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Review

A Review on Galactogogic Properties of India's Rich Tradition of Medicinal Herbs and Spices for Lactation

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Abstract

Throughout history, herbalists and traditional healers have wielded the power of plant-based remedies, an ancient practice now embraced by modern science. Delving into the therapeutic properties of conventional herbs and spices is a recent pursuit. Galactogogues, compounds known for their ability to heighten prolactin levels by modulating dopamine receptors, stand as agents amplifying milk production—a vital function for lactation. This study endeavors to meticulously explore medicinal spices and herbs recognized for their remarkable capacity to augment breast milk production. Methodologically, information pertaining to medicinal herbs and spices recognized for promoting lactation was extracted from reputable literature. A meticulous exploration across multiple academic databases, encompassing PubMed, Science Direct, Scopus, Google Scholar, and Web of Science, was undertaken to authenticate the impacts of these medicinal plants on lactation, considering their identified pharmacological properties. The findings underscored the potency of *Trigonella foenum-graecum* L., *Asparagus racemosus* W., *Zingiber officinale* Roscoe, *Moringa oleifera* L., *Cuminum cyminum* L., and *Trachyspermum ammi* L., contribute to increased lactation. They achieve this through mechanisms such as phytoestrogenic effects, vasodilation, stimulation of mammary growth, and facilitation of breast milk production. In conclusion, the fusion of traditional wisdom with contemporary scientific inquiry offers a promising avenue for discovering potent phyto pharmaceuticals that effectively boost breast milk production. Leveraging this amalgamation may yield impactful advancements in maternal health and lactation support.

Keywords: Galactogogues; Traditional medicine; Lactation; Breastfeeding; Breast milk

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Introduction

Breastfeeding stands as a crucial physiological practice, offering a spectrum of health benefits for both infants and mothers. The National Family Health Survey-5 reflects over 60% of Indian mothers exclusively breastfeeding for six months, underscoring its cultural and health significance [1-5]. However, challenges arise from insufficient breastfeeding, influenced by factors like delivery mode, breastfeeding technique, hormonal imbalances, and cultural beliefs. These challenges contribute to preventable and biological factors leading to breastfeeding cessation, with insufficient breast milk volume being a significant cause within the first six months postpartum [5-7]. Studies identify different factors affecting breastfeeding cessation, highlighting the need for effective interventions [8-10]. Interventions to address breastfeeding challenges include pharmacological agents like metoclopramide, domperidone, sulpiride, and chlorpromazine. However, concerns about harmful side effects prompt an increasing interest in herbal galactogogues, especially in Asian countries like India [6,11-13]. The process of producing maternal milk is intricate, involving various physiological processes and hormonal regulation. Dopamine agonists can hinder prolactin production and milk synthesis, while dopamine antagonists enhance it. The use of natural galactogogues such as herbs, liquids, or foods offers a safer alternative to synthetic drugs, ensuring regular nutrient intake to increase milk supply during breastfeeding [14].

India, rich in herbal resources, relies significantly on Ayurveda, a traditional healthcare system rooted in herbal and medicinal plant usage. Traditional postpartum diets in India, featuring *ghee*, grains, sugar, nuts, and seeds, align with cultural practices emphasizing lactating mothers' nourishment. Specific herbs and spices like Fenugreek (*Trigonella foenum-graecum* L.), Shatavari (*Asparagus racemosus* W.), Ginger (*Zingiber officinale* Roscoe), Drumstick leaves (*Moringa oleifera* L.), Cumin (*Cuminum cyminum* L.), and Omum (*Trachyspermum ammi* L.) are recognized for their potential to enhance breast milk production [15,16]. The multifaceted nature of lactation involves both physiological and psychological aspects, emphasizing the vital role of prolactin [17,18]. Scientific exploration of traditional galactogogues reveals the intricate interplay of physiological and psychological factors involved in lactation. Hormones like prolactin play a central role in milk production, while herbs and spices like fenugreek, ginger, and cumin are believed to modulate hormonal activity to enhance lactation. Yet, despite their long-standing use in traditional medicine systems, the scientific understanding of these natural remedies remains limited, underscoring the need for further research to elucidate their mechanisms of action and efficacy [12-14].

As modern healthcare practices increasingly rely on pharmaceutical solutions to address lactation challenges, there is a growing recognition of the value of integrating traditional remedies into lactation care. Healthcare providers are encouraged to familiarize themselves with commonly used herbal galactogogues to offer comprehensive support to lactating mothers. By embracing a holistic approach that combines traditional wisdom with scientific scrutiny, healthcare professionals can empower women to navigate the complexities of breastfeeding with confidence and ease [19-21]. The resurgence of interest in herbal and spice preparations for their galactogogue properties reflects a broader shift towards embracing natural, holistic approaches to healthcare. By honoring cultural traditions and harnessing the potential of traditional remedies, we can foster a supportive environment for lactating mothers and promote optimal breastfeeding outcomes for both mother and child. In the integration of traditional herbal galactogogues with contemporary pharmaceutical options for lactation, it is imperative to discern potential interactions between botanicals and medications. Despite the contentious literature surrounding the efficacy and safety of dopamine antagonists like domperidone, and the dearth of research on metoclopramide's galactogenic properties, clinicians confront intricate decisions in guiding lactating women. Amidst burgeoning interest in herbal remedies, particularly among females, healthcare providers must acquaint themselves with commonly utilized botanical galactogogues to adeptly counsel lactating mothers [22-24]. Figure 1 shows traditional herbs and spices used as galactogogues.

Methods

To compile a comprehensive review of traditional herbs and spices known for their galactogogue properties, the authors conducted a manual search across prominent databases including Scopus, Web of Science, and Google Scholar. This meticulous search focused on identifying scholarly articles, reviews, and clinical studies discussing the traditional uses and scientific evidence supporting the lactation enhancing effects of various herbs and spices in Indian traditional medicine. Additional literature sources were employed, encompassing books, conference papers, government organizational reports, as well as national and global survey reports, to augment the comprehensiveness of the study. After the search, six herbs were randomly selected based on their historical significance in traditional Indian medicine. These selected herbs include *Trigonella foenum-graecum* L., *Asparagus racemosus* W., *Zingiber officinale* Roscoe, *Moringa oleifera* L., *Cuminum cyminum* L., and *Trachyspermum ammi* L. The inclusion of these herbs ensures a comprehensive analysis of traditional reme-

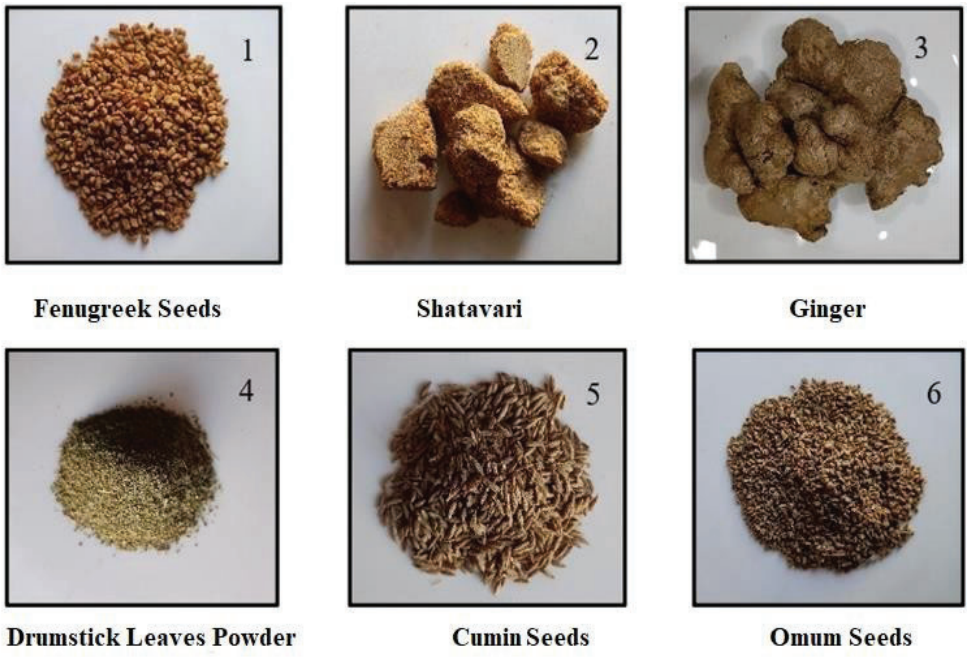

Figure 1. Image showing traditional herbs and spices used as galactogogues in India

dies for lactation support, providing valuable insights for both practitioners and researchers in the field of maternal health. All six herbs mentioned in this review exhibit a rich heritage of traditional medicinal usage in India, reflecting centuries of accumulated knowledge and practices in Ayurveda and other indigenous healing systems [25-27, 28-33].

Spices and herbs as galactogogues

Fenugreek

Fenugreek (*Trigonella foenum-graecum* L.), is a plant that completes its life cycle within a year. It falls under the *Fabaceae* family which is a leguminous herb cultivated in India [25]. Fenugreek has been employed both as a culinary spice and medicinal remedy such as fever, colic, flatulence, dysentery, coughs, tuberculosis, edema, rickets, ulcers, gout, diabetes, and even baldness in India since the early 20th century, drawing upon the rich tapestry of traditional Indian knowledge and experiences. But nowadays, fenugreek is widely recognized and employed globally as a galactogogue, primarily attributed to its outstanding lactogenic qualities [26,27] and it has been proven to be reliable and efficient. It is known for containing several important chemical compounds, such as diosgenin, apigenin, and luteolin. These compounds have been found to effectively stimulate the anterior pituitary gland, leading to an increase in the production of human milk [34,35] and it can stimulate sweat production, as the breast is a modified type of sweat gland, fenugreek may also have the ability to stimulate the breast to produce a greater amount of milk [36]. Additional lactogenic processes have been stated, which include estrogenic effects or the provision of an essential fatty acid supply [37]. The plant is globally renowned as a galactogogue for women, attributed to its abundant levels of phytoestrogens, making it a favored choice across various cultures to enhance lactation. The increase in milk production is attributed to the presence of phytoestrogens like diosgenin, a type of steroidal sapogenin [27]. In India, its seeds are commonly employed as a condiment in culinary practices and have been widely used in Indian Ayurveda for various purposes, primarily as a galactogogue [38]. The practice of using fenugreek to boost the production of breast milk has been in existence for centuries [39, 40]. It is recommended for mothers experiencing delayed or absent lactogenesis II, which is the process of the breast milk "coming in" after childbirth. Its usage can stimulate the production and secretion of milk from mammary glands, thereby promoting milk production in nonpuerperal women or re-lactation in those who have ceased milk production [41]. The theory suggests that fenugreek induces perspiration, which stimulates milk production by increasing the flow of fluids to the breast tissues [42]. According to a study conducted by Turkyilmaz et al. the consumption of galactogogue fenugreek tea resulted in a notable increase in the volume of breast milk during the initial days after delivery. The study further revealed that mothers of newborns who consumed galactogogue fenugreek tea had lower weight loss during the first week after birth

and regained their original birth weights earlier than infants whose mothers were in the placebo and control groups [37]. Abdou and Fathey reported that the consumption of fenugreek was found to influence the initial phase of lactogenesis and prolactin levels, but did not significantly impact the established volume of breast milk or changes in prolactin levels during later stages. Therefore, it can be suggested that fenugreek can be used to increase maternal satisfaction and provide reassurance during the early stages of lactation [43]. Studies have demonstrated fenugreek can have a favorable impact on milk production in different mammals, including rabbits, buffalos, goats, and ewes. Nevertheless, due to the significant differences in the dosages assessed (spanning from 180 mg per kilogram per day to 2.1 grams per kilogram per day), the claimed effects on milk production have ranged substantially, from a 10% rise to a 110% increase. As a result, determining the ideal fenugreek dosage is challenging [44-46]. Sevrin et al. investigated the use of fenugreek supplements and have reported that it could potentially boost milk production in cases where there is insufficient milk supply due to maternal stress, breastfeeding management difficulties, first-time mothers, or when nursing twins. Fenugreek, however, is unlikely to be successful in conditions that have an impact on breastfeeding physiology, such as nutritional deficiency, mammary hypoplasia, and hormonal imbalance [47]. According to a case report, the use of fenugreek has been documented anecdotally in more than 1200 women who reported experiencing a boost in their breast milk production within a time frame of 24 to 72 hours [48]. In addition, two small preliminary reports have also indicated that fenugreek may be effective in increasing milk production [49,50]. When consumed, fenugreek is generally well-tolerated by the body. However, it can cause a maple-like odour in bodily fluids such as sweat, milk, and urine [51]. While one study showed that consuming fenugreek alone did not lead to an increase in breastfeeding success, it did find that when combined with honey, there was a significant improvement. This suggests that honey can enhance the effectiveness of fenugreek and potentially other herbal galactogogues as well [52].

Shatavari

Shatavari (*Asparagus racemosus* W.) is a word derived from the combination of two Sanskrit terms, "*shat*" and "*vari*", which when put together means "curer of a hundred diseases". Essentially, the name implies that shatavari has the ability to treat and heal a vast number of ailments and health conditions [53]. Shatavari, also known as "willd asparagus" is classified under the *Asparagus genus* and was previously categorized under the subfamily *Asparagae* in the *Liliaceae* family. However, it has now been reclassified and belongs to a newly established family called *Asparagaceae*. The galactopoietic impact of *shatavari*, as documented in ancient Ayurvedic texts like *Charaka Samhita* and *Susruta Samhita*, has an extensive historical presence in India [54]. *Asparagus racemosus* W., a variant of asparagus indigenous to India, is extensively employed in traditional medicine such as fever, colic, flatulence, dysentery, coughs, tuberculosis, edema, rickets, ulcers, gout, diabetes, and even hair loss, recognized locally in Hindi as "*Shatawar*" and in Sanskrit as "*shatavari*," showcasing its roots in the rich traditional experiences of India [28]. In the Central Himalayan region, it is known as "*Satmuli*", which means "a hundred roots" in reference to the numerous roots of the plant. This herb is highly valued in Ayurveda, where it is referred to as the "queen of herbs" due to its unique ability to promote women's health in Ayurveda, *shatavari* is one of the six major *rasayana*, or plant medicines, that are thought to improve a person's general health by boosting cellular vitality or resistance [29]. It is also utilized as a hepatoprotectant, immunomodulator, and galactogogue [28]. The roots of *A. racemosus* contain steroidal saponins and asparagamine A, which are the main active components of the plant [55]. It contains an immense amount of folic acid, vitamins A, C, and K, and phytoestrogens, which have an estrogen-like hormonal influence on milk production. Estrogens, which promote the development of prolactin producing cells, directly boost prolactin production, and also decrease dopamine, are important regulators of prolactin production. Additionally, it has tryptophan, a crucial amino acid that may enhance prolactin levels and increase milk production [56]. It also has pharmacological properties that promote the production of milk and the development of mammary glands. It increases the level of prolactin in the blood and stimulates the growth of mammary gland cells [29]. Its well-known phytoestrogenic characteristics have been associated with heightened milk secretion. For instance, in hypogalactic women, the consumption of *A. racemosus* Ricalex tablets led to an increase in breast milk production [57]. The subsequent gradual decrease in milk production after discontinuation of the medication indicated a pharmacological, rather than psychological, influence [28]. In a 2011 clinical trial, oral administration of *A. racemosus* root powder tripled PRL levels which further enhanced the breast milk [58]. A double-blind, randomized, placebo-controlled trial was done by Gupta and Shaw in India and they investigated the effects of *Asparagus racemosus* W. root capsules on lactating women experiencing deficient or painful lactation, loss of appetite, anxiety, or infant crying following feedings. The 30-day study found that the

herb increased prolactin levels by 33% and infant weight by 16% compared to the placebo group, without adverse effects. The authors concluded that *Shatavari* demonstrated galactogogue activity and was secure [58]. A study has shown that supplementing buffalo feed with 500 g of fresh *shatavari* root during lactation can significantly increase milk production [29]. Similarly, in the case of freshly calved crossbred cattle, oral supplementation of *shatavari* root powder at a rate of 100 g per animal on alternate days resulted in a significant improvement in milk production [59]. *shatavari* is commercially available as powder, granules, pills, etc. To disguise the acrid flavour of *shatavari*, many of these formulations have very high sugar content. The flavour and palatability of most of these formulation items are a concern because they must be combined with milk. To address this, a study was conducted on *shatavari* bars. The results showed that the *shatavari* bar increased breast milk production in lactating mothers more effectively than a placebo. The study observed a statistically significant increase in breast milk volume in the group that consumed the *Shatavari* bar [60].

Ginger

Ginger (*Zingiber officinale* Roscoe), is a plant belonging to the *Zingiberaceae* family. It holds significant importance due to its diverse nutritional and traditional medicinal properties [61]. Ginger plays a significant role in Ayurveda, the ancient Indian medical system of India, where it is utilized to prevent excessive clotting (associated with heart disease), lower cholesterol levels, combat arthritis, and exhibit anti-cancer properties [62]. The rhizome is a renowned component of Ayurvedic medicine and a rich source of iron, vitamins, and minerals [30]. Additionally, it is a popular natural remedy for several health issues [63]. Ginger contains several bioactive compounds such as Gingerols, Shogaol, Zingerone, and Paradol, which are responsible for its medicinal properties [64]. Gingerol and shogaol reportedly induce vasodilation by stimulating muscarinic receptors and inhibiting Ca^{+2} channels. This vasodilatory impact is postulated to enhance lactation by augmenting blood flow to the mammary glands [65,66]. Ginger has thermogenic properties that can increase the temperature of the body's peripheral regions. This effect is likely due to its ability to promote vasodilation, which can enhance blood flow to the lactating breasts and potentially improve milk production [67]. A study by Paritakul et al. has shown ginger has the potential to serve as an effective natural galactogogue to increase breast milk production in the early postpartum period. This effect was observed without any significant adverse effects [68]. Chareankit et al. reported that the consumption of ginger drinks can lead to an increase in the amount of breast milk produced by lactating mothers who have undergone cesarean delivery. Additionally, the study found that the consumption of ginger-based beverages can also help to alleviate flatulence in these mothers [69]. Another study revealed that ginger is the second most commonly used herbal supplement after fenugreek, for the purpose of increasing milk production in breastfeeding mothers [70]. Another research study found that a combination of various herbal supplements, including turmeric, ginger and fenugreek, can lead to an increase in the volume of breast milk produced by lactating mothers over a period of two weeks. The study also reported that there were no significant negative effects on the health of the mothers or their infants [71].

Drumstick leaves

Drumstick leaves (*Moringa oleifera* L.) are also known as the horse radish tree and the drumstick tree because of their long, slender, triangular seed pods and similar flavor to horse radish. Additionally, it is referred to as the Ben oil tree since benzoyl is obtained from it. This tree is able to grow quickly and is resistant to drought. *Moringa oleifera* L. is a plant that is widely cultivated throughout India, although it is rarely found in the wild [72]. India's ancient Ayurvedic medicine has recognized over 300 diseases treatable with various parts of *M. oleifera*—including leaves, roots, bark, flowers, and seeds—reflecting the wealth of traditional Indian experiences in medicinal practices [73]. The leaves of the moringa plant are a highly valuable source of beneficial nutrients [31]. They contain essential components such as protein, β-carotene, phytosterols, amino acids, and iron that are beneficial for consumption and can fulfil nutritional requirements, particularly for vulnerable populations like pregnant women and lactating mothers [74]. *Moringa* leaf extract harbors phytosterol compounds such as Betasitosterol, kampesterol and stigmastero known for their efficacy in enhancing and optimizing breast milk production [75]. The consumption of *Moringa oleifera* L. leaves can enhance breast milk production by increasing prolactin levels and supplying necessary nutrients [76,77] and the potential lactogenic impact of *Moringa* may be attributed to an elevation in prolactin production within the anterior pituitary gland, which further lead to the enhancement of breast milk [78]. It takes approximately 24 hours for the effects of *Moringa oleifera* L. to take place after ingestion [79,80]. Few researchers have examined the effects of *Moringa oleifera* L., on breastfeeding. According to one study, ingesting *Moringa* cookies improved the quality of breast milk, particularly the amount of protein [81]. A different study observed that the utilization of *Moringa oleifera* L. leaves resulted in increased production of breast milk during

the fourth and fifth postpartum days among mothers who had given birth to premature infants [80]. In a study conducted by Espinosa-Kuo, it was discovered that consuming *Moringa oleifera* L. capsules resulted in slightly more breast milk production per day compared to placebo during the third to tenth days following childbirth. However, the difference was not statistically significant [79]. Another study done by Sulistiawati et al. on *Moringa oleifera* L. capsules demonstrated that the intervention group had increased levels of prolactin in comparison to the control group. This is believed to be due to the presence of phytosterols (polyphenols and sterols) in the capsules of *Moringa* leaves, which are known to have properties that can enhance prolactin production [82]. Elevated levels of prolactin are associated with improved milk production, as it helps in the process of producing, accelerating, and facilitating milk secretion. Furthermore, the presence of phytosterols and steroids in *Moringa* leaves can act as lactogogues, which stimulate the activities of secretory cells in the mammary gland, as well as the secretory nerve endings in the milk glands. This can result in an increase in milk secretion. Additionally, these compounds may stimulate the hormone prolactin, which in turn acts on the alveolar epithelial cells to further promote milk production [78].

Cumin

Cumin (*Cuminum cyminum* L.), is a valuable seed spice that is widely commercialized. It belongs to the family *Apiaceae* and is recognized for its aromatic qualities as well as its medicinal and therapeutic benefits [83]. Cumin is originally from the Mediterranean area and is extensively grown there. It is an annual herb that is popularly known as *zeera* or *jeera* in Hindi [84]. For millennia, cumin seeds have been a staple in Indian cuisine, enhancing countless dishes like kormas and soups, as well as various spice blends. Beyond culinary applications, they hold significant importance in traditional medicine, particularly within the Ayurvedic system, where they are esteemed for their various medicinal properties, such as promoting gastroprotection, serving as a digestive stimulant, and exerting cardio-protective effects through hypolipidemic and hypotensive actions [85]. Cumin is primarily produced and consumed in India, which holds the position of being the largest producer and consumer of this spice globally [86]. Cumin seeds have been a staple component in Indian cuisine for millennia. In addition to dietary consumption, it has a wide range of applications in medical practice [87]. It contains several compounds including alkaloids, coumarin, anthraquinone, flavonoids, glycosides, proteins, resins, saponins, tannins, and steroids. Its fatty acid composition and cumin oleoresin are rich in unsaturated fatty acids, particularly linoleic acid, which is recognized for its potential health benefits [32]. Cumin possesses several properties such as improving eyesight, increasing physical strength, and promoting lactation [88]. Cumin is believed to exhibit estrogenic properties, demonstrated by its capacity to promote the development of mammary glands, resulting in increased milk production [77]. In a study conducted by Ghafari et al. it was observed that the addition of cumin seed to the diet of cows at varying levels of 0, 100, 200, and 300 g per day had the potential to increase milk production in a curvilinear manner (with the highest average milk yield of 55.1 kg/day at 200 g/day of cumin seed) [32]. A research study was conducted to examine the different plants utilized as galactogogues by the *Warli* tribe residing in Dahanu, which is situated about 124 kilometers away from Mumbai, India. The study discovered that lactating mothers in Dahanu were ingesting a small amount of cumin seeds boiled in around two cups of water, filtered, and then consumed with a teaspoon of honey in the morning to increase their milk production [89].

Omum

Omum (*Trachyspermum ammi* L.) which is also referred to as *Ajwain*, Carom seed, Carom Ajowan, or Bishop's weed, is a significant seed spice that belongs to the *Apiaceae* family [90]. It is distributed throughout India but is mostly cultivated in Gujarat and Rajasthan. In the Indian medicinal tradition, *T. ammi* has served as a household remedy for stomach issues for generations. A paste made from crushed fruits is externally applied to alleviate colic pains, while a warm and dry fomentation of the fruits on the chest is commonly employed as a remedy for asthma, drawing from extensive traditional Indian experiences [91]. It is a well-known spice and traditional aromatic herb frequently used in Unani medicine by traditional healers and it has been shown to have pharmacological properties that are useful for treating more illnesses, such as estrogenic, anti-inflammatory, antibacterial, antioxidant, diuretic, galactogogue. It is also predominantly ascribed to its lactogenic characteristics, which promote the secretion of prolactin, a hormone pivotal for the lactation process in breastfeeding mothers [92]. The National Dairy Research Institute in India examined the levels of estrogen-like substances in various herbs, such as *T.ammi.* These herbs have been traditionally used to enhance milk production in dairy cattle and as a lactation aid in humans [93]. The dry *Ajwain* seed exhibits a notable total phytoestrogen content, quantified at 473 ppm, positioning it as the second-highest among the tested plant species in this regard. This attribute is associated with its role in enhancing

Table 1. List of traditional herbs and spices used as galactagogues

S.No	1	2	3	4	5	6
Scientific Names	*Trigonella foenum-graecum* L.	*Asparagus racemosus* W.	*Moringa oleifera* L.	*Zingiber officinale* Roscoe	*Cuminum cyminum* L.	*Trachyspermum ammi* L.
English Names	Fenugreek	Shatavai	Drumstick leaves	Ginger	Cumin	Omum
Form Used	Seeds Powder	Rhizome	Leaves	Dried roots	Seed extract	Seed *Laddu*
Type of Study	Animal	Animal	Clinical	Clinical	Animal	Clinical
Method of Administration	Orally	Orally	Capsules	Capsules orally	Orally	Orally
Dose	60g/day	30mg/100g body weight	250 mg of leaves/ capsules	500 mg/ capsules twice aday	Group C1: 1 g/L of rumen volume Group C2: 2 g/L of rumen volume	70 g once or twice aday
Duration ofintervention	7 weeks	15 days	3 to 5 postpartum days	7 days postpartum	30 days	Not mentioned
Lactogenic Phytoconstituents	Trimethylamine, Neurin, Trigonelline, and choline; saponins i.e graecunins, trigofenosides A-G, fenugrin B; flavonoids; [33,94]	Shatavarin I-V, Quercetin, Rutin, Aspargamine, Sitosterol, Asparosides, Curillosides, Gamma Linoleinicacids, Sarsapogenin [27]	Niazirin and Niazirinin,Niaziminin A, and Niaziminin B, Methionine, cysteine, Moringine [27]	Gingerol and Shogaol, α-curcumene, Zingiberene, **α**-farnesene, and β- sesquiphellandrene [27]	Coumarin, Anthraquinone, resins, and steroids [95]	**α**-phellandrene, β- pinene, Cis-myrtenol, **γ**-terpinene, o-carene, Otpinene, p-cumin-7-ol, pmentha-1,3,8 triene, Thymol [91]
Result Obtained	Significantly higher milk yield in the treated group compared to the control group (1236±38 vs. 1093±43 mL day^{-1}) [47].	The results suggest an estrogenic effect of Shatavari on thefemale mammary gland and genital organs [96].	Statistically significantincrease in milk production was observed on postpartum days 4 to 5among mothers who received these leaves compared to those on placebo [97].	Women in the ginger group had a higher milkvolume on the third daypostpartum compared tothe placebo group (191.0 ± 71.2 mL/day versus 135.0 ± 61.5 mL/day,$p < 0.01$) [98].	Enhanced milk production by 13% in the lower supplemented group (C1) [99].	96% of mothers believed that consumption of *ajwainladdu* enhanced milk production [100]

milk production [56].

Historically, women have partially used a variety of other herbs and substances, including *Gond* (*Tragacanth gum*), chaste tree seed, raspberry leaf, basil, beer, alfalfa, betel nut, and even marijuana, to increase milk production [50,52]. However, there is no robust scientific evidence to support their effectiveness as no well-designed studies have been conducted to evaluate their galactogogue properties. Therefore, further experimental validation is needed to determine the actual efficacy of these agents as galactogogues which are also a part of the traditional food wisdom of India.

Conclusion

In recent times, galactogogues have gained popularity as a constantly evolving area of research, with traditional herbs and spices being widely used to boost lactation. The extensive historical usage of certain plants as galactogogue agents, along with their well-documented pharmacological activities and negligible occurrence of serious adverse effects, has led to their

widespread use as galactogogues, with fenugreek being a particularly popular choice. Scientific research has validated the effectiveness of some of these botanicals in enhancing lactation, partially supporting their traditional reputation as milk-boosting agents. However, further investigations are required to determine the precise mechanisms by which these herbs function as galactogogues and to close the gap between their widespread use and the paucity of research on their safety and efficacy in lactation. Hence, it is imperative to carry on with further research to establish definitive evidence regarding the effectiveness of these methods in stimulating lactation, while exploring new avenues for understanding the underlying mechanisms of these herbs and spices.

Conflict of Interests
None.

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None.

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