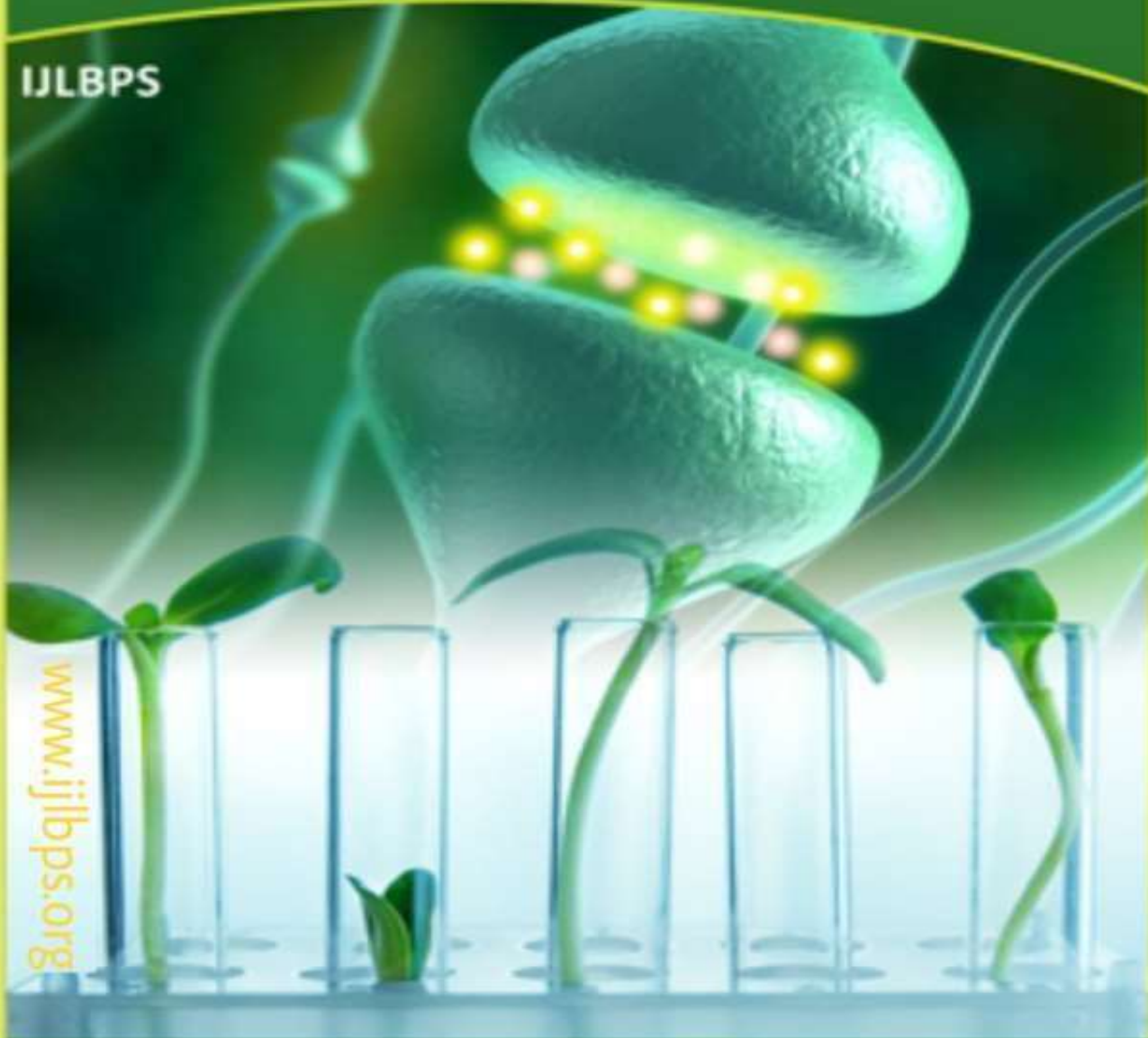




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## DEVELOPMENT AND CHARACTERIZATION OF WHOLE MILK AND COCONUT MILK PANEER INCORPORATED WITH SPINACH LEAF

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### ABSTRACT

The paneer is the most dairy product and made of milk products and dairy products. It is used in various types of products like frying, curries and different types. It is developed the quality in its is the main ingredient is spinach and coconut milk to enhance the taste of the product, texture and flavor and aroma and its is spongy and softy in texture. And spinach is rich in more iron, potassium, vitamins and minerals. Paneer (pronounced [pə'ni:r/), also known as panir (pronounced [pani r), is a fresh acid-set cheese common in the cuisine of the Indian subcontinent made from full-fat buffalo milk or cow milk. It is a soft cheese that is not aged and does not melt that is created by adding an acidic fruit or vegetable, like lemon juice, to milk to curdle it. One type of soft cheese from South Asia is called paneer, which is made by coagulating milk with heat and acid. It is widely consumed in South Asia and is used to make a variety of snacks and gourmet preparations. It is a great source of fat, vitamins, minerals, and high-quality animal protein.

**Key words:** coconut milk, spinach, vitamins, minerals, flavor, texture.

### INTRODUCTION

An Indian origin is improbable because it was prohibited in ancient Indo-Aryan society to acidulate milk; sour milk cheese is not mentioned in the many allusions to milk, butter, ghee, and dahi (yogurt) found in Krishna stories Walker, Harlan, ed. (2000).. One type of cheese is "perhaps referred to" in Rigveda 6.48.18, according to Arthur Berriedale Keit<sup>^</sup> Keith, Arthur Berriedale (1995).. On the other hand, the Rigveda, according to Otto Schrader (1890), only refers to "a skin of sour milk, not cheese in the proper sense<sup>^</sup> Schrader, Otto (1890). Vedic literature makes reference to a substance that, although lacking conclusive proof, several authors—K. T. Achaya, Om Prakash, and Sanjeev Kapoor—interpret as a potential form of paneer. Kapoor, Sanjeev (2010).

Paneer is a rich source of animal protein available at a comparatively lower cost and forms an important source of animal protein for vegetarians. Over and above its high protein content and digestibility, the biological value of protein in paneer is in the range of 80 to 86 (Shrivastava and Goyal 2007). In addition, paneer is a valuable source of fat, vitamins and

minerals like calcium and phosphorus.

The fabrication of paneer has been predominantly restricted to the informal dairy industry which utilizes conventional, ineffective techniques of production. Work for the advancement of the conventional techniques of paneer manufacture was carried out. The production of paneer is now spreading throughout the world. The ability of paneer to be deep fried is one feature that has led to its wider acceptance and a favourite for making snacks, *pakor*s or fried paneer chunks (Aneja 2007).

A variety of tender cheese from Southern Asia known as paneer is created by curdling milk with acid and heat to preserve the fat, casein, and lactose: It is an essential traditional curdled dairy item that provides customers with excellent nourishment, variety, security, distinctive tastes, consistencies, flexibility, and profitability. It is not a cheese that is aromatic, fresh, firm, or non-coagulated. With a production of 132.4 million metric tonnes of milk (2012–2013), India has emerged as the largest milk producer in the world. On average, 7% of the milk generated is converted to Paneer. It is crucial to generate fresh categories and versions of Paneer since the demand from diverse health-conscious customers is perpetually growing. Since it has a short expiry date, refrigeration is necessary to preserve. The clotting process involves the formation of a substantial structural protein clumping.

Aneja et al., (2002) gives an in-depth look at the technology used in the manufacturing of different dairy products in India. The literature review concentrates on the conventional approaches and contemporary strategies employed for the creation of Indian dairy items, such as paneer, clarified butter, curd, and . The customary techniques of paneer manufacturing, which include coagulating milk with citric acid or vinegar, and emphasizes the primary stages and factors implicated in the procedure. The analysis also includes the technological progress and alterations made in the manufacturing of paneer, like the employment of starter cultures, curd, and other enhancers to enhance the excellence and longevity of the product.

Lu et al.,(2019) explores the use of maize kernels and starch as stabilizers for coconut milk emulsions. The study reveals that the addition of maize kernels and starch significantly improves the stability of coconut milk emulsions, preventing phase separation and maintaining a stable emulsion structure. The authors also observe that the presence of maize kernels and starch has a significant impact on the rheological properties of the emulsions, affecting their viscosity, elasticity, and flow behavior.. The findings of this study have implications for the development of new and innovative food products that prioritize natural and healthy ingredients.

It has a reasonably long shelf life under refrigeration. A marble white hue, a sweet, somewhat acidic taste, a nutty scent, a sponge-like consistency, and a tightly woven, velvety texture are characteristics of high-quality paneer. "Item derived from cow or buffalo milk or a mix of both, through coagulation with sour milk, lactic acid, or citric acid" is what is meant to be understood by the PFA (2010). It must keep its moisture content at a maximum of 70% and, when dry, its lipid content cannot drop below 50%. You can also use solids to

make paneer. For paneer, the Bureau of Indian Standards (BIS) established a maximum moisture content of 60% and a minimum fat content of 50% in dry substance. Paneer is used in many different ways, including as a foundation for a range of gourmet dishes.

**HEALTH BENEFITS:** The paneer provides good texture and flavor of product. It enhances the taste of product.

- ✓ Reduces the risk of cancer.
- ✓ Building bones and teeth.
- ✓ Rich in vitamins & minerals.
- ✓ Regulates blood pressure .
- ✓ Weight loss, heart health .
- ✓ Antioxidants.

**MATERIALS AND METHODS:**

The palak leaf (spinach) is taken for the preparation of juice as much as we need. The developed whole milk and coconut milk paneer that is incorporated with palak leaf is done by 3 formulations with different liters and grams of juice etc..The coconut milk which is extracted from coconut or direct from the ready made coconut milk is also used to enhance flavor. The juice is 4gms , 5 gms, 2gms. And it provides vitamins, minerals and antioxidants. It is soft spongy cheese like texture and flavor product . It has proteins and fats and calorific values. Various researchers suggested use of buffalo milk standardized to 5–6% fat to get product complying with the PFA standards (Bhattacharya et al. 1971; Arora and Gupta 1980; Rao et al. 1984; Singh and Kanawjia 1990). Sachdeva and Singh (1988a) recommended standardizing buffalo milk to 5.8% fat and 9.5% SNF (Fat: SNF; 1: 1.65) for paneer making.

» **Table: 1 Formulation of paneer incorporated by palak leaf:**

INGREDIENTS	T1	T2	T3
WHOLE MILK	2 ltrs	5 ltrs	2 ltrs
COCONUT MILK	1 ltr	1 ltr	1 ltr
PALAK JUICE	4gms	5 gms	2 gms
ACETIC ACID	4%	4%	4%

**Procedure:**

- ❖ The fresh whole milk, coconut milk and palak is collected. And ready to prepare.
- ❖ The whole milk is standardize and boil at (90°c /10 min) & fat is (6.0%) ,SNF(8.4%). And transfer the milk into the pan. Heat the milk with agitation.
- ❖ The coconut milk is heated separately in different pan. And fresh palak (spinach) is taken and grind the palak leaf and make in to fine juice.
- ❖ Then take the whole milk and mix the coconut milk both mixed and then add the palak leaf extracted juice into it and stir it continuously by adding acetic acid into it .Stir it slowly by adding acetic acid.
- ❖ Then pour the prepared milk into muslin cloth and separate the whey from it by pressing the cloth until total whey is removed.

- ❖ Then spread the paneer properly to get into a perfect shape. And then prepared paneer is cooled for 10 to 15 mins in cool water. Then take it out and cut into perfect shapes called tofus.
- ❖ Then the freshly paneer is prepared. And then healthy paneer is ready to eat, fry ,curries etc....

### Physio –chemical Analysis:

#### Moisture content:

The moisture content of the sample was determined by using the method of (AOAC2007).

#### PROCEDURE:

1. The petridish with lid was weighed.
2. 5 g of the sample was weighed into the petridish and spread evenly for uniform drying.
3. Oven was set at 100 to 105 and the petridish with sample was placed inside the oven with lip open for 15 - 17 hours.
4. petridish was cooled in a dessicator with lid open for 1-2 hours.
5. The petridish with sample was weighed.
6. This was prepared for all samples till constant weight was achieved.

Calculations  $(w_2-w_1) - (w_2-w_3) \times 100$

Moisture % =  $(w_2-w_1)$

Where,  $W_1$  = initial weight of the petridish (g)

$W_2$  = weight of the petridish with sample before drying (g)

$W_3$  = weight of the petridish with sample after drying (g)

#### PROTEIN:

**Biuret Reagent:** Dissolve 3 g of copper sulphate ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ) and 9 g of sodium potassium tartarate in 500 ml of 0.2 mol/liter sodium hydroxide; add 5 g of potassium iodide and make up to 1 liter with 0.2 mol/liter sodium hydroxide. **2. Protein Standard:** 5 mg BSA/ml. **Apparatus and Glass wares required:** Test tubes, Pipettes, Colorimeter, etc.,

#### Procedure:

- ✓ Pipette out 0.0, 0.2, 0.4, 0.6, 0.8 and 1 ml of working standard in to the series of labelled test tubes. Pipette out 1 ml of the given sample in another test tube.
- ✓ Make up the volume to 1 ml in all the test tubes. A tube with 1 ml of distilled water serves as the blank.
- ✓ Now add 3 ml of Biuret reagent to all the test tubes including the test tubes labeled 'blank' and 'unknown'.
- ✓ Mix the contents of the tubes by vortexing / shaking the tubes and warm at 37 °C for 10 min.
- ✓ Now cool the contents to room temperature and record the absorbance at 540 nm against blank
- ✓ Then plot the standard curve by taking concentration of protein along X-axis and absorbance at 540 nm along Y-axis. Then from this standard curve calculate the concentration of protein in the given sample. (Yoon Jung Park, 2022)

**Fat:** To determine the fat content coconut milk & palak incorporated in paneer by using the soxhlet extraction method.

**PH:** To asses the acidity and alkalinity of the product.

**Carbohydrates:** To determine the carbohydrates in the given sample by using the fehling solution.



### SENSORY EVALUATION:

The excellence of paneer relies on the caliber of milk from which it was produced. Milk lipids have a profound impact on the sensory quality of paneer. The perceptual rating rose with escalating lipid (4 to 6%) concentrations (Arora and Gupta 1980). Low calorie paneer with satisfactory organoleptic quality was produced from cow milk with 3.5% fat content (Vishweshwaraiah and Anantkrishnan 1986). Chawla and colleagues (1985) stated that satisfactory quality paneer could be obtained from milk containing 3.5–6.0% fat. Singh and Kanawjia (1988) noted that the sensory rating of cow milk paneer increased with higher coagulation temperatures (i.e. 75-90°C). The sensory evaluation is done to know about taste, texture, flavor, appearance, consistency, and overall acceptance of the 3 samples of developed product.

**Table: 2 Sensory Evaluation:**

Sensory evaluation	Control	Trail 1	Trail 2	Trail 3
Colour	8	9	8	9
Flavor	8	7	8	8
Consistency	9	8	8	9
Taste	9	7	9	9
Appearance	9	8	9	9
Overall acceptance	9	8	8	9

The given above values by this we can say that the trail 3 is good in taste. And this trail is taken into consideration. According to this new product is developed. Because it is good in taste, flavor, texture etc.. The product that is finalized can be determined by using sensory evaluation the physiochemical analysis and to determine the nutritional content.

### RESULT AND DISCUSSION:

The examination shows that conventional paneer can greatly improve the taste profile of coconut milk paneer, with specific mixtures proving more successful in achieving a sought-after sensory experience. The coconut milk and spinach juice is the most effective in this aspect, providing a balanced combination of tastes and scents that heightened the general attractiveness of the paneer. These results can lead the way for creating new paneer that utilize classic to fulfill customer desires for tasty and culturally influenced for fries. Profile of paneer is green color. The green is vibrant and indicating freshness of spinach. paneer offers a chewy and soft texture, making dish more substantial. The paneer is high in protein.

» **Table 3: Nutritional composition of coconut milk & palak incorporated paneer:**

Nutrition	Control	Sampl e
Ash	1.43%	1.6%
Moisture	51.8%	57%
PH	5.7-6.0	5.9%
Protein	15g	18g
Fat	20%	19%
<b>Carbohydrates</b>	<b>5.3g</b>	<b>6.2g</b>

### CONCLUSION:

The product that is formed by the both cow & buffalo milk and some flavor is added. This

flavor is rich in nutritive value of iron, vitamins, and minerals. This paneer is flavoured like palak and other flavours. In this product the coconut milk is added to enhance the flavor and palak extracted juice to enhance the paneer flavor. Incorporating full fat milk and coconut milk paneer with palak offers distinctive & nourishing fusion, buttery consistency of paneer. The coconut milk paneer is a decadent velvety meal with different taste; it is delicate sweetness and touch of exotic flavor. The addition of coconut milk paneer also accommodates those with lactose intolerance. The combination of dairy with plant based can attract the customers. This paneer is flavoured paneer by enjoying in culinary and appealing to customers.

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