



ORIGINAL ARTICLE

NutriGalacto: Formulation and Evaluation of a Value-Added Ayurvedic Galactogenic Formulation

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Abstract

Breastfeeding is a part of our species-specific biopsychosocial system that has evolved through our mammalian history to optimise the health and survival of both mothers and infants. Nursing thus plays a crucial role in the nutrition of infants, but some mothers encounter challenges with milk production, necessitating extra assistance to boost lactation. This research intends to create and assess an Ayurvedic galactogenic snack bar aimed at improving lactation and the health of mothers. The formulation of the snack bar "NutriGalacto" includes various Ayurvedic herbs recognized for their galactogenic effects, such as Shashtika (*Oryza sativa* L.), Ikshuvalika (*Hygrophila auriculata*), Satavari (*Asparagus racemosus*), Aswagandha (*Withania somnifera*), Methika (*Trigonella foenum-graecum* L.), and Adrakam (*Zingiber officinale*). These herbs are traditionally documented in Ayurvedic literature for enhancing milk production and promoting the overall well-being of the mother. The formulation was systematically evaluated through proximate analysis to determine its macronutrient composition (carbohydrates, proteins, fats, and energy value) along with selected micronutrients relevant to lactation, to assess its adequacy in meeting the nutritional requirements of postnatal mothers. Furthermore, pharmaceutical quality attributes were assessed through physicochemical characterization and microbial load analysis to establish the product's stability, shelf life, and safety. In addition, sensory evaluation by a trained panel was conducted to ensure consumer acceptability alongside nutritional efficacy. This study aids in creating a practical, nourishing, and palatable option for breastfeeding mothers who are looking for natural methods to enhance lactation. NutriGalacto, a value-added Ayurvedic galactogenic functional food formulation, is intended to provide nutritional support to lactating women by integrating the therapeutic potential of selected medicinal herbs into a convenient, ready-to-use food formulation. Proximate analysis of the galactagogue-rich Ayurvedic formulation revealed a high carbohydrate content (78.4 g/100 g) with substantial dietary fibre (18.23 g/100 g) and a moderate energy value of 369.33 kcal/100 g. The formulation contained low total fat (2.69%), comprising minimal saturated fat (0.72 g/100 g), monounsaturated fat (0.90 g/100 g), and polyunsaturated fat (1.07 g/100 g), with trans fat and cholesterol being undetectable. With respect to

micronutrients, the product provided appreciable levels of calcium (18.93 mg/100 g), iron (12.99 mg/100 g), and vitamin B9 (6.91 mg/100 g), along with a protein content of 7.88 g/100 g and sodium of 75.34 mg/100 g. Physicochemical evaluation of three independently prepared batches at fixed intervals (Day 1, Day 7, and Day 15) demonstrated consistent quality and batch-to-batch reproducibility. The formulation exhibited a slightly acidic pH (5.51 ± 0.06), uniform moisture content (loss on drying 9.74%), low total ash (0.75%), absence of acid-insoluble ash, and acceptable water-soluble ash (0.69%). High water-soluble (61.02%) and alcohol-soluble extractive values (24.37%) indicated rich phytoconstituent content. Microbial analysis on Days 1, 7, and 15 confirmed that all parameters remained within permissible limits on Day 1 and 7, indicating microbiological safety until Day 7. However, by the 15th day, the presence of microbes was detected, suggesting that the shelf life should be assumed to be 1 week. Sensory evaluation revealed high acceptability with favorable taste, pleasing texture, and overall consumer approval. The Ayurvedic galactogenic value-added formulation exhibited acceptable nutritional, physicochemical, microbiological, and sensory attributes, indicating its promise as a supportive nutritional intervention for lactating women, warranting further clinical validation.

Introduction

Breastfeeding is a crucial aspect of infant nutrition, providing numerous health benefits for both the child and the mother¹. However, some mothers may face challenges with lactation, necessitating additional support to optimize milk production². In Ayurveda, traditional Indian medicine, various herbs and ingredients are known for their galactogenic properties, aiding in the stimulation of lactation. This study aims to develop and evaluate an Ayurvedic galactogenic functional food formulation intended to enhance lactation and support maternal nutritional health.

Any food or medication that assists initiation, maintenance, and augmentation of lactation is called a galactagogue³. In Ayurveda, several medicinal herbs have long been utilized to support lactation, offering a natural and systematic approach to enhancing milk production. The application of Ayurvedic principles in the development of modern nutritional formulations provides an opportunity to harness the galactogenic potential of these classical herbal drugs in a convenient and palatable functional food form. By formulating a snack bar infused with Ayurvedic herbs known for their lactation-promoting effects, this research seeks to provide a practical solution for breastfeeding mothers seeking additional support in optimizing lactation.

The present study aims to develop a snack bar “NutriGalacto” that holds the benefits of lactogenic activity of selected Ayurveda medicinal plants like *Shashtika* (*Oryza sativa*), *Ikshuvalika* (*Hygrophila auriculata*), *Satavari* (*Asparagus racemosus*), *Aswagandha* (*Withania somnifera*), *Adrakam* (*Zingiber officinale*), and *Methika* (*Trigonella foenum*). Among these, *Shastika* and *Ikshuvalika* are “*sthanyajanana*” or herbs having galactogenic activity as per Ayurveda⁴. *Satavari*⁵, *Aswagandha*⁶ and *Methika*⁷ are revered for their galactogenic actions in traditional Ayurveda clinical practice and are so well proven through the studies. *Adrakam* the “*mahaushadhi*” of Ayurveda, will be added to this snack bar to utilise its action on digestion (*Deepana*, *pachana*), as *stanya sodhana* (purifying breast milk), and for its galactogenic action⁽⁸⁾⁽⁹⁾.

This study focuses on the formulation and evaluation of an Ayurvedic galactogenic snack bar, “NutriGalacto”, developed as a value-added product incorporating selected galactogenic herbs to promote lactation in breastfeeding mothers. The research adopts a developmental research design, emphasizing product development and standardization. The evaluation process includes a comprehensive pharmaceutical assessment covering physicochemical parameters, sensory attributes, nutrient profile analysis, and microbial analysis for shelf-life estimation. Through this systematic approach, the study aims to establish *NutriGalacto* as a nutritious, palatable, and safe nutritional support that supports lactation and contributes to holistic maternal health in line with Ayurvedic principles.

METHODOLOGY

STUDY DESIGN

1. **Developmental research** - Value-added Product development
2. **Pharmaceutical Evaluation:** Physicochemical parameters, sensory evaluation, analysis of nutrient profile, and microbial analysis

STUDY SETTING

- Department of Dravyaguna Vijnanam, Vaidyaratnam Ayurveda College, Ollur, Thrissur, Kerala
- QC LAB, Vaidyaratnam Oushadashala, Thaikkattussery, Thrissur, Kerala
- CareKerala, Koratty, Kerala

STUDY MATERIALS

The raw drugs required for the study were procured from the local crude drug market in Thrissur, Kerala, following standard identification and authentication procedures. The crude drugs were authenticated at the Department of Dravyaguna, Vaidyaratnam Ayurveda College, Ollur, using standard

Ayurvedic pharmacognostic parameters. Voucher specimens of the crude drugs were deposited in the herbarium of the Department of Dravyaguna for future reference.

The quantity of individual ingredients was finalized based on their intended functional role in the formulation, reported galactogenic relevance in Ayurvedic literature, and preliminary trials for palatability and texture. Shashtika (*Oryza sativa* L.) and Ikshuvalika (*Hygrophila auriculata*) were incorporated as the primary components in higher proportions (500 g and 250 g, respectively). Equal quantities were avoided due to the unfavorable taste and coarse texture imparted by Ikshuvalika at higher levels. Shatavari (*Asparagus racemosus*) and Aswagandha (*Withania somnifera*) were included at moderate levels (100 g each) to provide supportive nutritive and functional effects. Methika (*Trigonella foenum-graecum* L.) and Shunti (*Zingiber officinale*) were added in smaller quantities (50 g each) primarily for formulation balance and acceptability. Jaggery (100 g) was used as a natural sweetening and binding agent, and ghee (100 ml) was included to improve palatability and provide dietary lipids in the formulation.

The formulation composition is given in Table 1.

DEVELOPMENT OF THE VALUE-ADDED FORMULATION

The crude drugs (1-5) were cleaned to remove physical impurities and examined for quality assurance. The *Sāṣṭika sāli* (grains of *Oryza sativa*) was thoroughly washed and subjected to a traditional soaking process (*nimmajana bhāvana*) by immersing it overnight in a decoction of *Kokilākṣa* (*Hygrophila auriculata*), prepared by boiling 250 g of the plant in 1000 mL of water and reducing it to one-fourth of its original volume. This processed "*Sastika sali*" was shade-dried and powdered. Ingredients 3-5 were dried and finely powdered. The 6th ingredient tubers of *Shatavari* (*Asparagus racemosus* Willd.), were cleaned and processed into a smooth paste. All the processed ingredients (1-6) were then incorporated into molten jaggery and stirred continuously over low heat along with clarified butter (*ghee*) until a thick consistency was achieved. The mixture was spread uniformly onto a greased tray, allowed to cool partially until it attained a firm, non-sticky

consistency, and then cut into uniform bar-shaped units each weighing approximately 12 g

PHARMACEUTICAL ANALYSIS

1. Nutrient Profile Analysis:

The nutritional evaluation of the formulation was performed to quantify its macronutrient profile (carbohydrates, protein, fat, and dietary fibre), selected micronutrients (calcium, iron, and folic acid), and additional nutritional parameters including sodium, cholesterol, and trans fat.

Table 2: Parameters in Nutrient Profile Analysis

Sl.NO	PARAMETERS	TEST METHOD
1	Carbohydrate	CKL/ANL/FP-025
2	Mono-unsaturated fat	CKL/ANL/GC-003
3	Total ash	IS:1155-1968
4	Dietary fibre	IS 11062-1984
5	Sodium	AOAC, 22nd Edition, 2023
6	Cholesterol	CKL/ANL/FP-032
7	Saturated fat	CKL/ANL/GC-003
8	Polyunsaturated fat	CKL/ANL/GC-003
9	Total fat	AOAC, 22nd Edition, 2023
10	Trans fat	CKL/ANL/GC-003
11	Moisture	FSSAI Lab Manual for fruits & vegetables 2016
12	Added sugar (as sucrose)	FSSAI Lab Manual for fruits & vegetables 2016
13	Energy value	CKL/ANL/FP-026
14	Total sugar	FSSAI Lab Manual for fruits & vegetables 2016
15	Calcium	AOAC, 22nd Edition, 2023
16	Iron	CKL/ANL/FP-019
17	Vitamin B9	CKL/ANL/HPLC-014
18	Protein	IS:7219-1973

Table 1: Composition of 1000 g of NutriGalacto

SL NO	DRUG	BOTANICAL NAME	FAMILY	QUANTITY	PART USED
1	Shashtika	<i>Oryza sativa</i>	Poaceae	500g	Seed
2	Ikshuvalika	<i>Hygrophila auriculata</i>	Acanthaceae	250g	Seed
3	Aswagandha	<i>Withania somnifera</i>	Solanaceae	100g	Root
4	Methika	<i>Trigonella foenum</i>	Fabaceae	50g	Seed
5	Shunti	<i>Zingiber officinale</i>	Zingiberaceae	50g	Rhizome
6	Satavari	<i>Asparagus racemosus</i>	Asparagaceae	100g	Root
7	Jaggery	<i>Saccharum officinarum</i>	Poaceae	100g	Stem
8	Ghee			100ml	

2. Microbial Evaluation:

Table 3: Microbial Evaluation

Sl.No	Parameters	Reference
	Microbiology analysis	Ayurvedic Pharmacopoeia of India (API)
1	Total aerobic plate count	API
2	Total fungal count	API
3	<i>Escherichia coli</i>	API
4	<i>Salmonella.sp.</i>	API
5	<i>Staphylococcus aureus</i>	API
6	<i>Pseudomonas.aeruginosa</i>	API

3. Sensory Evaluation: Sensory evaluation was conducted on the day of preparation of the test food using a panel of 20 healthy volunteers aged 18-24 years from Vaidyaratnam Ayurveda College, Ollur, Thrissur, Kerala. Participants were selected based on expressed willingness to participate and were screened for eligibility. Individuals with any acute or chronic illness, ongoing medication use, food allergies, dietary restrictions, or conditions known to impair taste perception (such as upper respiratory tract infection, oral lesions, or smoking habits) were excluded from the study.

A participant information sheet containing details of the study purpose, procedure, and expected participation was provided to all volunteers. Eligibility was confirmed through individual interviews, and written informed consent was obtained prior to participation. The study protocol was approved by the Institutional Ethics Committee (Ref:EC/51/15/06/2024).

Three independently prepared samples (corresponding to three batches) were evaluated. Each panelist was individually presented with a single coded test sample at a time on a white plate under normal room conditions with daylight illumination. Prior to evaluation, the panelists were instructed on the use of a 6-point hedonic scale ranging from 0 to 5 (0 - disliked extremely, 1 - disliked, 2 - neither liked nor disliked, 3 - liked moderately, 4 - liked very much, 5 - liked extremely). The sensory attributes assessed included taste, smell, appearance, texture, and overall acceptability. Panelists were asked to cleanse their palate with water between samples to minimize bias.

4. Physicochemical parameters: Physicochemical parameters, including pH(using digital pH meter), loss on drying (moisture content), total ash, and extractive values, were assessed as per standard procedure on the day of preparation, 7th day, and 15th day to evaluate the short-term stability of the formulation.

RESULTS

RESULTS OF NUTRIENT PROFILE ANALYSIS

The results of Proximate analysis is given in Table 4. Nutritional estimation shows that 100 grams of Nutrigalacto contains 78.4g Carbohydrates, 0.90g Mono unsaturated fat, 1.34% total ash, 18.23g dietary fibre, 75.34mg sodium, 0.72g saturated fat, 1.07g Poly unsaturated fat, 2.69% total fat, 9.69g moisture,20.24g added sugar, 369.33 Kcal energy, 27.99g total sugar, 18.93mg calcium, 12.99mg Iron, 6.91mg Vitamin B9 and 7.88g of Protein.

Table 4. Results of Nutrient profile analysis

Sl.NO	PARAMETERS	UNIT	RESULT	DETECTION LIMIT	TEST METHOD
1	Carbohydrate	g/ 100g	78.4	-	CKL/ANL/FP-025
2	Mono unsaturated fat	g/ 100g	0.90	0.05	CKL/ANL/GC-003
3	Total ash	%/mass	1.34	-	IS:1155-1968
4	Dietary fibre	g/ 100g	18.23	0.2	IS 11062-1984
5	Sodium	mg/100g	75.34	-	AOAC, 22nd Edition, 2023
6	Cholesterol	mg/100g	Not detected	1.0	CKL/ANL/FP-032
7	Saturated fat	g/ 100g	0.72	0.05	CKL/ANL/GC-003
8	Polyunsaturated fat	g/ 100g	1.07	0.05	CKL/ANL/GC-003
9	Total fat	%/mass	2.69	-	AOAC, 22nd Edition, 2023
10	Trans fat	g/ 100g	Not detected	0.05	CKL/ANL/GC-003
11	Moisture	g/ 100g	9.69	-	FSSAI Lab Manual for fruits & vegetables 2016
12	Added sugar (as sucrose)	g/ 100g	20.24	-	FSSAI Lab Manual for fruits & vegetables 2016
13	Energy value	Kcal/100g	369.33	-	CKL/ANL/FP-026
14	Total sugar	g/ 100g	27.99	-	FSSAI Lab Manual for fruits & vegetables 2016
15	Calcium	mg/100g	18.93	-	AOAC, 22nd Edition, 2023
16	Iron	mg/ 100g	12.99	-	CKL/ANL/FP-019
17	Vitamin B9	mg/ 100g	6.91	-	CKL/ANL/HPLC-014
18	Protein	g/ 100g	7.88	0.1	IS:7219-1973

Table 5: Results of microbial analysis

Sl.No	Parameters	Unit	Limit	Result on DAY 1	Result on DAY 7	Result on DAY 15	Reference
Microbiology analysis							API
1	Total aerobic plate count	cfu/g	NMT 1×10^5	200	200	220	API
2	Total fungal count	cfu/g	NMT 1×10^3	Nil	Nil	Nil	API
3	<i>Escherichia coli</i>	-	Absent	Absent	Absent	Present	API
4	<i>Salmonella spp.</i>	-	Absent	Absent	Absent	Absent	API
5	<i>Staphylococcus aureus</i>	-	Absent	Absent	Absent	Absent	API
6	<i>Pseudomonas aeruginosa</i>	-	Absent	Absent	Absent	Absent	API

3. RESULTS OF SENSORY EVALUATION

Most of the participants rated it in the higher region of the scale, indicating that they liked the taste. The panelist's impartial response was indicated by the rating of "average" for smell. The appearance was rated as average, indicating that the product was visually acceptable without being particularly distinctive or unattractive. Texture received a high rating, indicating a pleasing consistency and mouthfeel. The test food was generally well-received, as evidenced by the high level of acceptance.

Table 6: Results of Sensory evaluation

Parameter	Results
Taste	4.2 ± 0.6 Well appreciated
Smell	2.8 ± 0.7 Average
Appearance	2.9 ± 0.5 Average
Texture	3.7 ± 0.6 Good
Overall acceptability	3.9 ± 0.5 Good

The mean deviation 5.51 ± 0.06 , which indicates the sample is slightly acidic. The low standard deviation of 0.06 shows the consistency among different samples. 9.74% loss on drying indicates the uniformity in a moderate level of moisture, which is within the acceptable limits, and low standard deviation shows the low moisture content among different samples. A low value of total ash 0.75 ± 0.01 indicates the presence of a minimal amount of inorganic materials, indicating its purity. Acid-insoluble ash is zero, indicating the absence of sand, soil, etc. Water-soluble ash value of 0.69 is within the normal range and shows the presence of water-soluble minerals. High percentage of water-soluble extract 61.02 indicates the presence of phytochemicals like carbohydrates, tannins, glycosides and flavonoids. 24.37 % of alcohol soluble extract reflects that phytochemicals like resins, alkaloids, and fatty acids may be present. Minimum standard deviation in all these values indicates consistency in sample compositions and ensures reproducibility.

4. RESULTS OF PHYSICOCHEMICAL ANALYSIS

Table 7: Results of Physicochemical analysis

	Sample date:03/03/2025	Sample date:11/03/25	Sample date 18/03/25	Mean +/- standard deviation
pH (10% aqueous solution)	5.56	5.44	5.54	5.51 ± 0.06
Loss on drying at 105 °C (% w/w)	9.8	9.68	9.74	9.74 ± 0.06
Total ash	0.76	0.74	0.75	0.75 ± 0.01
Acid-insoluble ash	0	0	0	0 ± 0
Water-soluble ash	0.7	0.69	0.68	0.69 ± 0.01
Water-soluble extractives	61.28	60.93	60.86	61.02 ± 0.23
Alcohol soluble extractive	24.53	24.31	24.26	24.37 ± 0.14

DISCUSSION

Sasthika (*Oryza sativa* L.), known as "Njavara" in Kerala, is considered a health food, particularly during the postnatal period and as a weaning food¹⁰. Research indicates that the starch hydrolysis rate in 'Njavara' rice is the highest (67.3%) among various rice varieties. It also shows the lowest kinetic constant (k), suggesting it has inherent resistance to enzymatic breakdown¹⁰. 'Njavara' is easily digestible, making it suitable as a galactagogue, and as food for infants and the elderly.

Ikshuvalika, scientifically identified as *Hygrophila auriculata* (K. Schum.) Heine (synonyms: *Asteracantha longifolia* Nees and *Hygrophila schulli* (Ham.) M.R. & S.M. Almeida) belongs to the family Acanthaceae. In Ayurvedic texts, it is regarded as one of the top remedies for Vatarakta, possessing *Sitha veryam* (cooling) and *Madhura vipaka* (sweet post-digestive) properties. Also known as *Iskuvalika* and *Ikshugandha*, *Kokilaksha* is included in the *stanyajanana mahakasaya* by Acharya Charaka. The seeds of *Kokilaksha* are bitter and have a mucilaginous nature, causing them to swell in water. They are recognized for their aphrodisiac properties and are used in treating male infertility¹¹. An ethanolic extract from the aerial parts of *H. spinosa* has been shown to significantly improve hemoglobin, hematocrit, RBC, and total WBC counts in rats compared to control groups. This highlights the extract's haematinic properties in experimental models of anemia¹². *Kokilaksha* offers several health benefits due to its water-soluble compounds, which include flavonoids, terpenoids, alkaloids, steroids, and tannins, all of which have potent free radical-scavenging effects^[13].

The pharmacological actions of "*Methika*" (fenugreek, *Trigonella foenum-graecum* Linn.), such as its galactagogue, anti-inflammatory, and antioxidant properties, can be attributed to the diverse phytochemicals it contains, including steroids, alkaloids, saponins, polyphenols, flavonoids, lipids, carbohydrates, amino acids, and hydrocarbons¹⁴. This combination of phytochemicals makes fenugreek an excellent supplement during the postnatal period.

Asparagus racemosus Willd. has been widely recognized as a galactagogue in Ayurvedic literature, with its effects confirmed through animal studies¹⁵. A randomized double-blind clinical trial involving 60 lactating mothers investigated its galactagogue effect by measuring changes in prolactin hormone levels. The study showed that oral administration of the research drug led to a more than threefold increase in prolactin levels compared to the control group. Secondary parameters, such as maternal and baby weight, and subjective measures of maternal satisfaction and baby well-being, supported the primary findings, all of which were statistically significant ($p < 0.05$)¹⁴.

A crucial finding of this study is the combination of natural ingredients that provide both nutritional and therapeutic benefits. The presence of *Shashtika* (*Oryza sativa*), a variety of rice recognized for its excellent digestibility and nutritional content, contributes to the snack bar's energy-dense nature. *Ikshuvalika* (*Hygrophila auriculata*), traditionally used in Ayurveda to support kidney function and overall vitality, also plays a role in improving milk secretion. *Satavari* (*Asparagus racemosus*) is widely acknowledged as a galactagogue, with studies indicating its ability to enhance prolactin levels, a hormone essential for lactation. *Aswagandha* (*Withania somnifera*) is included for its adaptogenic properties, helping mothers manage stress and fatigue, common concerns during postpartum recovery. *Methika* (*Trigonella foenum-graecum* L.) or fenugreek, a well-known lactation enhancer, further supports the formulation's primary objective. *Adrakam* (*Zingiber officinale*), or ginger, aids digestion and provides anti-inflammatory benefits, ensuring overall maternal health support.

The research also focused on nutrient profile analysis, pharmaceutical profile evaluation, microbial analysis and sensory evaluation. The nutrient profile analysis revealed that the snack bar contains high amounts of protein, folic acid, iron, and calcium, all of which are essential for lactating mothers. The physicochemical analysis demonstrated batch-to-batch consistency with minimal variation in pH, loss on drying, ash values, and extractive values, indicating uniform composition and process reliability. These parameters, along with the absence of acid-insoluble ash and acceptable moisture content, substantiate the physicochemical quality and reproducibility of the formulation. Microbial load analysis confirmed the safety of the initial batch, indicating the product remained uncontaminated for the first seven days. However, microbial presence was detected by the 15th day. As no intermediate evaluations were performed, the precise time of microbial onset could not be established; hence, the shelf life is conservatively fixed at 7 days.

Sensory evaluation conducted with 20 participants highlighted the product's acceptability. The majority of participants rated the snack bar positively in terms of taste, texture, and overall appeal, confirming its palatability and consumer-friendliness. The fusion of Ayurvedic principles with contemporary food technology in this product's development illustrates the potential for traditional medicine to be transformed into convenient and acceptable options for current consumer preferences.

The nutrient profile analysis further validated that the snack bar is a suitable nutritional support for lactating mothers. The presence of high protein content is particularly

advantageous, as protein is crucial for postnatal recovery and milk production. Moreover, folic acid, an essential nutrient for both mother and infant, contributes to the infant's neurological development. The iron content helps prevent postpartum anemia, a common condition among new mothers, while calcium is necessary for maintaining bone health and preventing deficiencies that may arise due to the increased calcium demands during breastfeeding.

The pharmaceutical profile evaluation, which analyzed the consistency, texture, and stability of the snack bar, demonstrated that it achieved uniformity across different batches. This is a significant finding, as it ensures the snack bar's production can be scaled up while maintaining quality standards. Furthermore, the microbial analysis revealed that while the product was safe for the first seven days, microbial presence increased by the 15th day, suggesting a limited shelf life. This limitation highlights the need for further research into natural or mild preservative methods to extend the product's usability without compromising its nutritional value.

These findings position *NutriGalacto* as a promising nutritional support for the postnatal period, offering both nutritive and therapeutic benefits. The integration of traditionally recognized *stanya-janana* (lactogenic) ingredients with modern food formulation practices underscores the product's dual role as a nutritional supplement aid. Its palatability and ease of use address practical barriers often encountered with traditional postnatal formulations, which may be unappealing in taste or cumbersome in preparation. By providing a convenient, ready-to-consume form, *NutriGalacto* aligns well with the modern lifestyle, especially in urban settings where traditional postpartum care practices may not be easily followed.

Moreover, the favorable sensory feedback suggests high consumer acceptability, which is crucial for compliance and sustained usage. The short shelf life, although a limitation, aligns with the Ayurvedic emphasis on *swasthavritta* (healthy regimen) and consumption of fresh, minimally processed foods. However, future work could explore the incorporation of naturally derived preservatives or modified packaging techniques to extend shelf life without compromising the product's integrity.

Further clinical evaluation may be warranted to validate the *galactagogue* effect of the formulation in a larger postpartum population, ideally through randomized controlled trials assessing outcomes such as breast milk volume, maternal hemoglobin levels, and infant growth parameters. Additionally, expansion into other formats-such as granules, instant mixes, or fortified porridges-could enhance accessibility and customization according to individual dietary preferences and regional palates.

Overall, *Nutrigalacto* offers a novel example of how time-tested Ayurvedic principles can be translated into scientifically supported, consumer-friendly interventions for maternal health.

Conclusion

The Ayurvedic galactogenic snack bar may offer a convenient, nutritious, and palatable option for breastfeeding mothers seeking natural methods to enhance lactation. By integrating traditional Ayurvedic knowledge with modern food science, this study presents a promising nutritional supplement to support maternal health. Future studies may focus on enhancing the shelf life of the product through improved preservation techniques or packaging methods. Additionally, clinical trials could be conducted to assess the direct impact of the snack bar on lactation and maternal well-being, being a boon for mother and infant.

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References

1. Meek JY, Noble L; Section on Breastfeeding. Policy statement: Breastfeeding and the use of human milk. *Pediatrics*. 2022;150(1):e2022057988. doi:10.1542/peds.2022-057988.
2. Lessen R, Krebs N. Position of the Academy of Nutrition and Dietetics: Promoting and supporting breastfeeding. *J Acad Nutr Diet*. 2015;115(3):444–449.
3. Brodribb W; Academy of Breastfeeding Medicine Protocol Committee. ABM clinical protocol #9: Use of galactagogues in initiating or augmenting maternal milk production. *Breastfeed Med*. 2018;13(5):307–314. doi:10.1089/bfm.2018.29092.wjb.
4. Shastri KD, editor. *Agnivesha; Charaka Samhita*, Part I. Varanasi (India): Chaukhambha Bharati Academy; 2005. p. 551.
5. Jingar SC, Patel RS, Laka HLBSMM. Effect of Shatavari (*Asparagus racemosus*) on milk production in lactating buffaloes. *Int J Curr Microbiol App Sci*. 2018;7(9):- . ISSN: 2319-7706.

6. Beegam AR, Nayar TS. Plants used for natal healthcare in folk medicine of Kerala, India. *Indian J Tradit Knowl*. 2011;10(3):523–527.
7. Turkyilmaz C. The use of fenugreek for breastfeeding women. *Complement Ther Nurs Midwifery*. 2003;9(2):98–101.
8. Sourbini, Kadibagil VR. Ardraka & Shunti - Mahoushadhis of Ayurveda. *Int J Ayu Pharm Chem*. 2016;5(2):249–259.
9. Chithra S, Saji DP, Raj PP. Pharmacognosy and phytochemical analysis of *Asparagus racemosus*. *J Pharmacogn Phytochem*. 2019;8(3):2479–2482.
10. Deepa G, Singh V, Naidu KA. A comparative study on starch digestibility, glycemic index and resistant starch of pigmented ('Njavara' and 'Jyothi') and a non-pigmented ('IR 64') rice varieties. *J Food Sci Technol*. 2010;47(6):644–649. doi:10.1007/s13197-010-0106-1.
11. Sethiya NK, Ahmed NM, Shekh RM, Kumar V, Singh PK, Kumar V. Ethnomedicinal, phytochemical and pharmacological updates on *Hygrophila auriculata* (Schum.) Heine: An overview. *J Integr Med*. 2018;16(5):299–311. doi:10.1016/j.joim.2018.07.002.
12. Gomes A, Das M, Dasgupta SC. Haematinic effect of *Hygrophila spinosa* T. Anderson on experimental rodents. *Indian J Exp Biol*. 2001;39(4):381–382.
13. Kshirsagar AD, Ingale KG, Vyawahare NS, Thorve VS. *Hygrophila spinosa*: A comprehensive review. *Pharmacogn Rev*. 2010;4(8):167–171. doi:10.4103/0973-7847.70912.
14. Nagulapalli Venkata KC, Swaroop A, Bagchi D, Bishayee A. A small plant with big benefits: Fenugreek (*Trigonella foenum-graecum* Linn.) for disease prevention and health promotion. *Mol Nutr Food Res*. 2017;61(6):1600950. doi:10.1002/mnfr.201600950.
15. Gupta M, Shaw B. A double-blind randomized clinical trial for evaluation of galactagogue activity of *Asparagus racemosus* Willd. *Iran J Pharm Res*. 2011;10(1):167–172.

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