysis tailored to the specific circumstances of each mother and her infant before making a decision about breastfeeding [74,79].

Nutraceuticals & Galactagogues

Nutraceuticals refer to bioactive nutritional components that are derived from natural food sources and provide health benefits beyond basic nutrition [80,81]. Historically, they have been utilized for their nutritional and medicinal properties in prevention and treatment of disease, but more recently, they are incorporated into health regimens to promote overall wellbeing. The scope of nonpharmacological nutraceuticals has expanded to include food and dietary supplements, prebiotics, probiotics, minerals, antioxidants, and vitamins. They are commonly added to balanced diets to enhance nutrient intake, to replenish essential vitamins and minerals, and/or to provide novel nutrients that otherwise are not being consumed through traditional food sources. As reviewed below, some nutraceuticals have been scientifically shown to support lactation including fenugreek, milk thistle, moringa, and goats rue.

Fenugreek (*Trigonella foenum-graecum*), originating in India and Northern Africa, is one of the oldest known medicinal herbs. It is widely available and often regarded as a natural remedy for various health conditions. The recommended dose to achieve the galactagogue effects is usually one to two grams of dried seed or powder, consumed three times per day [7].

Fenugreek contains compounds, such as diosgenin, which are thought to serve as precursors for the synthesis of steroid hormones, although this conversion typically occurs in a laboratory setting rather than through proteolytic cleavage in the human body. For instance, insulin is derived from pro-insulin, while hormones like (Adrenocorticotrophic Hormone) ACTH and (beta lipotropin) β-LPH are derived from a precursor molecule called pro-opiomelanocortin (POMC) [82,83]. The galactagogue effect of fenugreek may stem from its stimulation of sweat production, as the breast is considered a specialized "sweat gland."

Animal studies have demonstrated that fenugreek increases prolactin, oxytocin, and insulin secretion [84,85]. It is thought to be most effective in promoting lactation within the first two weeks postpartum. A recent animal study compared groups of mice on normal and low protein diets with or without 1g/kg/day of fenugreek. The fenugreek treated on normal protein mice showed a 16.1% increase in milk production and 11% increase in pup growth compared to the untreated group, where pups experienced weight loss and yielded less milk [86]. While these findings are of interest, the dosage is far higher than what would be consumed by humans, questioning the generalizability of these data.

With regards to human use, a U.S. survey of 1,294 breastfeeding mothers taking fenugreek and recruited via social media found that 43% reported an increase in supply, 12% reported maintenance, 24% reported no impact, 16% were uncertain, and 5% reported a decrease [87]. In one study, infant weight gain remained consistent with and without fenugreek supplementation with the control group finishing at 2.6%, compared to the baseline and the experimental remaining stable at approximately 2.55% [88]. However, infants in the experimental group exhibited increased hydration following supplementation, indicated by frequent urination, which rose from 4.4% at baseline to 6.1%. These findings suggest that fenugreek may enhance maternal milk production in the experimental group. Fenugreek has also been found to increase serum prolactin and oxytocin levels in women, corroborated by infant weight gain, improved breast milk composition, and increased milk volume [89].

Alongside reports of efficacy, participants in some research studies and surveys have also reported experiencing side effects, particularly gastrointestinal issues including nausea and vomiting, as well as flatulence. Mothers taking fenugreek together with fennel and goat's rue reported diarrhea [90]. In a survey of 188 nursing mothers in the United States, 54% reported increased milk supply, but 45% experienced oversupply, infant gassiness, and/or a maternal odor resembling maple syrup [91].

Due to its uterine-stimulating properties, fenugreek is not recommended during pregnancy to prevent the risk of premature labor or miscarriage [92,93]. Fenugreek seeds are known to lower serum cholesterol and blood sugar levels, which may necessitate caution for women with hypoglycemia, particularly those taking antidiabetic medications. Additionally, fenugreek can interact with anticoagulants and antidiabetic drugs, although its glucose lowering effect is relatively mild at doses exceeding 25 mg/day [92,94].

Milk thistle (*Silybum marianum* or *silymarin-phoshatidylserine*) is widely recognized for its hepatoprotective properties [95,96]. Micronized doses of 420 mg/day have been reported to stimulate prolactin secretion [97,98]. Moreover, it is hypothesized that milk thistle may provide psychological benefits by promoting hydration and encouraging the consumption of a healthy, balanced diet [99].

A randomized, double-blind trial involved mothers of preterm infants receiving silymarin and galega at 5 g/day or placebo, from 3 to 28 days postpartum. Each group included 50 mothers with similar baseline characteristics. Milk production was significantly higher in the galactagogue group by day 7 and 30, with an average output of 200 mL, compared to 115 mL in the placebo group. Additionally, total milk production over the study was greater and more mothers met the 200 mL breast milk/day target in the galactagogue group. Milk thistle effectively increased breast milk production in mothers of preterm infants [99].

Milk thistle is often used in conjunction with goats' rue (*galega*) with no documented adverse reactions or side effects [99]. Due to poor oral absorption of its active components, milk thistle is considered unlikely to have negative effects on breast fed infants.

Moringa (*Moringa oleifera*, *Moringa pterygosperma*) commonly referred to as the "tree of life" or the "miracle tree," is a versatile herbal plant valued for its nutritional and medicinal properties. Native to Afghanistan, Bangladesh, India, and Pakistan, moringa comprises thirteen species, including *Moringa oleifera* [100]. Nutritionally, moringa is rich in beta-carotene, minerals, calcium, and potassium.

Moringa oleifera is frequently used as an herbal galactagogue to enhance breast milk production in breastfeeding mothers. In a randomized, double-blind, placebo-controlled study involving 88 participants, nursing mothers receiving *Moringa oleifera* leaf powder (450–900 mg/day in capsule form) exhibited a significant increase in milk supply between days three and ten compared to the placebo group [58]. The findings indicated that by day three, mothers in the *Moringa oleifera* group experienced notable increases in milk production, accompanied by visible breast fullness and corresponding infant weight gain.

A systematic review of six clinical trials performed in the Philippines further highlighted moringa's effectiveness in promoting lactation. In a pooled analysis of two of those studies that included 73 women, mothers taking moringa exhibited higher prolactin serum levels compared to those on placebo. A significant increase in residual human milk from days four to seven postpartum was reported, although this method likely underestimated the actual volume produced. Infant weight gain improved with a mean increase of 11.9% over four weeks [101].

In terms of safety, mild side effects such as gastrointestinal upset, nausea, vomiting, altered bowel habits, low blood pressure, and hypoglycemia were monitored. Serious adverse effects, including severe hypoglycemia in both mothers and infants, were not observed [58]. Moringa may stimulate blood clotting and is therefore not recommended for lactating mothers who are at risk for thrombotic events [102].

Goats' rue (*galega*) was first studied in the French Academy in 1873 after it was observed that it increased milk production in cows by 35 to 50%, a finding that was later confirmed in 1913 [73]. *Galega* is rich in guanidine which was found to lower blood glucose in animals and thus related to Metformin (dimethylbiguanide) [103]. Goat's rue is typically consumed in the form of tablets or tea but is most commonly found in combination with other herbs [95].

Although there is a lack of human studies specifically examining *galega* as a monotherapy for lactation, it has been studied in sheep. In one study, sheep were given 2 g/kg dry *galega* per starting one month after lambing. The results revealed a 16.9% increase in milk production after two months [104].

Goats' rue, when used with silymarin, has been clinically shown to enhance human milk production. In a double-bind, randomized trial, mothers of infants took 5 g/day *galega* and 5 g/day silymarin or 5 g/day lactose placebo from days 3 to 28 postpartum. A significant increase in milk supply was observed by day 7 with continued improvement at day 30. Ninety percent of the mothers were able to achieve their target milk supply [99]. No adverse reactions and side effects reported.

Galega is used as a hypoglycemic agent, and caution is advised as it may induce hypoglycemia in nursing mothers who are taking antidiabetic medications [73,99,103].

Galactagogue Foods and Supplements

Galactagogues are specific foods and herbal remedies purported to increase breast milk production in lactating mothers. Despite their widespread use, the efficacy of galactagogues remains a topic of debate due to limited evidence available from research [105]. Further investigations are necessary to substantiate their potential benefits and establish clear guidelines for their use. Food-based products touted to support lactation include brewer's yeast, fennel seed, oats (release oxytocin), and flax seed to their nutritional diet [62,63]. The scientific evidence for these agents is reviewed briefly below.

Brewer's Yeast (*Saccharomyces cerevisiae*) consisting of inactive yeast cells is commonly believed to enhance milk production by stimulating prolactin levels [106]. It is a rich source of vitamin B, beta-glucan, mannan oligosaccharides, and bioavailable chromium, which may contribute to its perceived health benefits [84].

A survey of 190 mothers in the U.S. who had used brewer's yeast for lactation found that 46% reported an increase in milk supply [87]. Unfortunately, survey data primarily reflects subjective experiences from participants and lacks the controlled conditions of clinical trials. To our knowledge, there are no clinical trials confirming the effectiveness of brewer's yeast in increasing human milk supply. However, an ongoing study, BLOOM, is investigating the effectiveness and safety of brewer's yeast and beta-glucan for lactation support, with results anticipated soon [107].

Many women consider brewer's yeast a safe and natural option for supporting an increase in breast milk supply; however, side effects have been reported with use. Among 592 Australian mothers surveyed, 11% experienced side effects such as weight gain, stomach cramps, dry mouth, and nausea. Additionally, a survey of 108 African mothers noted reports of infant cramps linked to brewer's yeast consumption by breastfeeding mothers [46,108].

Fennel (*Foeniculum vulgare*) seed is an aromatic spice touted as a galactagogue and used in traditional medicine to support milk production. Hippocrates suggested that women consume the fruit and root of fennel to prevent milk from drying up [109]. An uncontrolled, nonrandomized, and nonblinded study conducted in Iran included 46 healthy nursing mothers. Each participant consumed 3 grams of fennel powder daily for 15 days. Baseline serum prolactin levels averaged 64.6 mcg/L and increased to 95.6 mcg/L after the intervention. While the results demonstrated a rise in serum prolactin, the study did not measure milk production, leaving the direct impact of fennel on lactation outcomes unassessed [110]. The hypothesized mechanisms of its effects remain speculative and lack experimental confirmation. One theory suggests that anethole, a compound in fennel, may indirectly stimulate prolactin levels by reducing dopamine activity on dopamine receptors. Additionally, its oestrogenic properties may provide some stimulation of prolactin secretion [111]. Alternatively, the indirect promotion of milk production may be attributed to fennel's potential to support the milk ejection reflex and stimulate mammary tissue growth [62].

While fennel seed consumption is generally considered safe for mothers and infants, it is not recommended for individuals allergic to plants in the *Apiaceae* family, such as carrots, parsnips, celery, dill, anise, cumin, coriander, and caraway.

Oats are commonly believed to support increased human milk production [46]. They are a nutrient-rich food, providing dietary fiber and complex carbohydrates, along with protein, B1 and B5 vitamins, and essential minerals such as iron, magnesium, zinc, folate, and phosphorus [112]. Oats can be incorporated into the diet in various forms, including hot cereal, granola bars, trail mix, or smoothies, making them a versatile dietary addition. Despite their popularity as a potential galactagogue, there is no scientific evidence to confirm that oats directly enhance milk production. Nevertheless, their nutritional value can contribute to a balanced diet, which is beneficial for overall health during lactation [113].

Flax seed (*Linum usitatissimum*) is a rich source of alpha-linolenic acid (ALA), a precursor to omega-3 fatty acids such as docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA), which are produced through metabolic conversion in the human body. Flaxseed is often used as a laxative due to its non-absorbable fiber content [114].

While flaxseed is touted as a galactagogue, there has been little to no research done on its efficacy [114]. However, flaxseed consumption can enhance the ALA content in breast milk, which subsequently improves the DHA available for transfer to the infant, as observed in seven nursing mothers who were administered one-gram flaxseed capsules in three divided doses daily. Ten breast milk samples collected at the midpoint of nursing showed an increase in ALA levels during treatment, which returned to baseline one week after discontinuation [115].

However, flaxseed use during pregnancy and lactation warrants caution due to conflicting findings in rodent studies. While secoisolariciresinol diglucoside (SDG) increased body fat mass, flaxseed oil reduced fat mass and lowered serum and milk triglyceride and cholesterol levels during lactation. Offspring of flaxseed oil-supplemented mothers had reduced fat mass and triglycerides, which could have negative effects on maternal and offspring health. Similar findings have not been reported elsewhere. Randomized, placebo-controlled trials in humans are necessary for definitive conclusions [116].

Herbal Lactation Teas marketed for lactation typically contain a blend of traditional galactagogues, including fenugreek seed, blessed thistle, fennel, coriander, anise, spearmint, lemongrass, lemon verbena, and marshmallow root [117,118]. These teas draw inspiration from traditional European medicine, passed down through generations to support breastfeeding mothers. One popular example, "Mother's Milk Tea," is believed to stimulate the release of prolactin, thereby supporting milk production.

In a study on the effects of herbal tea on lactation, three groups of women were either given herbal tea, a placebo, or were part of the control group. Mothers who consumed herbal tea, demonstrated a greater breast milk volume by the third postpartum day when using an electric breast pump. Additionally, infants in the treatment group experienced less weight loss compared to those whose mothers consumed water or a placebo. The initial weight loss observed in newborns is typically attributed to the utilization of protective fluid stores present at birth and is typically less than 10% of total body weight one to three days postpartum [119]. The study's findings suggest that mothers who consumed herbal tea were able to produce a sufficient milk supply to support their infants' nutritional needs [120].

Mothers should exercise caution when consuming herbal teas containing caffeine, as it is transferred through breast milk and newborns lack the necessary enzymes to metabolize caffeine effectively in the first days after birth [56]. The plasma elimination half-life of caffeine in infants is approximately four days (100 hours), making them particularly sensitive to its effects and may cause infants to become irritable [121]. To minimize potential risks, it is recommended that maternal caffeine intake should be limited to no more than 400 mg/day—equivalent to approximately four 8-ounce cups of coffee—which is considered safe for most adults [122]. Less caffeine intake may be more appropriate.

Lecithin is a mixture of choline, fatty acids, lipids and natural components that are already present in breast milk [123,124]. From a lactation perspective, it is hypothesized that it may help maintain or increase milk production, as it is used to treat and prevent clogged ducts by keeping the mammary ducts patent. However, there is insufficient scientific evidence regarding the safety and efficacy of lecithin in high doses [123]. Dosing recommendations are based on anecdotal evidence. It is commonly recommended at a dosage of 1200 mg, taken four times daily, to treat and prevent clogged ducts [125]. Clogged breast milk ducts occur when the tissues and blood vessels around the ducts become inflamed due to improper infant latch, ineffective milk removal, or delayed feeding times. Symptoms of clogged ducts may include a localized, painful or tender lump in the breast, a lump that decreases in size or disappears after pumping or feeding, pain or discomfort during breastfeeding, or localized redness [126,127].

Summary of scientific support for Nutraceuticals & Galactagogues

Table 1 provides an overview of various nutraceuticals, pharmaceuticals, foods and supplements for increasing breast milk production. Research on individual nutraceuticals and galactagogues on lactation is extremely limited, with very few human studies and small subject pools. Mothers and healthcare providers should consider these limitations when considering incorporating any of the discussed agents. Future human lactation research should prioritize human-based studies rather than relying on animal models, ensuring more accurate application to maternal health guidelines. While surveys of mothers utilizing nutraceuticals and galactagogues provide insight into perceived benefits that could enhance breastfeeding, the questions often used lack quantitative findings that could better determine the agent's efficacy. Future studies should focus on longer term changes to milk volume and infant weight gain in a larger and more diverse subject pool, similar to previous studies on fenugreek, milk thistle, moringa [86,88,89,99].

Lifestyle

Nutraceuticals and galactagogues can aid in boosting milk supply but should be integrated into a comprehensive approach that includes a healthy lifestyle as the priority. Key components such as proper nutrition, exercise, hydration, and complementary and alternative methods play essential roles in supporting breast milk production. A balanced diet ensures both the mother and baby receive the necessary energy and nutrients, while exercise supports overall good health. Managing stress promotes hormonal balance, which is critical for breast milk production. Additionally, complementary and alternative practices may offer further support in stimulating breast milk production.

Diet

During breastfeeding, maternal energy and nutrient demands increase to support both milk production and the infant's growth. Healthy dietary practices can not only improve breast milk quality but also support maternal well-being and health during lactation. It is recommended that breastfeeding mothers increase their caloric intake by approximately 450 to 500 calories per day, depending on activity level. For instance, the Dietary Guidelines for Americans suggest daily caloric needs of 1,800 to 2,400 calories for women aged 19 to 50, with the exact requirement based on physical activity. Adding 500 calories to these recommendations places breastfeeding mothers' needs between 2,300 to 2,900 calories per day [128,129].

A balanced diet should include 2-3 servings of lean protein, such as chicken, eggs, and seafood (8-12 ounces per week), and low-fat dairy provides essential nutrients for milk production. Healthy fats from sources like avocados, olive oil, and walnuts, foods rich in omega-3 fatty acids such as salmon and flaxseeds support the infant's brain and nervous system development [130]. Additionally, fruits, vegetables, legumes, and whole grains such as quinoa and oats, deliver vitamins, antioxidants, and energy while reducing the risk of deficiencies [131]. For vegan or vegetarian diets, mothers should consider additional supplementation to address potential gaps in vitamin B12, iron, and zinc [129,132].

Micronutrients such as vitamins A, D, B6, and B12, along with minerals like iron, calcium, and iodine, directly reflect maternal dietary intake. While breast milk prioritizes nutrient composition for the infant, maternal stores may deplete without adequate dietary support, increasing the mother's risk for deficiencies [133,134]. Proper dietary planning, including supplements, ensures that both maternal and infant health are supported.

Breastfeeding mothers should avoid high-mercury fish like shark and swordfish due to the risk of neurotoxicity in infants. Certain foods and herbs may contribute to hypolactation, including caffeine and herbs such as sage, peppermint/spearmint (which contains menthol), rosemary, lemon balm, and parsley. Although no concrete scientific evidence explains why herbs might reduce breast milk production, certain herbs are believed to exert a drying effect on the mammary glands. They are often used to facilitate weaning or to manage hyperlactation. As such, it is recommended that caution be exercised when consuming these foods or herbs.

As mentioned previously, moderate caffeine intake (approximately three to four cups per day or 400 mg) is generally considered safe, but caution is advised as newborns are unable to metabolize caffeine as efficiently as older infants. Caffeine remains in the body for approximately three to seven hours, and research shows that about 1% of caffeine is excreted into breast milk [135,136]. Additionally, excessive caffeine intake can increase urine production by stimulating cortisol, which has a natural diuretic effect. If fluid loss is not compensated for, dehydration may occur, potentially inhibiting milk production. Additionally, caffeine excreted into breast milk may alter sleep patterns in infants.

Exercise

Regular exercise training can enhance the benefits of breastfeeding, provided that adequate hydration is maintained by drinking sufficient water before, during, and after exercise. Women who exercise regularly report increased energy levels, improved mood, reduced stress, better sleep, and greater success with postpartum weight loss. Common forms of exercise chosen by women include walking, yoga, swimming, biking, and weight-bearing activities [137]. The American College of Obstetricians and Gynecologists recommends at least 150 minutes of moderate-intensity aerobic activity each week [138].

While some mothers are concerned that intense exercise may lead to an increase in lactic acid in breast milk, there is no evidence suggesting that it negatively impacts infants. However, exercise should be limited to mild-to-moderate intensity, as high lactic acid levels may alter the taste of breast milk, though again, this is not harmful. Studies also indicate that the long-chain polyunsaturated fatty acid content of human milk is unaffected by exercise, and that infants experience no changes in weight or length as a result [139]. Overall, exercise does not negatively impact breastfeeding performance. The benefits of exercise extend to overall health, with a direct positive impact on human milk production.

Findings from rodent studies, though their applicability to humans remains uncertain, generally indicate that exercise during pregnancy and lactation does not adversely affect offspring growth and development [140].

Hydration

Fluid intake is vital to the mother's health. Proper hydration is essential to the physiological functions of the human body, mood, balance and sleep by regulating homeostasis and body temperature, carrying nutrients and oxygen to cells, lubricating joints and mucous membranes, and removing waste products from the body [141]. Lactation poses a distinct challenge to maintaining water balance in breastfeeding women. Proper hydration is important during this time, as women produce around 750 to 780 mL of breast milk daily [142,143]. However, breast milk supply, which is approximately 87% water, is not affected by the mother's hydration status [143,144]. Due to the demands of milk production, lactating women are at risk of dehydration, which could impact their health. It is therefore recommended for mothers to increase fluid consumption to 3.3 to 3.7 L/day (roughly 14-16 cups/day).

Hydration is important during breastfeeding, with a recommendation to drink water or unsweetened beverages during breastfeeding sessions to satisfy thirst and maintain breast milk supply [131] and mother's health. The thirst experienced during lactation may be influenced by oxytocin, which shares structural similarities with vasopressin, and possibly prolactin [142].

Complementary and Alternative Methods

Mothers often use complementary methods to stimulate milk production or facilitate the let-down reflex. These methods include guided imagery (e.g., looking at pictures or videos of the baby), smelling clothes that the baby has worn, listening to recordings of the baby crying, snuggling the baby before nursing, kangaroo care, breast massage, and warm, moist compresses [145]. The let-down reflex is an automatic hormonal response triggered when the pituitary gland releases oxytocin. This hormone causes the alveoli in the breast to contract, releasing milk through the breast ducts to the nursing baby. These complementary and alternative methods to increase milk supply have been shown to be effective, particularly for mothers of babies in the NICU [146].

Placental encapsulation or human placentophagy, is both a traditional Western and Asian practice where a mother consumes the placenta after childbirth. The placenta can be consumed in various forms, including dehydrated, roasted, raw, or most commonly, encapsulated. Some women choose placental encapsulation as a means to enhance postpartum wellness and potentially increase breast milk production. Proponents suggest potential benefits of placental encapsulation, including preventing postpartum hormone withdrawal, increasing milk production, reducing postpartum bleeding through the oxytocin-mediated stimulation of uterine contractions, and improving mood and energy levels [147].

The placenta produces human chorionic somatomammotropin (HCS), also known as human placental lactogen (hPL), which is believed to aid in the physiological changes necessary for breastfeeding [148–150]. However, placental encapsulation may also inhibit lactation, as the placenta contains high levels of progesterone, which can block the action of prolactin on the lactocytes, potentially reducing milk production [151]. Overall, while some women may choose to engage in placental encapsulation, there is currently no direct evidence to support its effectiveness in increasing breast milk production.

The Centers for Disease Control and Prevention (CDC) has cautioned against consuming the placenta due to the risk of transmitting group B streptococcus to the infant via breast milk [152,153]. Other potential risks include sepsis, ingesting toxic trace elements or medications present at delivery, Escherichia coli and Staphylococcus aureus exposures, which can be transmitted to the infant [154,155].

CONCLUSION

Evidence-based interventions are crucial in supporting mothers to maximize milk supply, as breast milk remains the most beneficial and natural source of nutrition for newborns. Although breastfeeding offers numerous health benefits to infants, many mothers continue to face challenges in producing an adequate milk supply. Various options, including pharmaceutical treatments, complementary and alternative methods (CAMs), and galactagogues, are available. While some preliminary research supports the use of these practices, more studies are needed to establish their efficacy. Mothers should always consult with healthcare professionals before making any changes to their lactation support strategies.

Select studies support the positive impact of nutraceuticals including fenugreek, milk thistle, and moringa, with further evidence for pharmaceutical interventions using domperidone and metoclopramide in boosting milk production. Despite these findings, a significant gap remains in research-based evidence regarding the effectiveness of nutraceuticals and supplements in improving human milk production. Further research is essential, based on the limited and inconclusive scientific data on the individual or combined efficacy of the nutraceuticals discussed in this article. These findings greatly limit the scientific support necessary to make informed decisions in the incorporation of these natural products. Further studies should aim to explore the effects of these interventions in controlled environments, ideally involving healthy mothers with normal birth weight, non-hospitalized infants. Specifically, studies should focus on longer periods (3-6 months), should apply large and more diverse maternal populations, should be placebo-controlled, and should assess changes to milk supply volume and infant weight gain to provide a more rigorous analysis of lactation benefits for the various purported galactagogues and nutraceuticals. Additional research should explore the causation of breast milk supply issues, particularly exploring maternal genetic differences in nutrient metabolism and absorption.

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TABLES

Table 1. Summary of findings specific to breast milk production and related outcomes.

Treatment	Outcome(s)	Reference(s)
Nutraceuticals		
Fenugreek *(Trigonella foenum-graecum)*	Approximately 45% of women reported an increase in breast milk production within three to seven days of use; most popular.	[88,94]
Moringa *(Moringa oleifera)*	Scientifically demonstrated at a mean average of 47% to increase human milk supply in postpartum lactating women.	[100,156]
Milk Thistle *(Silybum marianum)*	Reported to stimulate prolactin and increase breast milk production in human and animal studies, at micronized doses at 420 mg/day.	[65,157]
Goat's Rue *(Galega)*	Clinically shown to increase breast milk within 7 days.	[158]
Pharmaceuticals		
Domperidone	Although not intended to increase human milk production, can be effective; one of the side effects is an increase in prolactin levels.	[68,159]
Metoclopramide	Although not intended to increase human milk production, can be effective; one of the side effects is an increase in prolactin levels.	[71,72]
Metformin	No strong evidence in its effectiveness. Increase of milk resulted from the decrease of androgen and luteinizing hormone levels in women with PCOS.	[160,161]

Foods & Supplements		
Brewer's Yeast	No clinical trials that confirm the effectiveness in increasing human milk supply in humans.	[107,162]
Fennel	Believed to be a galactagogue used in traditional medicine to increase milk supply. However, it has not been shown to increase serum prolactin levels.	[163]
Oats	No scientific evidence to show that adding oats is effective in increasing breast milk supply.	[46,112,113]
Flax Seed	Flax seed is believed to be a galactagogue to increase breast milk production, but has been found ineffective.	[115,164]
Herbal Tea	Usually compounded with fenugreek seed, blessed thistle, fennel, coriander, anise, spearmint lemongrass, lemon verbena and marshmallow root. Inspired by traditional European medicines to increase human milk production by stimulating prolactin levels.	[117,118]
Lecithin	Keeps milk ducts patent to prevent clogged milk ducts.	[158]
Placental Encapsulation	Often used for postpartum health and to increase human milk production. High progesterone levels from the placenta block prolactin levels.	[147,152,165]