



**International Journal of Biology, Pharmacy  
and Allied Sciences (IJBPAS)**

*'A Bridge Between Laboratory and Reader'*

[www.ijbpas.com](http://www.ijbpas.com)

---

---

**PHARMACOLOGICAL APPRAISAL OF GALACTAGOGUE  
CHOCOLATE: A HERBAL NUTRITIONAL SUPPLEMENT FOR  
BREAST FEEDING MOTHERS**

**MESHAM S<sup>1\*</sup>, SREEJA VENUGOPAL MP<sup>2</sup> AND ARUN RAJ GR<sup>3</sup>**

- 1:** Professor, Department of Dravyagunavijnana, Parul Institute of Ayurved and Research, Parul University, Vadodara - 391760, Gujarat state, India
- 2:** Assistant Professor, Department of Prasutitantra and Streeroga, Parul Institute of Ayurved and Research, Parul University, Vadodara - 391760, Gujarat state, India
- 3:** Associate Professor, Department of Kaumarabhritya, Parul Institute of Ayurved and Research, Parul University, Vadodara - 391760, Gujarat state, India

**\*Corresponding Author: Dr. Suwarna Meshram: E Mail: [dr.sameshram@gmail.com](mailto:dr.sameshram@gmail.com)**

Received 15<sup>th</sup> Dec. 2023; Revised 19<sup>th</sup> Jan. 2024; Accepted 27<sup>th</sup> June 2024; Available online 1<sup>st</sup> May 2025

<https://doi.org/10.31032/IJBPAS/2025/14.5.8973>

**ABSTRACT**

Galactagogue chocolate presents a novel innovative approach designed to lactation support by combining traditional galactagogue ingredients with the irresistible appeal of chocolate. This chocolate integrates traditional wisdom with contemporary nutritional science to create a delicious and convenient solution for lactation challenges. This innovative formulation aims to address lactation challenges faced by breastfeeding mothers, offering a convenient and enjoyable solution. The key ingredients in galactagogue chocolate include Vidarikanda, Sweet potato, Corn seed coat, Suranaa, Methika leaves, Gum acacia, and Coco butter, each selected for their potential to enhance milk production and quality. These ingredients are believed to work synergistically to regulate hormonal balance, provide essential nutrients, stimulate milk synthesis, reduce stress, and support breast tissue health. Vidarikandaa, known for its phytoestrogenic properties, may mimic estrogen activity, promoting milk production. Sweet potato and Corn seed coat offer nutritional support, supplying vitamins, minerals, and antioxidants crucial for lactation. Suranaa and Methika leaves contribute to breast tissue nourishment and hormonal regulation, while Gum acacia and Coco butter provide texture and flavor to the chocolate. Galactagogue chocolate provides a palatable and accessible option for mothers seeking to optimize their lactation

experience. Its convenient form allows for easy integration into daily routines, making it an attractive choice for busy mothers. While traditional lactation support methods exist, galactagogue chocolate offers a modern twist, catering to contemporary tastes while harnessing the wisdom of traditional medicine. While preliminary evidence suggests the potential efficacy of galactagogue chocolate, further research is warranted to validate its safety and effectiveness. Future studies should explore its impact on milk production, maternal well-being, and infant health outcomes. Galactagogue chocolate holds promise as an innovative tool in supporting breastfeeding mothers, offering a delectable way to nourish both body and soul during the lactation journey.

**Keywords: Galactagogue, nutritional supplement, Vidarikanda, Sweet potato, Corn seed coat, Suranaa**

## INTRODUCTION

Galactagogues, whether synthetic or derived from plants, serve to initiate, sustain, and amplify milk production, orchestrating intricate processes influenced by both physical and physiological factors [1]. The production of milk is vital for nurturing infants optimally, directly affecting their growth, development, and overall health during the neonatal phase. India has long recognized the significance of breastfeeding, acknowledging the role of specific medicinal plants in enhancing breast milk production [2]. Ancient Ayurvedic texts provide detailed insights into milk formation and release physiology, as well as strategies for managing conditions affecting breast milk quality and quantity.

Breastfeeding is subject to various nutritional and non-nutritional influences, encompassing factors such as endocrinology, health status, climate, and caregiving practices, all of which shape milk synthesis and secretion. These factors

modulate physiological responses that govern scenarios like non-infectious agalactias and hypogalactias, with the latter posing a predominant challenge for breastfeeding women. Ayurvedic principles recognize *Stanya kshaya* or *nasa* as a state where insufficient milk production impedes breastfeeding, underscoring the importance of exclusive breastfeeding for promoting positive health outcomes. Despite the known benefits, widespread adoption of exclusive breastfeeding faces hurdles, with perceived inadequate milk production cited as a primary reason for early cessation.

However, despite its paramount importance, lactational insufficiency, termed as *Stanyakshaya* in Ayurveda, remains a prevalent concern, exacerbated by modern lifestyles characterized by stress, inadequate nutrition, and improper health practices [3]. This deficiency poses significant risks to both maternal and infant health, necessitating interventions to

promote breastfeeding and enhance milk production.

Leveraging Ayurveda's wealth of medicinal flora with galactagogue properties may offer safe and effective strategies for enhancing breast milk production. In addressing lactational insufficiency, this study explores the efficacy of certain Ayurvedic formulations in augmenting breast milk quantity and quality. Utilizing palatable formulations

containing herbal extracts, the aim is to develop cost-effective solutions that encourage breastfeeding and mitigate the risks associated with breast milk substitutes. The trial formulation, presented in the form of a nutritive chocolate, seeks to enhance lactation through the synergistic action of key ingredients such as Vidarikandaa, Sweet potato, Corn seed coat, Suranaa, Methika leaves, Gum acacia, and Coco butter.

### DRUG REVIEW

Sl. No.	Name of drug	Botanical name	Family	Gana	Rasa	Guna	Virya	Vipaka	Karma
1.	Vidarikandaa	<i>Pueraria tuberosa</i> (Roxb. ex Willd.) [4]	Leguminosae	Balya, brmhaniya, maduraskanda, valli panchamoola	Madhura	Guru, snigdha	Sita	Madhura	Vata Pitta hara, Snehana Hrudya, Vrushya Stanyajanana Daha prasamana Jwaraghna, Balya
2.	Madhvalu (Sweet potato)	<i>Ipomoea batatas</i> [5]	Convolvulaceae		Madhura	Guru	Sita	Madhura	Rakta pittanut, Kaphavata kara, balya, vrushya, swalpa agni vardhanam
3.	Corn seed coat (Maize)	<i>Zea mays</i> L [6]	Gramineae	Mahakashaya	Madhura	Ruksha	Ushna	Madhura	Kapha Pitta hara
4.	Suranaa	<i>Amorphophallus capanulatus</i> (Roxb.) Blume ex Decne [7]	Araceae		Katu Kashaya	Laghu, ruksha, tikshna	Ushna	katu	Kapha Vata hara, Dipana Pachana, Sothahara Vedanasthapana Vrushya Artavajanana Balya, Rasayana
5.	Methika leaves	<i>Trigonella foenugraecum</i> [8]	Leguminosae	Chathurbija	Katu	Laghu, snigdha	Ushna	Katu	Vata hara, Dipana Pachana, Sothanasana Vedanasthapana Anulomana Sthanyajanana Angamardaprasamana
6.	Babul (Gum acacia)	<i>Acacia arabica</i> Willd [9]	Mimosaceae						Grahi, brmhana
7.	Coco butter								

#### 1. Vidarikandaa (*Pueraria tuberosa* Roxb. ex Willd.)

Vidarikandaa (*Pueraria tuberosa* Roxb. ex Willd.) DC. (Fabaceae), also known as Indian Kudzu, is a rapidly growing perennial

with big tuberous roots, distributed throughout India and other Asian countries. It has been found to grow at 4,000 feet in the Himalayan mountain series. Tuber and leaves of this plant have been extensively

reported for nutritional and medicinal properties in Ayurveda. *P. tuberosa* extracts and its refined components demonstrate a diverse array of effects including anticancer, anticonvulsant, antidiabetic, antifertility, anti-inflammatory, antioxidant, anti-stress, antiulcerogenic, cardioprotective, hypolipidemic, hepatoprotective, immunomodulatory, nephroprotective, neuroprotective, and wound healing properties. Tuber and leaf extracts of *P. tuberosa* contain several bioactive constituents such as puerarin, daidzein, genistein, quercetin, irisolidone, biochanin A, biochanin B, isoorientin, and mangiferin, which possess an extensive range of pharmacological activities. Many phytochemicals have been identified and characterized from *P. tuberosa*; however, some of them are still unexplored [10].

According to the Ayurvedic pharmacopoeia of India (2001), the tuber from this plant possesses a sweet taste and finds extensive application in managing conditions such as fever, menorrhagia, skin ailments, wounds, bronchial asthma, and jaundice. Numerous studies have explored various pharmacological effects of *P. tuberosa* extracts and their refined constituents, including anticancer, anticonvulsant, antidiabetic, antifertility, anti-inflammatory, antioxidant, anti-stress, antiulcerogenic, cardioprotective, hypolipidemic, hepatoprotective,

immunomodulatory, nephroprotective, nootropic, neuroprotective, and wound healing properties [11].

According to Ayurveda, Vidarikanda is recognized as a plant with significant nutritional content. Additionally, it is known to exhibit aphrodisiac, diuretic, galactagogue, energizing, and spermatogenic properties. It is recommended for rebalancing all three Doshas of the human body (Ayurvedic pharmacopoeia of India, 1999). Additionally, it has demonstrated antihyperglycemic, antihyperlipidemic, antifertility in male rats, hepatoprotective, and anti-implantation activities. Vidarikanda is included in various formulations utilized for its nutritive, diuretic, and expectorant properties, as well as for managing rheumatism, fever, and bronchitis. *P. tuberosa* tubers are abundant in isoflavonoids, with key phytoconstituents including puerarin, daidzein, genistein, puetuberosanol, and tuberosin. Interest in these isoflavonoids has surged in recent years due to their proposed beneficial effects endorsed by epidemiologists, nutritionists, and food manufacturers. These isoflavonoids have shown interactions with milk proteins, such as bovine serum albumin, casein micelle, and  $\beta$ -lactoglobulin, as observed in certain food and drug preparations containing soy isoflavonoids. Furthermore, in vivo studies

have revealed that these interactions often result in reduced lipid oxidation and enhanced antioxidant properties, which are highly significant from a health perspective [11].

Recent findings from an in vivo study on the immunomodulatory and antioxidative effects of *P. tuberosa* combined with milk as a carrier indicate that *P. tuberosa* contains bioactive compounds that enhance the therapeutic qualities of milk. Milk supplemented with *P. tuberosa* extracts demonstrated both immunostimulatory and antioxidative properties. Furthermore, investigations have been conducted to assess the impact of incorporating herb extracts on the oxidative stability of ghee under accelerated oxidation conditions. The results revealed that among all the herbs tested, the ethanolic extract of Vidarikanda exhibited the highest antioxidant activity.

## 2. Sweet potato (*Ipomoea batatas*) [12]

*Ipomoea batatas*, commonly known as sweet potato and belonging to the convolvulaceae family, holds a prominent status as a vital root vegetable prized for its large size, starchy texture, and pleasantly sweet taste. This versatile and nutritious vegetable stands out for its culinary versatility and remarkable health benefits. Characterized by its herbaceous perennial vine structure, it features heart-shaped or palmately lobed leaves alternately arranged

along its stems, accompanied by medium-sized flowers.

The tuberous root of *I. batatas*, elongated and tapered with a smooth outer surface, is particularly valued for its relatively short growth period of 90 to 120 days. Throughout history, sweet potato has served as a valuable source of both sustenance and medicinal properties, playing a crucial role in human nutrition across various cultures. Notably, traditional practices in regions like Ghana and Brazil utilize different parts of the plant for treating ailments such as type 2 diabetes and oral inflammations, reflecting its rich medicinal heritage.

Beyond its culinary and medicinal uses, sweet potato is increasingly recognized for its diverse array of natural compounds with potential health benefits. This comprehensive review aims to provide insight into the nutritional composition, health-promoting properties, and medicinal applications of sweet potato. It explores the biological activities of its isolated compounds, the pharmacological effects of its extracts, clinical research findings, and potential therapeutic uses, as well as safety considerations, highlighting its emerging role as a medicinal food.

Across various cultures and regions, different species of *Ipomoea* have been utilized for treating a wide range of ailments, including diabetes, hypertension, and inflammatory conditions. These plants boast

a versatile pharmacological profile, offering antimicrobial, analgesic, and anti-cancer properties, among others. Notably, sweet potatoes contribute to maintaining fluid and electrolyte balance, supporting cardiovascular health, and addressing various health issues such as oral tumors, asthma, and gastrointestinal disorders.

Utilized in various preparations, sweet potato leaves offer a host of therapeutic benefits, including alterative, aphrodisiac, and laxative effects, underscoring their multifaceted medicinal potential. Overall, the rich nutritional content and therapeutic properties of sweet potato underscore its importance as a valuable botanical resource for promoting human health and well-being.

### 3. Corn seed coat (*Zea mays*) [13]

In India, *Zea mays*, commonly known as maize or corn, Gramineae family, is an important cereal crop cultivated extensively across various regions of the country. Maize cultivation in India is widespread and occurs across various agro-climatic regions. The distribution of *Zea mays* in India is influenced by factors such as climate, soil type, and agricultural practices. Maize is grown both as a kharif (monsoon) and rabi (winter) crop in India, with the kharif season being the predominant one. The crop is used for various purposes, including human consumption, animal feed, and industrial uses like starch production and biofuel. It

has been traditionally used in various cultures as a galactagogue, a substance that promotes lactation in breastfeeding mothers. While scientific evidence supporting its effectiveness is limited, some cultures have incorporated corn or its byproducts into their diets to help increase milk production.

The stem of *Zea mays* in India is sturdy and erect, with nodes and internodes along its length. It provides support to the plant and houses the vascular system. The leaves of corn in India are long, narrow, and alternate along the stem. They have parallel venation and a prominent midrib. The inflorescence, known as the ear or corn cob, develops from the axils of the leaves near the top of the stem. The ear consists of a central axis called the cob or rachis, which bears numerous spikelets (kernels) arranged in rows. Each kernel is a potential seed and develops from a single ovary. Corn flowers in India are small and inconspicuous, grouped together in spikelets. Each spikelet contains both male and female flowers. The male flowers, or tassels, are located at the top of the plant and produce pollen, while the female flowers, or silk, are located on the ears and develop into kernels after pollination.

Corn is a rich source of nutrients such as carbohydrates, vitamins (particularly B vitamins), and minerals like magnesium and potassium, which are important for overall health, including

lactation. Additionally, certain compounds found in corn, such as phytoestrogens, may have estrogenic effects that could potentially influence lactation. While scientific studies on the specific chemical constituents of Zea mays (corn) promoting a galactogogue effect are limited, some compounds found in corn may potentially contribute to this effect.

Here are a few chemical constituents of corn that have been suggested to have galactogogue properties:

- a) **Phytoestrogens:** Corn contains phytoestrogens, which are plant-derived compounds that have estrogenic effects. These compounds may interact with estrogen receptors in the body and potentially influence lactation.
- b) **Carbohydrates:** Corn is rich in carbohydrates, which provide energy for the body, including lactation. Carbohydrates are essential for milk production and may indirectly support lactation by providing energy for the body's metabolic processes.
- c) **Vitamins:** Corn contains various vitamins, including B vitamins such as thiamine (B1), riboflavin (B2), niacin (B3), and folate (B9). These vitamins are important for overall health and may indirectly support lactation by promoting metabolic

processes involved in milk production.

- d) **Minerals:** Corn is a good source of minerals such as magnesium, potassium, and calcium, which are essential for overall health and may indirectly support lactation by maintaining proper bodily functions.
- e) **Fiber:** Corn contains dietary fiber, which may help regulate digestion and nutrient absorption, potentially supporting overall health and lactation.

#### 4. **Suranaa (Amorphophallus campanulatus) [14]**

*Amorphophallus campanulatus* Linn is commonly known as Suranaa in Ayurveda. It is a tuberous, stout herb, found throughout India in plains. It has an underground corm which is hemispherical and depressed, 10-35 cm or more in diameter and of a dull brown color. It bears a large solitary mottled leaf on a long petiole. Corms weigh from 2-4 kg more than that. An annual herb with large, depressed-globose, muchwarted tubers, 20-25 cm diam. Perennial herb of 1-2 m tall. Adventitious root system, shallow and fleshy. Underground stem modified into corm, is a cylindrical or spherical, bulb-like fleshy structure with short internode at the base of the stem. The petiole is long, stout, the blade is bifurcating and ultimately divided into oblong, acuminate, decurrent

lobes. Three types of flower namely, male, female and neuter are present. Leaves solitary, 30-90 cm broad, 3-partite, segments pinnatisect, appearing long after the flowers. Spathe 15- 23 cm across. Spadix very stout; female inflorescence cylindrical, male subturbinate, appendage dark-purple. Berries ovoid. They keep well for a long period if stored dry in well ventilated room. The corms of wild plants are highly irritant on account of the presence of crystals of calcium oxalate. In cultivated plants they are less abundant. The corms and leaves of elephant foot yams are important foods in the local diet in many Asian regions. Because of its production potential and popularity as a vegetable in various cuisines, it can be raised as a cash crop. Corm has great medicinal as well as nutritional value so being used for medicinal as well as edible purposes.

In Ayurveda, the dried corms of this plant are employed in treating various conditions such as Arsha (Piles), Pliha (splenic disorders), Gulma (lump), Shwasa (Bronchial Asthma), and Ashtila (Enlarged Prostate). Moreover, the plant has been noted for its antimicrobial, antitubercular, and lipid-lowering properties. Plant has been reported to possess antimicrobial, antitubercular, lipid lowering activities. Corms are used in rheumatic pains, antidote in snake bite, abortion and in scabies. It also inhibits trypsin activity.

The tubers harbor a range of constituents including an active diastatic enzyme known as amylase, betulinic acid, B-sitosterol, stigmasterol, B-sitosterolpalmitate, lupeol, triacontane, amino acids, carbohydrates, saponin, as well as vitamins such as thiamine, riboflavin, niacin, and carotene. The extract of the corm has anthelmintic activity due to the presence of petroleum ether, chloroform and methanol. Crude tannins were isolated from methanol extract. All extracts and crude tannins were evaluated for anthelmintic activity. Methanol extract of the corm have antihyperglycemic activity and reduces blood glucose levels. The biochemical and histopathological results proved that *Amorphophallus campanulatus* tubers had hepatoprotective potency to liver damage.

#### 5. **Methika** (*Trigonella foenugraecum*) [15]

*Trigonella foenum-graecum* L., commonly referred to as fenugreek, stands out as a plant renowned for its distinctive characteristics. Belonging to the Fabaceae family, it is a self-pollinating annual herbaceous crop known by various names including bird's foot, Greek hayseed, halba, and methi. Cultivated extensively in regions such as India and the Mediterranean, fenugreek seeds are celebrated for their pungent aroma and culinary uses, with recent attention focusing on their therapeutic potential.

For centuries, fenugreek has been utilized in folk medicine to address a spectrum of health issues, owing to its rich composition of fiber, protein, and gum. It has found applications as a food stabilizer and emulsifying agent due to these properties. The leaves and seeds of *Trigonella foenum-graecum* are commonly employed in the preparation of extracts and powders for therapeutic purposes, with preliminary research indicating promising hypoglycemic, hypolipidemic, and hypocholesterolemic effects. Additionally, fenugreek has been studied for its anti-fertility, anticancer, anti-parasitic, and antimicrobial properties.

The chemical composition of fenugreek seeds reveals a rich array of nutrients and bioactive compounds. These include carbohydrates, proteins high in tryptophan and lysine, fixed oils, pyridine alkaloids, flavonoids, saponins, glycosides, vitamins, minerals, and volatile oils. Notably, fenugreek is a notable source of iron, with its seeds containing about 33 mg per 100 g of dry weight. Furthermore, phytochemical analysis has identified alkaloids, flavonoids, saponins, and polyphenols as major constituents contributing to fenugreek's health benefits.

Traditionally, fenugreek has been employed to enhance breast milk production, a practice supported by its phytoestrogen content. Studies suggest that

fenugreek seeds contain estrogen-like compounds that stimulate pS2 expression, a marker of estrogenicity, potentially explaining their lactogenic effects. However, the precise mechanisms underlying this action remain unclear. Phytoestrogens in fenugreek possess structural similarities to endogenous estrogen, allowing them to interact with estrogen receptors and modulate hormonal activity, thereby influencing lactation.

In cultures worldwide, the role of fenugreek in promoting breast milk production reflects its valued status as a galactagogue. Recognized as a vital source of nutrition for infants, breast milk provides essential nutrients and supports early development. While fenugreek's mechanisms of action in lactation warrant further investigation, its historical and contemporary uses underscore its significance in maternal and child health. Because of its high fibre, protein, and gum content, fenugreek has recently been utilized as a food stabilizer and emulsifying agent. The leaves and seeds of *T. foenum-graecum* are extensively utilized to make extracts and powder for therapeutic applications in numerous investigations. There have been several preliminary animal and human trials that demonstrated fenugreek exhibiting hypoglycaemic, hypolipidemic, and hypocholesterolemic effects. *T. foenum-graecum* has also been

reported to possess anti-fertility, anticancer, anti-parasitic, and antimicrobial effects.

Fenugreek seeds consist of 45 to 60% carbohydrates, in which mucilaginous fibre (galactomannans), 20 to 30% proteins high in tryptophan and lysine, 5 to 10% fixed oils (lipids), pyridine alkaloids, mainly choline (0.5%), trigonelline (0.2–0.38%), gentianine, and carpaine, the flavonoids apigenin, orientin, luteolin, quercetin, vitexin, and isovitexin, free amino acids, such as 4-hydroxyisoleucine (0.09%), arginine, lysine, and histidine calcium and iron, saponins (0.6–1.7%), glycosides yielding steroidal sapogenins on hydrolysis (diosgenin, yamogenin, tigogenin, neotigogenin), cholesterol and sitosterol, vitamins B, A, C, and nicotinic acid, and 0.015% volatile oils (*n*-alkanes and sesquiterpenes). Furthermore, fenugreek contains 33 mg of iron per 100 g dry weight, making it a good source of iron. The leaves have an approximate moisture content of 86.1%, 4.4% protein, 0.9% fat, 1.5% minerals, 1.1% fibre, and 6% carbs. Fresh fenugreek leaves contain approximately 220.97 mg of ascorbic acid per 100 g of leaves, and approximately 19 mg/100 g of  $\beta$ -carotene is present.

The fenugreek seed has been found to contain a number of chemical compounds, commonly known as phytochemicals. They contain various types of alkaloids, flavonoids, and saponins, with the saponins

showing the highest concentration with 4.63 g per 10 g. Fenugreek contains about 35% alkaloids, mainly trigonelline. Fenugreek seeds also contain more than 10 mg of flavonoid per gram of seed, as well as a minor amount of volatile and fixed oils. The oils were rich in linoleic acid (42.71–42.80%), linolenic acid (26.03–26.15%), and oleic acid (14.24–14.40%). Fenugreek essential oil from the seeds (>5%) is rich in neryl acetate (17.3%), camphor (16.3%),  $\beta$ -Pinene (15.05%),  $\beta$ -caryophyllene (14.63%), and 2,5-dimethylpyrazine (6.14%). The phytochemical analysis of fenugreek revealed that the majority of flavonoids occur as glycosides, which are intricate and attributed to C-glycosidic and O-glycosidic bonding with carbohydrates. Flavonol glycosides found in fenugreek include quercetin-3-O-rhamnoside (quercitrin), vitexin-7-O-glucoside (afroside), and apigenin-6-C-glucoside (isovitexin). The alkaloid and volatile compound present are the two main chemical constituents that cause the bitter taste and the odour of the seeds. The seeds of fenugreek contain about 0.1 to 0.9% of diosgenin, which is a type of steroidal sapinogen. Polyphenol chemicals, such as rhaponticin and isovitexin, are known to be the primary bioactive compounds in fenugreek seeds.

#### **PROBABLE MODE OF ACTION OF GALACTOGOGUE CHOCOLATE**

Stanya [16] is considered as a minor structural component (upadhatu) and the essence (prasada bhaga) of rasa dhatu metabolism, originating in the breast/mammary glands in females. Sushruta regards stanya as a product of digested food (pakwahara) and compares its presence to that of shukra, spanning throughout the body. Kashyapa suggests that stanya is derived from the rakta dhatu, which can be justified as it is produced and expressed from the stana, comprising the sira, which are the upadhatu of rakta. The metabolism of rasa-rakta dhatu forms the primary framework for understanding stanya physiology. Similar to menstruation, stanya is observed for a limited time during a female's life, specifically during the post-delivery or lactation period. During pregnancy, rasa dhatu metabolism is directed towards stanya formation. The experimental blend, designed as a nourishing chocolate, aims to boost lactation by combining key ingredients like Vidarikandaa, Sweet potato, Corn seed coat, Suranaa, Methika leaves, Gum acacia, and Coco butter to work together synergistically.

As per Ayurvedic science, Vidarikandaa [17] is included under the following Ganas like Balya, Madhuraskanda and Valli panchamoola, have the properties like madhura rasa, snigdha guru guna, sita veerya and madhura vipaka. It is vata pittahara in nature with special snehana,

stanyajanan, balya and hrudya properties. Madhvalu is madhura in rasa, with guru guna, sita veerya and madhura vipaka. It is kaphavatakara, balya, agnivardhana also. Corn seed coat, included in mahakashaya varga, have madhura rasa, ruksha guna, ushna veerya and madhura vipaka. It is kapha pittahara too. Suranaa has katu Kashaya rasa, laghu ruksha tikshna guna, ushna veerya and katu vipaka. It is kapha vatahara, and has dipana, pachana, sothahara and rasayana properties. Methika leaves, which are included in chathurbija gana have the property of katu rasa, laghu snigdha guna, ushna veerya and katu vipaka. It is vatahara and having the properties of dipana, pachana, sothanasana, anulomana and stanyajanana.

All these drugs are acting synergistically for the excellent outcome of the galactagogue chocolate. Majority of the drugs are madhura in both rasa and vipaka, and having sita veerya along with balya and rasayana properties. These properties will help in the production of sthanya. The drugs like Suranaa and methika have katu rasa, snigdha guna and ushna veerya, which may help in the proper rechana of the milk inturn, helps to sustain the flow of the milk.

Vidari kanda, the major ingredient of this galactagogue chocolate contains phytoestrogens, which are plant-derived compounds that mimic the activity of estrogen in the body. Estrogen plays a role

in mammary gland development and milk production. Phytoestrogens may interact with estrogen receptors in the breast tissue, potentially stimulating milk production. It is rich in nutrients such as carbohydrates, proteins, and minerals like calcium and iron. Adequate nutrition is essential for lactation, and consuming nutrient-rich foods or herbs like Vidari kanda may support overall maternal health and milk production. Some studies suggest that Vidari kanda may influence hormone levels in the body, including prolactin, which is the hormone responsible for milk synthesis and secretion. By modulating hormonal levels, Vidari kanda may indirectly promote lactation. Vidari kanda has been traditionally used in Ayurveda as an adaptogen, helping the body adapt to stress and promoting relaxation. By reducing stress levels, Vidari kanda may support optimal lactation. Vidari kanda possesses anti-inflammatory and immunomodulatory properties, which may help maintain breast health and support lactation by reducing inflammation and enhancing immune function in the mammary glands.

Sweet potatoes [18] are rich in various nutrients, including vitamins (such as vitamin A, vitamin C, and several B vitamins), minerals (such as potassium, manganese, and magnesium), dietary fiber, and antioxidants. Adequate nutrition is crucial for breastfeeding mothers to support

milk production, and consuming nutrient-rich foods like sweet potatoes can contribute to overall maternal health, potentially enhancing lactation. Sweet potatoes are a good source of complex carbohydrates, providing energy to the body. Breastfeeding requires additional energy, and consuming carbohydrate-rich foods like sweet potatoes may help meet the increased energy demands during lactation. Sweet potatoes, contain phytoestrogens that exhibit weak estrogenic activity. Estrogen plays a role in mammary gland development and milk synthesis. Although the estrogenic effects of phytoestrogens are much weaker than those of endogenous estrogen, they may potentially influence lactation by interacting with estrogen receptors in breast tissue. Sweet potatoes contain various bioactive compounds, including certain polysaccharides and phytochemicals, which may have galactagogue properties. These compounds may act through different mechanisms to stimulate prolactin secretion, enhance mammary gland development, or improve milk synthesis and secretion. Sweet potatoes have high water content, and maintaining adequate hydration is essential for optimal lactation.

Corn seed coat [19] contains phytoestrogens which may exert weak estrogenic effects in the body, potentially interacting with estrogen receptors in breast tissue and stimulating lactation. Corn seed

coat is rich in various nutrients, including vitamins (such as vitamin E, vitamin K, and several B vitamins), minerals (such as magnesium, phosphorus, and zinc), and dietary fiber. Adequate nutrition is important for lactation, and consuming nutrient-rich foods may support overall maternal health and milk production. Corn seed coat contains polyphenolic compounds, such as flavonoids and phenolic acids, which have antioxidant and anti-inflammatory properties. These compounds may help maintain breast health and support lactation by reducing inflammation and oxidative stress in breast tissue. Corn seed coat contains polysaccharides, including dietary fibre and resistant starch. These polysaccharides may support gut health and digestion, potentially enhancing nutrient absorption and utilization, which is important for lactation. Corn seed coat contains protein, although in smaller amounts compared to other parts of the corn kernel. Protein is important for tissue repair and growth, including mammary gland development and milk synthesis. Corn seed coat contains phytosterols, which are plant-derived compounds structurally similar to cholesterol. Phytosterols may have various physiological effects, including potential influences on hormone regulation and lipid metabolism, although their specific role in lactation is not well understood.

Surana [20] is rich in various nutrients, including carbohydrates, dietary fiber, vitamins (such as vitamin C and vitamin B6), and minerals (such as potassium and magnesium). Adequate nutrition is essential for lactation, and consuming nutrient-rich foods like Surana may support overall maternal health and milk production. Surana, contain phytoestrogens which may potentially interact with estrogen receptors in breast tissue, stimulating lactation. Surana contains various bioactive compounds, including alkaloids, flavonoids, and saponins, which may have physiological effects. While their specific role in lactation is not well understood, these compounds could potentially influence hormone regulation, milk production, or mammary gland function. In some traditional systems of medicine, such as Ayurveda, Surana has been used as a galactagogue based on anecdotal evidence and cultural practices. While these traditional uses may lack scientific validation, they are often deeply ingrained in cultural traditions and may have been passed down through generations. Surana has a high water content, and maintaining adequate hydration is essential for optimal lactation.

Methi [21] contain saponins, which are phytochemical compounds known for their various biological activities. Saponins may stimulate milk production by

mimicking the action of estrogen in the body. They may also enhance the release of prolactin, a hormone responsible for milk synthesis, from the pituitary gland. Methi is a rich source of diosgenin, a steroidal sapogenin with estrogenic properties. Diosgenin may help regulate hormone levels in the body, including prolactin, and promote lactation. Methi is high in galactomannan, a soluble dietary fiber that forms a gel-like substance when mixed with water. Galactomannan may help increase breast milk production by promoting hydration and improving milk flow. Methi contains phytoestrogens, that may stimulate mammary gland development and milk production by interacting with estrogen receptors in breast tissue. Methi is rich in vitamins and minerals, including vitamin A, vitamin C, vitamin B6, iron, and magnesium, which are essential nutrients for lactating mothers. Methi contains amino acids, the building blocks of protein. Protein is crucial for tissue repair and growth, including the development of mammary glands and the synthesis of milk proteins.

#### **CONCLUSION:**

In brief, galactogogue chocolate represents a promising and innovative approach to lactation support for breastfeeding mothers. By harnessing the synergistic effects of traditional galactogogue ingredients and the universal appeal of chocolate, this formulation offers

a convenient, palatable, and enjoyable solution to address lactation challenges. The integration of key ingredients such as Vidarikandaa, Sweet potato, Corn seed coat, Suranaa, Methika leaves, Gum acacia, and Coco butter aims to regulate hormonal balance, provide essential nutrients, stimulate milk synthesis, reduce stress, and support breast tissue health. Galactogogue chocolate not only offers practical benefits but also caters to contemporary tastes, making it an attractive option for modern mothers. Its accessibility and ease of incorporation into daily routines provide a valuable resource for mothers seeking to optimize their lactation experience. However, while initial evidence suggests potential efficacy, further research is needed to validate its safety and effectiveness, as well as to explore its impact on milk production, maternal well-being, and infant health outcomes. Despite these considerations, galactogogue chocolate holds promise as a delightful and effective tool in supporting breastfeeding mothers throughout their lactation journey. As awareness and interest in natural approaches to lactation support continue to grow, galactogogue chocolate stands as a shining example of innovation in this field. With ongoing research and development, it has the potential to become a staple resource for mothers worldwide, offering a delectable

way to nourish both body and soul during the breastfeeding experience.

## REFERENCES

- [1] Felipe Penagos Tabares, Juliana V. Bedoya Jaramillo, Zulma Tatiana Ruiz-Cortés, "Pharmacological Overview of Galactogogues", *Veterinary Medicine International*, vol. 2014, Article ID 602894, 20 pages, 2014.
- [2] Charantimath U, Bellad R, Majantashetti N, Washio Y, Derman R, Kelly PJ, Short V, Chung E, Goudar S. Facilitators and challenges to exclusive breastfeeding in Belagavi District, Karnataka, India. *PLoS One*. 2020 May 4;15(5):e0231755.
- [3] Sharma, Upasana; Sharma, Sushila. Stanyakshya (insufficient lactation) and its management by an Ayurveda formulation: A case report. *Journal of Indian System of Medicine* 10(3):p 192-195, Jul-Sep 2022.
- [4] Sivaraj S, Mallannavar V, Raj GRA, Shailaja U: Standardization of Amritaprasha ghrita: a herbal ghee based medicinal preparation. *Int J Pharm Sci & Res* 2018; 9(11): 4842-48.
- [5] Pavithra, P., Thangamani, C., Pugalendhi, L., & Kumar, J. S. (2023). Assessment of sweet potato (*Ipomoea batatas*) accessions for growth, yield and quality traits. *The Indian Journal of Agricultural Sciences*, 93(3), 332–335.
- [6] Ravindra Singh Bhadauria, Arun Kumar Chaurasia, Mohammad Haris Siddiqui, Khalid Habib and Soban Ahmad Faridi. Effect of different seed coatings and packaging on seed quality of maize (*Zea mays* L.) seeds during ambient storage condition. *Journal of Pharmacognosy and Phytochemistry* 2019; 8(6): 194-200.
- [7] Dey YN, Ota S, Srikanth N, Jamal M, Wanjari M. A phytopharmacological review on an important medicinal plant - *Amorphophallus paeoniifolius*. *Ayu*. 2012 Jan;33(1):27-32.
- [8] Sur P, Das M, Gomes A, Vedasiromoni JR, Sahu NP, Banerjee S, Sharma RM, Ganguly DK. *Trigonella foenum graecum* (fenugreek) seed extract as an antineoplastic agent. *Phytother Res*. 2001 May;15(3):257-9.
- [9] Jyoti, Garg V. *Acacia catechu* Willd. and *Acacia arabica* Willd. decrease the extent of anxiety behavior by reducing oxidative stress and moderating neurochemicals. *J Ethnopharmacol*. 2023 Aug 10;312:116496.

- [10] Bharti R, Chopra BS, Raut S, Khatri N. *Pueraria tuberosa*: A Review on Traditional Uses, Pharmacology, and Phytochemistry. *Front Pharmacol*. 2021 Jan 27;11:582506.
- [11] Neag MA, Mocan A, Echeverría J, Pop RM, Bocsan CI, Crişan G, Buzoianu AD. Berberine: Botanical Occurrence, Traditional Uses, Extraction Methods, and Relevance in Cardiovascular, Metabolic, Hepatic, and Renal Disorders. *Front Pharmacol*. 2018 Aug 21;9:557.
- [12] Cláudio E. Cartabiano-Leite, Ornella M. Porcu, Alicia F. de Casas. Sweet potato (*Ipomoea batatas* L. Lam) nutritional potential and social relevance: a review. *International Journal of Engineering Research and Applications*. 2020 Jun; 10(6):23-40.
- [13] Murdia L. K., Wadhvani R., Wadhawan N., Bajpai P., and Shekhawat S., "Maize Utilization in India: An Overview." *American Journal of Food and Nutrition*, vol. 4, no. 6 (2016): 169-176.
- [14] Swapnil Y Chaudhari, Harisha CR, Galib, Pradeep Kumar Prajapati. Pharmacognostical evaluation of Suranaakanda (corm of *Amorphophallus Campanulatus* Linn.). *Annals Ayurvedic Med*. 2013;2(1-2) 41-45.
- [15] Visuvanathan T, Than LTL, Stanslas J, Chew SY, Vellasamy S. Revisiting *Trigonella foenum-graecum* L.: Pharmacology and Therapeutic Potentialities. *Plants (Basel)*. 2022 May 29;11(11):1450.
- [16] Meti R, Ankad G. Breast milk as an etiological factor in infantile disorders - An observational study. *J Ayurveda Integr Med*. 2021 Oct-Dec;12(4):700-704.
- [17] Shivhare L, A review of Balya action of Vidarikanda in tribal zone as mentioned in Ayurveda. *J Ayu Int Med Sci*. 2023;8(8):196-200.
- [18] Senthilkumar, R., Muragod, P.P., & Muruli, N. V. (2020). Nutrient Analysis of Sweet Potato and Its Health Benefits, *Ind. J. Pure App. Biosci*. 8(3), 614-618.
- [19] Rodríguez-García C, Sánchez-Quesada C, Toledo E, Delgado-Rodríguez M, Gaforio JJ. Naturally Lignan-Rich Foods: A Dietary Tool for Health Promotion? *Molecules*. 2019 Mar 6;24(5):917.
- [20] Basu, S., M. Das, A. Sen, U. RoyChoudhury, and G. Datta. "Analysis of complete nutritional profile of *Amorphophallus*

*campanulatus* tuber cultivated in howrah district of West Bengal, India”. Asian Journal of Pharmaceutical and Clinical Research, vol. 7, no. 3, July 2014, pp. 25-29.

[21] Karimi E, Jaafar HZ, Ahmad S. Phytochemical analysis and antimicrobial activities of methanolic extracts of leaf, stem and root from different varieties of *Labisa pumila* Benth. *Molecules*. 2011 May 27;16(6):4438-50.