

# Development and Nutritional Evaluation of Nutrified Jeera Paratha: A Traditional Food Product Development Study

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## Abstract

Traditional galactagogue foods are widely consumed by lactating women in India. Jeera Paratha was identified as the most frequently reported galactagogue food in a cross-sectional investigation of lactating women in Maharashtra. The present study developed a nutrified version of this traditional preparation and evaluated its estimated nutritional composition, sensory characteristics, and qualitative phytochemical profile. The product-development study was derived from a broader investigation involving 60 lactating women aged >19 years during the first 0–6 months of lactation in Maharashtra. Jeera Paratha was selected because it was reportedly consumed by 57 of the 60 participants. The standard formulation comprised wheat flour, jeera, and ghee. The nutrified formulation incorporated ajwain, coriander leaves, and processed cheese. Sensory evaluation was conducted by 15 semi-trained panellists selected through a triangle test, using a 9-point hedonic scale and a 5-point composite rating scale. Qualitative phytochemical screening assessed tannins, steroids, saponins, and glycosides. The nutrified formulation had higher reconstructed ingredient-based estimates of energy (544.77 vs. 295.31 kcal), protein (26.07 vs. 7.63 g), fat (29.90 vs. 11.44 g), fibre (2.00 vs. 1.38 g), vitamin A (677.02 vs. 44.40 µg), iron (4.08 vs. 3.17 mg), and calcium (479.59 vs. 30.96 mg) than the standard formulation per standardized recipe preparation. The mean overall hedonic score was higher for the nutrified product ( $8.9 \pm 0.25$ ) than for the standard product ( $8.0 \pm 0.37$ ). The nutrified formulation received higher mean scores for colour, taste, and aftertaste. Both formulations tested positive for saponins and glycosides and negative for tannins and steroids. Nutrification of traditional Jeera Paratha through the incorporation of ajwain, coriander leaves, and processed cheese improved its estimated nutrient contribution while maintaining favourable sensory acceptability.

**Keywords:** Traditional foods; Jeera Paratha; nutrification; galactagogues; sensory evaluation; nutritional composition; lactation

## 1. Introduction

Breastfeeding is an important component of infant nutrition and development. Lactation is regulated by complex physiological mechanisms involving hormonal regulation and effective milk removal. Prolactin has an important role in milk synthesis, while oxytocin facilitates milk ejection (Kent, 2007; Neville, 2001). Maternal and infant illness, mother–infant separation, ineffective milk removal, anxiety, fatigue, and emotional stress may adversely affect breastfeeding and milk production (Amir, 2006; Zuppa et al., 2010).

Concerns regarding insufficient milk supply have contributed to the widespread use of substances traditionally believed to initiate, maintain, or augment lactation. These substances are commonly referred to as galactogogues or lactagogues and may include pharmaceutical agents, herbs, and foods (Academy of Breastfeeding Medicine Protocol Committee, 2011; Forinash et al., 2012).

Traditional foods and herbs have been used for this purpose across diverse cultural settings. Commonly reported food- and plant-based galactogogues include fenugreek, fennel, garlic, coriander, cumin, and other herbs and foods (Nice, 2011). However, traditional use should not be equated with scientifically established clinical efficacy. Systematic reviews have identified important limitations in the evidence supporting many herbal galactogogues (Mortel & Mehta, 2013), while concerns regarding the efficacy and safety of both herbal and pharmaceutical galactogogues have also been reported (Zuppa et al., 2010). Nevertheless, traditional foods may provide nutritional benefits independent of any claimed lactogenic activity. Their cultural familiarity and regular incorporation into maternal diets make them potential vehicles for food-based nutritional interventions. Nutritional modification of traditional foods, sometimes conceptualized as nutrification, can improve the nutrient contribution of familiar preparations through the incorporation of selected ingredients (Lachance, 1972).

The present study was derived from a broader investigation entitled *Traditional Galactogogue Foods Used by Lactating Women in Maharashtra and Nutrification of a Popular Recipe—Jeera Paratha*. The broader investigation included 60 lactating women residing in Maharashtra and examined the use, preparation, and consumption of traditional galactogogue foods. Jeera Paratha was reported as the most frequently consumed preparation, with 57 of the 60 participants reporting its use.

The standard Jeera Paratha was subsequently modified by incorporating ajwain (*Trachyspermum ammi*), coriander leaves (*Coriandrum sativum*), and processed cheese. These ingredients were selected as part of the original nutrification strategy to enhance the nutritional characteristics of the traditional product. The study documented the standardized formulation and its subsequent sensory, nutritional, and phytochemical evaluation.

Accordingly, the present study aimed to:

1. Develop a nutrified formulation of traditional Jeera Paratha.
2. Reconstruct and compare the ingredient-based nutritional composition of the standard and nutrified formulations.
3. Evaluate the sensory acceptability of the developed formulations.
4. Qualitatively assess selected phytochemical constituents.

## 2. Materials and Methods

### 2.1 Study design and origin of product selection

The present product-development study was derived from a broader cross-sectional investigation of traditional galactogogue foods used by lactating women in Maharashtra. The original study included 60 consenting lactating women during the first 0–6 months of lactation who were older than 19 years and resided in Maharashtra.

Information concerning traditional galactogogue foods—including their type, frequency of consumption, ingredients, methods of preparation, perceived effects, and precautions—was collected using self-designed, pre-tested questionnaires. Dietary patterns were assessed using a 24-hour dietary recall method. Jeera Paratha was selected for product development because it was the most frequently reported galactogogue food among the study participants.

## **2.2 Product development and standardization**

### **2.2.1 Standard formulation**

The standard Jeera Paratha formulation consisted of:

- Wheat flour: 60 g
- Jeera: 0.5 g
- Ghee: 10 g

### **2.2.2 Nutrified formulation**

The nutrified Jeera Paratha formulation incorporated:

- Wheat flour: 60 g
- Jeera: 0.5 g
- Ajwain: 0.5 g
- Coriander leaves: 5 g
- Processed cheese: 60 g
- Ghee: 10 g

The nutrification strategy involved the incorporation of ajwain, coriander leaves, and processed cheese into the traditional preparation.

## **2.3 Reconstruction of nutritional composition**

The study calculated the nutritive value of the standardized recipes using ingredient-level nutrient contributions using the following equation:

Total nutrient content =  $\sum_{i=1}^n$  Nutrient contribution of ingredient  $i$

The reconstructed calculations included:

- Energy
- Protein
- Fat
- Fibre
- Vitamin A
- Iron
- Calcium

## **2.4 Selection of sensory panellists**

Fifteen postgraduate students were selected as semi-trained sensory panellists through a triangle difference test designed to assess tasting and discrimination ability. The procedure involved three coded samples, two identical and one different.

## **2.5 Sensory evaluation**

### **2.5.1 Nine-point hedonic scale**

Overall product acceptability was evaluated using a 9-point hedonic scale, where 1 represented “dislike extremely” and 9 represented “like extremely.” The scale was used to determine the overall liking of the standard and nutrified formulations (Wichchukit & O'Mahony, 2015).

### **2.5.2 Five-point composite rating scale**

Specific sensory characteristics were evaluated using a five-point composite rating scale. The attributes assessed were:

- Appearance
- Colour

- Taste
- Texture
- Aftertaste

A score of 5 represented “excellent,” whereas a score of 1 represented “poor.”

## 2.6 Qualitative phytochemical analysis

The study qualitatively assessed the presence or absence of selected phytochemicals in the standard and nutrified formulations. The evaluated constituents were:

- Tannins
- Steroids
- Saponins
- Glycosides

Saponins were assessed using the foam test, and glycosides were assessed using Legal's test. Results were recorded qualitatively as positive or negative.

## 2.7 Statistical analysis

The study reported the use of descriptive statistics, including means and standard deviations, for sensory data and also reported Student's *t*-tests.

## 3. Results

### 3.1 Selection of Jeera Paratha for product development

Among the traditional galactagogue foods documented in the broader survey, Jeera Paratha was reported by 57 of the 60 participating lactating women, making it the most frequently reported preparation in the study population. Other foods included ajwain-jeera paratha, ajwain water, moong dal halwa, and methi laddoo.

Jeera Paratha was therefore selected as the traditional food for nutritional modification.

### 3.2 Standardized product formulations

**Table 1 Ingredient composition of standard and nutrified Jeera Paratha**

| Ingredient       | Standard formulation (g) | Nutrified formulation (g) |
|------------------|--------------------------|---------------------------|
| Wheat flour      | 60.0                     | 60.0                      |
| Jeera            | 0.5                      | 0.5                       |
| Ajwain           | —                        | 0.5                       |
| Coriander leaves | —                        | 5.0                       |
| Processed cheese | —                        | 60.0                      |
| Ghee             | 10.0                     | 10.0                      |

### 3.3 Reconstructed nutritional composition

**Table 2 Reconstructed ingredient-based nutritional composition per standardized recipe preparation**

| Nutrient      | Standard Jeera Paratha | Nutrified Jeera Paratha |
|---------------|------------------------|-------------------------|
| Energy (kcal) | 295.31                 | 544.77                  |
| Protein (g)   | 7.63                   | 26.07                   |
| Fat (g)       | 11.44                  | 29.90                   |
| Fibre (g)     | 1.38                   | 2.00                    |

|                |       |        |
|----------------|-------|--------|
| Vitamin A (µg) | 44.40 | 677.02 |
| Iron (mg)      | 3.17  | 4.08   |
| Calcium (mg)   | 30.96 | 479.59 |

The nutrified formulation had higher estimated values for all nutrients included in the reconstructed comparison.

### 3.4 Relative nutritional differences

**Table 3 Relative increase in reconstructed nutrient contribution of the nutrified formulation**

| Nutrient  | Increase (%) |
|-----------|--------------|
| Energy    | 84.5         |
| Protein   | 241.7        |
| Fat       | 161.4        |
| Fibre     | 44.9         |
| Vitamin A | 1,424.8      |
| Iron      | 28.7         |
| Calcium   | 1,449.1      |

The greatest relative increases were observed for calcium and vitamin A, followed by protein. The substantial differences primarily reflected the incorporation of processed cheese and coriander leaves, in addition to the other modifications introduced during nutrification.

### 3.5 Overall sensory acceptability

**Table 4 Overall sensory acceptability of standard and nutrified Jeera Paratha**

| Formulation             | Mean ± SD  |
|-------------------------|------------|
| Standard Jeera Paratha  | 8.0 ± 0.37 |
| Nutrified Jeera Paratha | 8.9 ± 0.25 |

The nutrified formulation received a higher mean overall hedonic score than the standard formulation. The original study similarly reported that the nutrified product had greater overall acceptability among the 15 sensory panellists.

### 3.6 Composite sensory evaluation

**Table 5 Sensory characteristics of standard and nutrified Jeera Paratha**

| Sensory attribute | Standard, Mean ± SD | Nutrified, Mean ± SD |
|-------------------|---------------------|----------------------|
| Appearance        | 4.5 ± 0.74          | 4.2 ± 0.79           |
| Colour            | 4.6 ± 0.63          | 4.8 ± 0.35           |
| Taste             | 4.2 ± 0.56          | 5.0 ± 0.00           |
| Texture           | 4.8 ± 0.35          | 4.3 ± 0.81           |
| Aftertaste        | 4.8 ± 0.41          | 4.9 ± 0.25           |

The nutrified formulation received higher mean scores for colour, taste, and aftertaste. The standard formulation received higher scores for appearance and texture. The highest score for the nutrified product was observed for taste.

### 3.7 Qualitative phytochemical profile

**Table 6 Qualitative phytochemical profile of standard and nutrified Jeera Paratha**

| Phytochemical | Standard formulation | Nutrified formulation |
|---------------|----------------------|-----------------------|
| Steroids      | Negative             | Negative              |
| Tannins       | Negative             | Negative              |

|            |          |          |
|------------|----------|----------|
| Saponins   | Positive | Positive |
| Glycosides | Positive | Positive |

Both formulations showed positive qualitative reactions for saponins and glycosides, whereas tannins and steroids were not detected under the test conditions used in the original investigation.

#### 4. Discussion

The present study demonstrates the feasibility of modifying a culturally familiar traditional food to improve its estimated nutritional contribution while maintaining favourable sensory acceptability.

##### 4.1 Traditional relevance of Jeera Paratha

Jeera Paratha was selected from a broader investigation of traditional galactagogue foods consumed by lactating women in Maharashtra. Its reported use by 57 of the 60 participants demonstrated its cultural relevance within the study population.

Traditional dietary practices are important considerations in food-based nutrition interventions because familiar foods may be more readily incorporated into existing dietary patterns. The present approach therefore focused on modifying, rather than replacing, a traditionally consumed preparation.

However, its traditional classification as a galactagogue should not be interpreted as evidence that the food increases breast-milk production. Although foods and herbs have historically been used to support lactation, the evidence for many herbal galactagogues remains limited and heterogeneous (Mortel & Mehta, 2013; Zuppa et al., 2010). The present study did not measure breast-milk volume, prolactin concentrations, infant growth, or other physiological outcomes associated with lactation.

##### 4.2 Nutritional implications of the nutrified formulation

The reconstructed nutritional calculations showed that the nutrified formulation provided higher estimated energy, protein, fat, fibre, vitamin A, iron, and calcium than the standard formulation.

The estimated protein content increased from 7.63 g to 26.07 g per standardized recipe preparation. The calculated calcium content increased from 30.96 mg to 479.59 mg. These increases were primarily associated with the incorporation of processed cheese, while coriander leaves and the other added ingredients contributed to the overall nutritional profile.

The principle underlying this approach is consistent with nutrification, in which food products are modified to improve their nutritional quality through deliberate ingredient selection (Lachance, 1972).

##### 4.3 Sensory acceptability

The sensory results indicated that nutrification did not adversely affect overall product acceptance. On the contrary, the nutrified Jeera Paratha received a higher mean hedonic score than the standard formulation. The nutrified product also received higher scores for colour, taste, and aftertaste. Its mean taste score of 5.0 represented the highest possible rating on the composite scale employed.

The standard formulation received relatively higher scores for appearance and texture. These differences may reflect changes in physical structure associated with the incorporation of processed cheese and fresh coriander leaves. However, the higher overall hedonic score of the nutrified formulation suggests that such changes did not reduce general product acceptability.

Sensory assessment is an essential component of food product development because nutritional improvement alone does not ensure practical acceptance. The present findings indicate that the selected modifications produced a nutritionally enhanced recipe that remained highly acceptable to the semi-trained sensory panel.

#### 4.4 Phytochemical findings

Both formulations demonstrated positive qualitative reactions for saponins and glycosides.

The nutrified formulation contained ingredients traditionally associated with diverse phytochemical constituents. The original study specifically incorporated ajwain, jeera, and coriander, which are widely used as culinary spices and herbs.

#### 5. Conclusion

A nutrified version of traditional Jeera Paratha was successfully developed through the incorporation of ajwain, coriander leaves, and processed cheese.

The reconstructed recipe-based nutritional analysis demonstrated higher estimated energy, protein, fat, fibre, vitamin A, iron, and calcium in the nutrified formulation compared with the standard formulation. The nutrified product also demonstrated favourable sensory acceptability, receiving a higher mean overall hedonic score than the standard product.

The findings indicate that traditional and culturally familiar foods may provide useful platforms for nutritional improvement through targeted recipe modification.

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