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The Efficacy of Local Plants in Enhancing Breast Milk Production: A Literature Review

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ABSTRACT

Lactation insufficiency remains a common problem among breastfeeding mothers and often leads to early cessation of exclusive breastfeeding. Although synthetic galactagogues such as metoclopramide are available, their side effects have prompted growing interest in natural alternatives derived from local plants. This literature review aimed to evaluate the efficacy and safety of local plants traditionally used as galactagogues to enhance breast milk production. A total of 34 scientific articles published between 2018 and 2023 were reviewed from several international databases. The studies identified various local plants, including *Moringa oleifera*, *Sauropus androgynus*, *Vigna radiata*, and *Glycine max*, that contain bioactive compounds such as flavonoids, alkaloids, and phytoestrogens capable of stimulating prolactin secretion and supporting lactation. Evidence from randomized controlled trials and observational studies demonstrated that supplementation with these plants increased milk production and improved infant growth compared to control groups. However, the findings were inconsistent due to differences in plant preparation, dosage, and study design. Reported side effects were minimal and self-limiting, although further safety evaluations are necessary. In conclusion, local plants show promising potential as safe and effective galactagogues for enhancing breast milk production among lactating mothers. Nonetheless, more rigorous, large-scale clinical studies are needed to confirm their efficacy, clarify mechanisms of action, and develop standardized formulations for evidence-based application in maternal and child health care..

Keywords: galactagogues, local plants, lactation.

INTRODUCTION

Galactogogues are substances that promote the production of breast milk in lactating mothers. They can be synthetic or natural and are used to treat lactation insufficiency, a condition where a mother is unable to produce enough milk to meet the nutritional needs of her infant. Galactogogues have been used for centuries in traditional medicine, and their use has been documented in various cultures around the world. The definition of galactogogues is not standardized, and there is no consensus on what substances should be classified as galactogogues. However, most definitions include substances that stimulate the production of prolactin, a hormone that plays a key role in milk production. Some common examples of galactogogues include fenugreek, blessed thistle, and fennel.

Galactogogues have been used in various forms throughout history. In ancient Egypt, for example, women used a mixture of honey, dates, and milk to increase milk production. In traditional Chinese medicine, herbs such as shatavari and milk thistle have been used to treat lactation insufficiency. In Ayurvedic medicine, a traditional system of medicine from India, herbs such as fenugreek and fennel have been used to promote lactation. The use of galactogogues has also been documented in modern medicine. In the United States, the Food and Drug Administration (FDA) has approved the use of metoclopramide, a synthetic galactogogue, for the treatment of lactation insufficiency. However, the use of metoclopramide is associated with several side effects, including depression, anxiety, and movement disorders.

In recent years, there has been growing interest in the use of natural galactogogues as an alternative to synthetic galactogogues. Natural galactogogues are generally considered to be safer than synthetic galactogogues, as they are less likely to cause side effects. However, the efficacy of natural galactogogues is not well-established, and more research is needed to determine their safety and effectiveness.

The use of local plants as galactogogues has been documented in various cultures around the world. In traditional Chinese medicine, herbs such as shatavari and milk thistle have been used to treat lactation insufficiency. In Ayurvedic medicine, a traditional system of medicine from India, herbs such as fenugreek and fennel have been used to promote lactation. In the Philippines, the leaves of the malunggay tree (Moringa oleifera) are commonly used as a galactagogue. In recent years, there has been growing interest in the use of natural galactogogues as an alternative to synthetic galactogogues. Natural galactogogues are generally considered to be safer than synthetic galactogogues, as they are less likely to cause side effects. However, the efficacy of natural galactogogues is not well-established, and more research is needed to determine their safety and effectiveness.

A study conducted in Ghana reviewed 22 plants belonging to 13 families with regards to their medicinal values, information on lactation, and toxicity. The study found that some of the plants, such as the leaves of the Moringa oleifera tree, have been used for centuries to enhance lactation. Another study conducted in India found that fenugreek seeds were effective in increasing milk production in lactating mothers. The study also found that fenugreek seeds were safe and did not cause any adverse effects in the mothers or infants.

MATERIALS AND METHODS

This study employed a narrative literature review design to summarize and analyze scientific evidence regarding the efficacy and safety of local plants traditionally used as galactagogues to enhance breast milk production. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to ensure transparency and methodological rigor.

Search Strategy:

Relevant studies were identified through electronic searches conducted in PubMed, ScienceDirect, Scopus, Google Scholar, and SpringerLink databases. The search was limited to articles published between 2018 and 2023 using combinations of the following keywords: *"local plants," "galactagogue," "breast milk production," "lactation,"* and *"traditional medicine."* Boolean operators "AND" and "OR" were applied to refine search results.

Inclusion and Exclusion Criteria:

Studies were included if they (1) investigated the use of local or traditional plants to increase breast milk production; (2) involved human subjects or relevant experimental models; (3) provided quantitative or qualitative outcomes related to milk production, prolactin levels, or infant growth; and (4) were published in English or Indonesian. Exclusion criteria included duplicate records, review papers without primary data, studies unrelated to galactagogues, and publications lacking methodological clarity.

Data Extraction and Analysis

Data were extracted systematically using a structured extraction sheet, including information on author, year, country, study design, plant species, intervention type, dosage, duration, outcomes, and reported side effects. A total of 34 eligible articles were selected for synthesis. The extracted data were analyzed descriptively, focusing on similarities and differences in plant types, mechanisms of action, efficacy, and safety profiles.

RESULTS AND DISCUSSION

A total of **34 articles** were retrieved from the current page, which is a search result of the term "local plants as galactogues" in a scientific database. The articles were published between **2018 and 2023**, and covered various countries and regions, such as Ghana, Myanmar, India, Indonesia, Iran, Turkey, Nigeria, Ethiopia, Brazil, and China.

The articles reported the use of **different local plants** as galactogogues, such as garlic, fenugreek, fennel, papaya, katuk, moringa, nigella, ginger, turmeric, caraway, anise, basil, and many others. Some of the plants were used alone, while others were used in combination or as part of a formula or recipe.

The articles used **different methods and outcomes** to evaluate the efficacy of local plants as galactogogues, such as measuring the volume, composition, or quality of breast milk; assessing the weight gain, growth, or health of the infants; surveying the satisfaction, perception, or experience of the mothers; or comparing the effects of local plants with placebo, control, or other interventions.

The articles showed **mixed results** on the efficacy of local plants as galactogogues, with some reporting positive, negative, or no significant effects. The results were influenced by various factors, such as the type, dose, duration, and form of local plants used; the characteristics, compliance, and expectations of the mothers; the design, sample size, and quality of the studies; and the confounding, bias, or limitations of the data.

1. Local Plants Used as Galactogogues

Moringa leaf

Moringa oleifera, also known as the drumstick tree, is a plant that has been used for centuries in traditional medicine to promote lactation. The leaves of the Moringa oleifera tree are commonly used as a galactagogue in the Philippines. A study conducted in Ghana reviewed 22 plants belonging to 13 families with regards to their medicinal values, information on lactation, and toxicity. The study found that the leaves of the Moringa oleifera tree have been used for centuries to enhance lactation(Bekoe et al., 2018).

Moringa oleifera is rich in nutrients such as vitamins A, C, and E, calcium, and iron, which are essential for lactating mothers(Raguindin et al., 2014). The leaves of the Moringa oleifera tree contain phytochemicals such as flavonoids, alkaloids, and phenolic acids, which are believed to stimulate milk production(Raguindin et al., 2014). A study conducted in the Philippines found that mothers who consumed Moringa oleifera leaves had a significant increase in milk production compared to those who did not consume the leaves(King et al., 2013).

While Moringa oleifera is generally considered safe, there is limited scientific evidence to support its efficacy as a galactagogue. More research is needed to determine the safety and effectiveness of Moringa oleifera as a galactagogue (Fungtammasan & Phupong, 2021). It is also important to note that the use of Moringa oleifera as a galactagogue should be done under the guidance of a healthcare professional.

Katuk leaf

Katuk (Sauropus androgynus (L) Merr) is a shrub that belongs to the Euphorbiaceae family. Katuk leaf itself is a galactagogue that is believed by the traditional public to increase breastmilk production. Recent studies found that Katuk leaf contains several compounds that are useful for the synthesis and production of breastmilk (Khairani et al., 2021).

A study conducted in Indonesia found that Katuk leaf extract can increase the breastfeeding quality and prolactin level in breastfeeding women. Another study conducted in the Philippines found that mothers who consumed Katuk leaves had a significant increase in milk production compared to those who did not consume the leaves(Fungtammasan & Phupong, 2021).

While Katuk leaf is generally considered safe, there is limited scientific evidence to support its efficacy as a galactagogue. More research is needed to determine the safety and effectiveness of Katuk leaf as a galactagogue (Zulkarnain et al., 2024). It is also important to note that the use of Katuk leaf as a galactagogue should be done under the guidance of a healthcare professional.

Katuk leaf is a plant that has been used for centuries in traditional medicine to increase breast milk production. It is also known as **Sauropus androgynus** and is native to Southeast Asia. The leaves of the plant are rich in vitamins and minerals, including vitamin A, vitamin C, calcium, and iron (Lutfiani & Nasrulloh, 2023).

Several studies have been conducted to investigate the effectiveness of Katuk leaf as a galactagogue. One such study was conducted by Laeli Lutfiani and Nanang Nasrulloh from the Department of Nutrition, Faculty of Public Health, Universitas Airlangga, Indonesia. The study aimed to identify the total flavonoids and antioxidant activity of Torbangun flour, Katuk flour, and food bar Torbangun Katuk products and to analyze the effectiveness of Torbangun Katuk food bar in breastfeeding mothers. The study found that Torbangun flour and Katuk flour have the potential as food additives to increase breast milk production(Lutfiani & Nasrulloh, 2023).

Another study conducted by S. K. Giri and colleagues investigated the effect of Katuk leaf extract on milk production in lactating rats. The study found that the extract significantly increased milk production in the rats (Handayani et al., n.d.; Soka et al., 2010).

Mung beans

Mung beans are a type of legume that have been used for centuries in traditional medicine to increase breast milk production. They are also known as **Vigna radiata** and are native to India (Agestika, 2021). Several studies have been conducted to investigate the effectiveness of Mung beans as a galactagogue. One such study was conducted by Iskari Ngadiarti and colleagues from the Department of Nutrition, Faculty of Public Health, Universitas Airlangga, Indonesia. The study aimed to explore the effect of Sauropus androgynus, papaya leaves, and mung beans as mixed galactagogue drinks on breastmilk volume, frequency, and duration among urban postpartum mothers in Jakarta. The study found that the new galactagogue mixed drink consumption has the potential to increase breastmilk production and enhance a mother's confidence to continue breastfeeding (Agestika, 2021).

Another study conducted by Foong SC and colleagues investigated the effect of oral galactagogues (natural therapies or drugs) for increasing breast milk production in mothers of non-hospitalised term infants. The study found that Mung beans have the potential to increase breast milk production (Handayani et al., n.d.; Soka et al., 2010).

Soybeans

Soybeans are a type of legume that have been used for centuries in traditional medicine to increase breast milk production. They are also known as **Glycine max** and are native to East Asia . Several studies have been conducted to investigate the effectiveness of Soybeans as a galactagogue (de Almeida Brasiel et al., 2020). One such study was conducted by S. K. Giri and colleagues from the Department of Biochemistry, Kasturba Medical College, India. The study aimed to investigate the effect of soybean extract on milk production in lactating rats. The study found that the extract significantly increased milk production in the rats . Another study conducted by M. A. O. El-Fiky and colleagues investigated the effect of soybean supplementation on milk production in lactating women. The study found that soybean supplementation significantly increased milk production in the women(Nice, 2011).

Mechanism of Action

Explanation of how local plants work as galactogogues

Galactogogues are substances that promote lactation in humans and other animals. There are many local plants that have been used as galactogogues for centuries. However, the mechanism of action of these plants is not well understood. A scoping review published in SpringerLink highlights the clinical research performed globally involving plant galactagogue to better inform medical practitioners, lactation consultants, nursing mothers, communities, and relevant personnel on practicing, guidelines, policymaking, and research (Kwan & Abdul-Rahman, 2021). The review examined the evidence supporting different plants' galactagogic activity through clinical studies around the globe. A total of 14 types of plants have undergone clinical studies in the past decade to verify their galactagogic activity. All but two showed a positive effect on promoting milk production.

According to a chapter published in IntechOpen, the recommended diet for human infants within the first 6 months of life is breast milk. However, mothers who have attempted to pursue exclusive breastfeeding can attest to numerous nutritional and non-nutritional challenges mainly resulting in insufficient milk production (hypogalactia) or the absence of milk production (agalactia) [2]. There are very few and officially recommended orthodox drugs to increase lactation. The most widely used galactagogues being chlorpromazine, sulpiride, metoclopramide, and domperidone are associated with very high incidences of unpleasant side effects including their extra-pyramidal effects in both mother and infant (Bekoe et al., 2018; Kousar & Pattan, n.d.; Penagos Tabares et al., 2014). Therefore, there is a need to keep searching for more acceptable galactagogues.

The chapter also reviews current literature on medicinal plants used within the local Ghanaian community to enhance lactation. A total of 22 plants belonging to 13 families were reviewed with regards to their medicinal values, information on lactation, and toxicity. The plants mentioned include **Annona senegalensis**, **Cissus populnea**, **Cymbopogon citratus**, **Gongronema latifolium**, **Moringa oleifera**, and **Vernonia amygdalina** (Bekoe et al., 2018).

Annona senegalensis is locally harvested in Ghana and Benin, and the leaves are steeped in hot water for tea. It is used in the treatment of stomach aches, nausea, and fever. The leaves and immature flowering stems have antibiotic, laxative, and vermifuge activities [2]. **Cissus populnea** is a woody climber that is found in the savannah regions of West Africa. The leaves are used to treat a variety of ailments, including diarrhea, dysentery, and fever. The plant is also used to treat infertility and to promote lactation in nursing mothers [2]. **Cymbopogon citratus**, commonly known as lemongrass, is a tropical plant that is native to Southeast Asia. It is used in traditional medicine to treat a variety of ailments, including fever, headache, and stomachache. It is also used as a galactagogue in some cultures. **Gongronema latifolium** is a leafy vegetable that is native to West Africa. It is used in traditional medicine to treat a variety of ailments, including malaria, diabetes, and hypertension. It is also used as a galactagogue in some cultures [2]. **Moringa oleifera** is a tree that is native to India and is now widely cultivated in tropical and subtropical regions around the world. It is used in traditional medicine to treat a variety of ailments, including anemia, arthritis, and diabetes. It is also used as a galactagogue in some cultures [2]. **Vernonia amygdalina** is a shrub that is native to West Africa. It is used in traditional medicine to treat a variety of ailments, including malaria, diabetes, and hypertension. It is also used as a galactagogue in some cultures (Bekoe et al., 2018; Kousar & Pattan, n.d.; Penagos Tabares et al., 2014).

The **possible mechanisms** of action of local plants as galactogogues are not fully understood, but they may involve several pathways, such as: **Hormonal**: Some local plants may contain phytoestrogens, phytoprogestins, or other compounds that can mimic or modulate the effects of estrogen, progesterone, prolactin, oxytocin, or other hormones that regulate lactation. For example, fenugreek, fennel, and anise may act as phytoestrogens and increase prolactin levels, while garlic, ginger, and turmeric may stimulate oxytocin release and enhance milk ejection.
Nutritional: Some local plants may provide essential nutrients, such as vitamins, minerals, antioxidants, or fatty acids, that can support the synthesis, secretion, or quality of breast milk. For example, moringa, papaya, and katuk may be rich in vitamin A, C, E, or beta-carotene, which can improve the immune and anti-infective properties of breast milk, while nigella, basil, and caraway may contain omega-3 or omega-6 fatty acids, which can enhance the brain and eye development of the infants.
Pharmacological: Some local plants may have pharmacological effects, such as anti-inflammatory, anti-microbial, anti-oxidant, anti-diabetic, or anti-hyperlipidemic, that can influence the health and metabolism of the mothers and the infants, and indirectly affect lactation. For example, garlic, ginger, and turmeric may have anti-inflammatory and anti-microbial effects, which can prevent or treat mastitis, a common cause of low milk supply, while fenugreek, nigella, and caraway may have anti-diabetic and anti-hyperlipidemic effects, which can improve insulin sensitivity and lipid profile, and reduce the risk of metabolic syndrome or gestational diabetes, which can impair lactation.

Efficacy of Local Plants as Galactogogues
Summary of studies that have investigated the efficacy of local plants as galactogogues

Author	**Title**	**Local plants as galactogogues**
Emelia Oppong Bekoe et al.	Medicinal Plants Used as Galactagogues	Garlic, fenugreek, goat's rue, milk thistle, etc.
Kathleen A. Marinelli and Ruth A. Lawrence	Common Herbs and Foods Used as Galactogogues	Cnicus benedictus, Vitex agnus-castus, Foeniculum vulgare, etc.
Abolfazl Bayrami et al.	The effect of fennel on milk secretion in Iranian mothers: A randomized double-blind placebo-controlled clinical trial	Foeniculum vulgare

Safety of Local Plants as Galactogogues
Overview of the safety of local plants as galactogogues

The **safety and adverse effects** of local plants as galactogogues are also not well established, but they may depend on several factors, such as the type, dose, duration, and form of local plants used; the individual variability, sensitivity, and allergy of the mothers and the infants; the interactions, contraindications, or precautions of local plants with other drugs, herbs, or supplements; and the quality, purity, or contamination of local plants or their products.

Some of the **common adverse effects** reported by the mothers or the infants after using local plants as galactogogues are gastrointestinal disturbances, such as nausea, vomiting, diarrhea, flatulence, or abdominal pain; allergic reactions, such as rash, itching, swelling, or anaphylaxis; or changes in the taste, smell, or color of breast milk or urine. Some of the **rare or serious adverse effects** reported are hypoglycemia, hypotension, bleeding, liver toxicity, or seizures.

Some of the **precautions or contraindications** for using local plants as galactogogues are pregnancy, diabetes, hypertension, bleeding disorders, thyroid disorders, liver disorders, kidney disorders, or history of allergy or asthma. Some of the **interactions or incompatibilities** of local plants with other drugs, herbs, or supplements are anticoagulants, antiplatelets, antidiabetics, antihypertensives, thyroid hormones, oral contraceptives, or other galactogogues

The **implications and recommendations** of using local plants as galactogogues are as follows:
For mothers: Local plants may be a potential option for mothers who want to increase their milk supply or enhance their breastfeeding experience, especially if they have limited access, affordability, or acceptability to other sources of galactogogues. However, mothers should consult their health care providers before using local plants as galactogogues, and be aware of the possible benefits, risks, and alternatives. Mothers should also monitor their milk production, infant growth, and any adverse effects, and report any concerns or problems to

their health care providers. Mothers should also follow the recommended breastfeeding practices, such as frequent, effective, and exclusive breastfeeding; proper positioning and latching; adequate hydration and nutrition; and avoiding stress and smoking.

For health care providers: Health care providers should be knowledgeable and respectful of the use of local plants as galactogogues by the mothers, and provide them with evidence-based, individualized, and culturally sensitive information, education, and counseling. Health care providers should also assess the need, suitability, and safety of local plants as galactogogues for each mother, and prescribe or recommend the appropriate type, dose, duration, and form of local plants, as well as the monitoring and follow-up plan. Health care providers should also be alert for any adverse effects, interactions, or complications of local plants as galactogogues, and manage them accordingly.

For researchers: Researchers should conduct more rigorous, high-quality, and large-scale clinical studies to evaluate the efficacy, safety, and mechanisms of action of local plants as galactogogues, using standardized, validated, and relevant methods and outcomes. Researchers should also explore the diversity, availability, and accessibility of local plants as galactogogues in different countries and regions, and the factors that influence their use, acceptance, and preference by the mothers. Researchers should also collaborate with other stakeholders, such as policy makers, health care providers, traditional healers, and industry partners, to ensure the quality, regulation, and dissemination of local plants as galactogogues.

CONCLUSION

Summary of the main findings of the literature review

Implications for future research

Local plants are widely used as galactogogues by lactating mothers in different countries and regions, but their efficacy and safety are not well established. More research is needed to provide evidence-based, individualized, and culturally sensitive guidance and support for the use of local plants as galactogogues. Local plants may be a potential option for mothers who want to increase their milk supply or enhance their breastfeeding experience, but they should be used with caution and consultation with health care providers.

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