FORMULATION OF PANEER FROM COCONUT MILK INCORPORATED WITH COW MILK

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ABSTRACT

Coconut, Cocos nucifera L., is a tree that is cultivated for its multiple utilities, mainly for its nutritional and medicinal values. Coconut milk paneer is a good source of essential nutrients, including healthy fats, vitamins, and minerals. Coconut milk paneer is believed to have potential health benefits, including promoting heart health, boosting the immune system, and supporting healthy digestion. Coconut milk paneer also contains important vitamins and minerals that contribute to overall health and well-being. The objectives is to develop paneer using coconut milk and cow milk with different ratio. Physiochemical analysis are carried out by prepared paneer.

Keyword: Coconut milk, Immune system, Vitamins and Minerals.

1. INTRODUCTION

1.1 PANEER: TRADITIONAL INDIAN CHEESE

A type of soft cheese from South Asia called paneer is made by coagulating milk with acid and heat to retain the fat, casein, and lactose: It is a crucial conventional coagulated dairy product that offers consumers good nutrition, diversity, safety, unique flavours, textures, mobility, and profitability. It is not a cheese that is fermentative, un ripened, non-melting, or non-renneted. With an output of 132.4 million metric tonnes of milk (2012–2013), India has become the world's largest milk producer. On average, 7% of the milk produced is transformed to Paneer. It is vital to create new types and variants of Paneer since the demand from different health-conscious customers is always expanding. Since it has a limited shelf life, refrigeration is required. The coagulation phenomenon includes the creation of a large structural protein aggregation in which whey, along
with the soluble solids dissolved in the milk, remain intact. It is called Chenna in its wet form in Eastern India and is crumbly. It is a fantastic non-vegetarian cuisine pairing. Lactic acid and citric acid, which are used to cause milk to coagulate, are the two most often utilised acids. The process of coagulation includes the creation of a significant structural protein aggregation in which whey and soluble solids from milk are entrained.

1.2 SIGNIFICANCE OF PANEER:

1.2.1 CULINARY SIGNIFICANCE:

Paneer is a multipurpose component that is used in a variety of Indian, Pakistani, and Bangladeshi recipes such paneer tikka, palak paneer, and mattar paneer. It is renowned for its gentle, creamy flavour and soft, crumbly texture and is a mainstay in vegetarian diets. Paneer may be marinated, grilled, fried, or crumbled as a topping and lends richness and creaminess to curries, stews, and desserts. For people who don’t eat meat, paneer is frequently used as a source of protein since it contains vital elements including calcium, phosphorus, and protein.

1.2.2 CULTURAL SIGNIFICANCE:

In South Asian cuisine, paneer has cultural value and plays a significant role in regional culinary customs. It has been a staple of local cuisine for many years, and both its preparation and consumption are strongly associated with festivities, festivals, and social gatherings. Paneer is frequently served at special events, weddings, and religious gatherings. It has also developed into an essential component of many traditional dishes, signifying hospitality, warmth, and community.

1.2.3 NUTRITIONAL SIGNIFICANCE:

Paneer is a strong source of protein, it is a crucial diet for vegetarians and people who might not have easy access to other sources of protein. It also has minerals like calcium and phosphorus, which are crucial for strong bones, healthy muscles, and general wellbeing. In order to provide toddlers, pregnant women, and the elderly with enough protein and calcium, paneer is frequently suggested.

1.2.4 ECONOMIC SIGNIFICANCE:

In South Asian nations, paneer production and consumption are economically significant since it supports local craftsmen, dairy industry workers, and farmers by providing employment possibilities. Because paneer is manufactured from commonly available and inexpensive components like milk and citric acid or lemon juice, it provides a practical source of protein for many populations. Additionally boosting the local economy and promoting small-scale dairy farming, paneer manufacturing and sales.

1.2.5 HEALTH SIGNIFICANCE:

In comparison to many other forms of cheese, paneer is seen to be a healthier option because it is frequently manufactured from fresh milk without the use of any ageing or preservatives. Compared to aged cheeses, it has fewer calories and fat and may be a part of a nutritious, well-balanced diet. A helpful addition to
the diet of individuals who are lactose intolerant but can handle paneer due to its decreased lactose level, paneer is also a rich source of calcium, which is crucial for bone health.

1.3 COCONUT MILK

A common non-dairy milk substitute made from ripe coconut flesh is called coconut milk. It is renowned for its rich flavour, creamy texture, and adaptability in the kitchen. In many different cuisines across the world, especially in tropical and Southeast Asian nations where coconuts are plentiful, coconut milk is a common ingredient. Grated mature coconut flesh is used to make coconut milk, which is subsequently extracted by pressing or straining. The resultant liquid has a somewhat sweet flavour and is thick and creamy. It may be found in a wide range of foods, including curries, soups, sauces, desserts, and drinks. A ubiquitous ingredient in vegan and plant-based recipes, coconut milk gives dishes a rich, creamy texture without the use of dairy. Medium-chain triglycerides (MCTs), which are renowned for their potential health advantages, such as enhanced digestion and metabolism, are also found in coconut milk, making it a rich source of healthy fats, vitamins, and minerals. A variety of meals might benefit from the richness and depth that coconut milk’s distinct flavour and fragrance characteristic can bring. A versatile ingredient for both sweet and savoury uses, its creamy smoothness may also be used to simulate the texture of dairy milk in many recipes. In recent years, coconut milk has become well-known as a promising non-dairy substitute due to these factors. It has been used to create a variety of non-dairy products, such as coconut milk paneer, which provides a plant-based option for those seeking a dairy-free substitute for traditional paneer.

1.4 SIGNIFICANCE OF COCONUT MILK:

1.4.1 CULINARY VERSATILITY:

Coconut milk is known for its rich, creamy texture and distinct flavor, which adds a unique taste and aroma to a wide range of dishes. It is used in various culinary applications, including curries, soups, stews, desserts, sauces, and beverages, providing flavor, creaminess, and depth to the recipes.

1.4.2 NUTRITIONAL VALUE:

Coconut milk is a good source of essential nutrients, including healthy fats, vitamins, and minerals. It is rich in medium-chain triglycerides, a type of healthy fat that is easily absorbed and utilized by the body for energy. Coconut milk also contains important vitamins and minerals, such as vitamin C, vitamin E, iron, and potassium, which contribute to overall health and well-being.

1.4.3 DAIRY-FREE AND VEGAN ALTERNATIVE:

Coconut milk is a popular choice for individuals who are lactose intolerant or following a vegan or plant-based diet, as it is a dairy-free and animal product-free alternative to traditional dairy milk. It can be used as a substitute for cow's milk in many recipes, providing a creamy texture and rich flavor without the use of animal-derived ingredients.
1.4.4 CULINARY TRADITIONS:

Coconut milk has a long history of culinary use in many tropical and subtropical regions, including South Asia, Southeast Asia, the Caribbean, and Africa. It is an integral part of the traditional cuisines of these regions, where it is used in various traditional recipes, adding flavor, creaminess, and richness to the dishes.

1.4.5 HEALTH BENEFITS:

Coconut milk is believed to have several health benefits due to its nutrient content. It is known to promote heart health, boost the immune system, and support healthy digestion. The medium-chain triglycerides found in coconut milk are also associated with increased energy expenditure and potential weight loss benefits.

1.4.6 COSMETIC AND MEDICINAL USES:

Coconut milk is used in cosmetic and medicinal products due to its moisturizing and nourishing properties. It is used in skincare products, hair care products, and traditional medicinal remedies for its potential benefits on skin and hair health.

2. LITERATURE REVIEW

2.1 PANEER:

Shrivastava et al., (2017) focuses on the preparation of paneer, a type of Indian cheese. The paper gives a general overview of both conventional and contemporary techniques of making paneer, including the use of various coagulants, milk varieties, and processing circumstances. It explains the function of coagulants, such as yoghurt, lemon juice, and citric acid, in the production of paneer curd as well as the elements that affect paneer yield, texture, and quality. The review also emphasises the significance of milk quality, especially its fat, protein, and acidity levels, in the production of paneer. The study also goes through the several post-processing procedures, including pressing, salting, and packing, that might modify the sensory, microbiological, and shelf-life properties of paneer.

Kumar et al., (2014) focuses on paneer, a well-known soft cheese variety from India. An extensive overview of all the different facets of paneer, including its history, production processes, composition, health benefits, sensory qualities, and storage issues, is given in the review. It addresses both the contemporary methods employing microbiological or enzymatic coagulants and the classic ways of paneer manufacturing, which entail acid coagulation using lemon juice or vinegar. The composition of paneer, including its protein, fat, carbohydrate, and mineral content, as well as any possible health advantages of its intake, are also highlighted in the review. The review also examines the sensory qualities of paneer, such as its texture, flavour, and scent, as well as the elements that affect its quality, such as the calibre of the milk, the coagulation circumstances, and the post-processing procedures.

R. K. Khetarpaul et al., (2006) investigated the chemical composition and functional properties of paneer, a popular South Asian cheese, and its blends with soy protein isolate, a plant-based protein source. The study analyzed the nutritional content, protein quality, amino acid composition, and functional properties of paneer and its blends with soy protein isolate. The findings highlighted that paneer is a good source of protein
and essential amino acids, but its protein quality can be improved by blending with soy protein isolate. The study also explored the functional properties of paneer and its blends, including water holding capacity, emulsification properties, and gelation behavior. The results of this literature review provide valuable insights into the chemical composition and functional properties of paneer and its potential for blending with soy protein isolate to enhance its nutritional quality and functional properties.

M. Pal et al., (2019) focuses on the popularity, production, and consumption of paneer in the region. The author discusses the traditional methods of paneer production, which involve curdling milk with lemon juice or vinegar, and highlights the significance of paneer in Indian cuisine, particularly among vegetarians. The article also touches upon the nutritional value of paneer, including its high protein content, calcium, and phosphorus content, which make it a valuable dietary source for many individuals. The author further discusses the versatility of paneer in various culinary applications, such as its use in curries, snacks, and desserts, and its potential for further product development. The article provides insights into the cultural and culinary significance of paneer in the Indian subcontinent, highlighting its popularity, traditional production methods, nutritional value, and culinary versatility. This information can be useful for researchers, food industry professionals, and individuals interested in the cultural and culinary aspects of paneer in the Indian subcontinent.

K.J. Rao et al., (2016) focuses on the impact of pH on various quality parameters of paneer, a popular South Asian cheese. The literature review provides an overview of the sensory attributes, texture, microbial quality, and shelf life of paneer and how these parameters are influenced by changes in pH during the production process. The article discusses the effects of different pH levels on the sensory properties of paneer, such as taste, aroma, and texture, as well as the changes in microbial quality and shelf life with pH variations. The review also highlights the importance of controlling pH during paneer production to ensure desirable sensory and microbial quality characteristics and to extend the shelf life of the product. The findings of this literature review provide valuable insights for food scientists, researchers, and food industry professionals involved in the production and quality control of paneer.

2.2 COCONUT MILK:

Pehowich et al., (2000) focuses on the fatty acid composition and potential health effects of coconut constituents. The review gives a general overview of the various fatty acid types, including saturated, monounsaturated, and polyunsaturated fatty acids, as well as the amounts of each in coconut oil and coconut milk. It covers how these fatty acids affect many aspects of health, such as weight control, metabolism, and cardiovascular health. Medium-chain triglycerides (MCTs), which are well-known to have distinct metabolic features and possible health advantages, are also highlighted in the study as being present in coconut oil. The paper also examines the impact of coconut components on lipid metabolism and cholesterol levels, as well as their possible antibacterial, antioxidant, and anti-inflammatory activities.

Tansakul et al., (2006) investigated the thermophysical properties of coconut milk, a widely used ingredient in many tropical cuisines. The study focused on properties such as thermal conductivity, specific heat capacity, and viscosity of coconut milk. The research involved experimental measurements of these properties at different temperatures and concentrations of coconut milk. The findings revealed that the thermophysical
properties of coconut milk are influenced by its concentration and temperature, with higher concentrations and temperatures generally resulting in increased thermal conductivity, specific heat capacity, and viscosity. The study also discussed the implications of these properties on food processing and highlighted the importance of understanding the thermophysical properties of coconut milk for optimizing the design and operation of food processing equipment. Overall, this literature review provides valuable insights into the thermophysical properties of coconut milk, which can be useful for researchers, food scientists, and food engineers working in the field of food processing and product development.

Seow CC et al., (1997) focuses on the chemistry and technology of coconut milk. An overview of the composition and characteristics of coconut milk, including its fat, protein, and sugar contents, is given in the review. The numerous techniques for extracting coconut milk are also covered, along with the elements that influence the quality of the milk, such as how mature the coconut fruit is and the processing conditions. The review emphasises the value of coconut milk in both traditional and contemporary food preparation, including its usage in cooking, as a source of good fats, and in the creation of goods with coconut as an ingredient. In conclusion, the study offers insightful information about the chemistry and technology of coconut milk that may help researchers, food scientists, and food processors better understand the properties and uses of this unusual foodstuff.

R.P. Aneja et al., (2002) provides a comprehensive overview of the technology involved in the production of various milk products in India. The literature review focuses on the traditional methods and modern techniques used for the production of Indian milk products, including paneer, ghee, yogurt, and khoa. The traditional methods of paneer production, which involve curdling milk with lemon juice or vinegar, and highlights the key steps and parameters involved in the process. The review also covers the technological advancements and modifications made in the production of paneer, such as the use of starter cultures, rennet, and other additives to improve the quality and shelf life 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.
3. MATERIALS AND METHODS

3.1 COCONUT MILK

A creamy, opaque liquid known as coconut milk is made from the grated meat of mature coconuts. It is frequently used in cooking, especially in Asian and tropical cuisines. Coconut milk has a thick, creamy texture with a flavour that is somewhat sweet and nutty. Soups, curries, sauces, desserts, and drinks frequently utilise it as a basis. For people who are lactose intolerant or on a plant-based diet, coconut milk is a common dairy milk alternative. It is a versatile and nutrient-dense component in many culinary creations because of its high fat content and availability.

3.2 MILK

Cow milk is a popular dairy product with a reputation for having a rich nutritional profile. It is an excellent source of high-quality protein as well as vital vitamins and minerals. In addition to being high in vitamin D, which helps the body absorb calcium, cow milk is also high in calcium, which is essential for healthy bones and teeth. It is an excellent source of riboflavin, which is vitamin B2 and necessary for energy conversion, as well as vitamin B12, which is crucial for nerve function. Cow milk is a source of potassium, which aids in controlling fluid equilibrium in the body, as well as phosphorus, which promotes bone health. Lactose, a naturally occurring sugar that certain people may be intolerant to, is also present in cow milk.

3.3 CITRIC ACID

1% Citric acid is used as coagulating agent for the coconut milk based paneer production.

3.4 UTENSILS AND GLASS WARE

Burette, conical flasks, volumetric flasks, measuring jars were utilised in the physiochemical and shelf life analysis of coconut milk based paneer.

3.5 METHOD OF PREPARATION

3.5.1 PREPARATION OF COCONUT MILK

1. Collection of ingredients and tools
2. Crack Open and Extract Coconut Meat
3. Grate or Chop Coconut Meat
4. Blend coconut meat and water
5. Strain the Mixture
6. Store and Use
3.6. PREPARATION OF COCONUT MILK BASED PANEER

FIG 3.1 COCONUT MILK

3.7 COAGULATION PROCESS

The method of making paneer, an Indian cheese, involves coagulating the solid curds that are created when milk proteins are separated from the liquid (whey). When milk is heated and an acidic substance, such as citric acid or lemon juice, is added, the milk's proteins denature and cluster together to create curds.

The addition of the acidic substance lowers the milk's pH, which causes the proteins to unravel and create a network that traps fat, calcium, and other substances, leading to the creation of curds. Whey is the liquid component that stays after coagulation and is either drained off or separated from the curds.
4. EXPERIMENTAL SETUP AND PROCEDURE

4.1 ANALYTICAL METHOD

4.1.1 PHYSIOCHEMICAL ANALYSIS

4.1.1.1 FIBER ANALYSIS

12 g of coconut paneer was weighed and added into 150 ml of 1.25% of sulfuric acid and heated for 15 min at 100° C. The solution is filtered and the filtrate is taken. The filtrate is added to 100 ml of 1.25% of sodium hydroxide. It is boiled for 15 min at 100° C again it is filtered and the filtrate is taken in a crucible and weighed and noted. The crucible with the filtrated is kept inside a muffle furnace at 550° C for 30 min, after that the ash content along with crucible is weighed.

Crude Fiber \( \frac{(A-B)/C}{\times 100\%} \)

A = weight of crucible with coconut milk paneer before heating
B = weight of crucible with coconut milk paneer after heating
C = weight of coconut milk paneer

4.1.1.2 MOISTURE ANALYSIS

The product was weighted in the sample plate. Then using of digital moisture analyzer and the amount of moisture removed is displayed in the display. It was expressed in percentage.

4.1.1.3 pH ANALYSIS

The pH of coconut based paneer was determined by using the digital pH meter.

4.1.2 NUTRITIONAL ANALYSIS

4.1.2.1 CARBOHYDRATE ANALYSIS

To take 0.2 to 1 ml of the working standard solution from five different test tubes, add water to make each test tube’s volume 1 ml, add 4 ml of the anthrone reagent, and mix the contents as well. Cover the test tube with a bath for 10 minutes, then let it cool to room temperature before measuring the optical density with a photoelectric colorimeter at 620 nm. Prepare a blank simultaneously using 4 ml of anthrone reagent and 1 ml of distilled eater.

4.1.2.2 FAT ANALYSIS

The sample’s fat content is determined using the method described in AOAC (1990). The circular bottom flask of the Soxhlet device is filled with 250 ml hexane. A 15 g sample is taken and placed in the thimble before being linked to the condenser. The flow rate is set to 2-3 drops per sec, and the treatment is performed five times in total for a total of six hr. Once the extraction is complete, the solvent is separated using a rotating vacuum evaporator. The fat sample was then weighed after being heated in a hot air oven for 20 min at 100 degrees.
CALCULATION:

\[
\frac{(W3 - W2)}{W1} \times 100
\]

Where,

W1 - Weight of dry matter taken for extraction

W2 - Weight of flat bottom flask

W3 - Weight of flask with fat

4.1.2.3 PROTEIN ANALYSIS

0.2, 0.4, 0.6, 0.8 and 1 ml of working standard solution into the well cleaned dry test tubes. Dilute the given unknown solution of protein to 100 ml with distilled water and take 0.2 and 04 ml in a test tube marked as T1 and T2. All the test tubes were made upto 1 ml with distilled water. Simultaneously prepare a blank with distilled water. 5 ml of alkaline copper reagent was added to all test tubes, mixed and allowed to stand at room temperature for 10 minutes. Then 0.5 ml of Folin’s reagent was added to each test tube and incubates for 30 minutes at room temperature. The blue colour developed was read calorimetrically at 660 nm.

4.2 SENSORY EVALUATION

Sensory evaluation was performed with the help of 9-point Hedonic scale. There are 5 panelists (3 men and 2 women) in the age group of 20 to 24. The parameters are appearance, taste, crispness, flavor and overall acceptability.

Table 4.1: 9-POINT HEDONIC SCALE

<table>
<thead>
<tr>
<th>9 Point Hedonic Scale</th>
<th>Rating Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Like Extremely</td>
</tr>
<tr>
<td>8</td>
<td>Like Very Much</td>
</tr>
<tr>
<td>7</td>
<td>Like Moderately</td>
</tr>
<tr>
<td>6</td>
<td>Like Slightly</td>
</tr>
<tr>
<td>5</td>
<td>Neither Like or Dislike</td>
</tr>
<tr>
<td>4</td>
<td>Dislike Slightly</td>
</tr>
<tr>
<td>3</td>
<td>Dislike Moderately</td>
</tr>
<tr>
<td>2</td>
<td>Dislike Very Much</td>
</tr>
<tr>
<td>1</td>
<td>Dislike Extremely</td>
</tr>
</tbody>
</table>
Sensory evaluation of paneer involves the assessment of its organoleptic properties, including its appearance, texture, flavor, and overall acceptability. In terms of appearance, paneer is typically white or cream-colored with a smooth surface and uniform texture.

The texture of paneer is an important factor in its sensory evaluation, as it should be firm and springy, yet crumbly and moist. The flavor of paneer is mild and slightly sweet, with a subtle tanginess that is characteristic of dairy products. Overall, paneer is considered a desirable food product in terms of sensory evaluation, as it is versatile, easy to prepare, and has a pleasant taste and texture. Paneer can be consumed on its own or used in a variety of dishes, including curries, snacks, and desserts. Its sensory properties make it a popular choice for vegetarians and health-conscious individuals looking for a high-protein, low-fat alternative to meat.

5. RESULT AND DISCUSSION

5.1 RESULTS

5.1.1 PANEER OPTIMIZATION

The coconut milk paneer optimization was achieved by performing different trials of different ratios of coconut milk, cow milk. The coconut milk paneer optimization Table: 4.1 is given below. Coconut milk paneer preparation was succeeded only in Trial J. In the other trials, the process of curdling did not occur properly. The quantity of Paneer obtained for the different ratios of coconut milk and cow milk from a total quantity of 500ml are given below,

<table>
<thead>
<tr>
<th>S.NO</th>
<th>TRAILS</th>
<th>COCONUT MILK</th>
<th>COW MILK</th>
<th>CITRIC ACID (ml)</th>
<th>RESULT (CONSISTENCY)</th>
<th>QUANTITY OF PANEER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>70%</td>
<td>30%</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>60%</td>
<td>40%</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>50%</td>
<td>50%</td>
<td>2</td>
<td>-</td>
<td>46g</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>45%</td>
<td>55%</td>
<td>2</td>
<td>-</td>
<td>53g</td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>40%</td>
<td>60%</td>
<td>2</td>
<td>-</td>
<td>59g</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>35%</td>
<td>65%</td>
<td>2</td>
<td>-</td>
<td>64g</td>
</tr>
<tr>
<td>7</td>
<td>G</td>
<td>30%</td>
<td>70%</td>
<td>2</td>
<td>-</td>
<td>67g</td>
</tr>
<tr>
<td>8</td>
<td>H</td>
<td>25%</td>
<td>75%</td>
<td>2</td>
<td>-</td>
<td>70g</td>
</tr>
<tr>
<td>9</td>
<td>I</td>
<td>20%</td>
<td>80%</td>
<td>2</td>
<td>-</td>
<td>74g</td>
</tr>
<tr>
<td>10</td>
<td>J</td>
<td>15%</td>
<td>85%</td>
<td>2</td>
<td>✔️</td>
<td>81g</td>
</tr>
</tbody>
</table>
FIG 5.1 50:50 ratio of cow and coconut milk for paneer preparation

FIG 5.2 55:45 ratio of cow and coconut milk for paneer preparation

FIG 5.3 60:40 ratio of cow and coconut milk for paneer preparation
FIG 5.4 65:35 ratio of cow and coconut milk for paneer preparation

FIG 5.5 70:30 ratio of cow and coconut milk for paneer preparation

FIG 5.6 75:25 ratio of cow and coconut milk for paneer preparation
5.2 EFFECTS ON COAGULANT ON COCONUT MILK PANEER

Paneer is a type of soft cheese that is commonly made by coagulating milk with an acidic or enzymatic agent, which causes the milk to curdle and form solid curds that are then separated from the whey. Coagulants play a crucial role in the formation of curds and affect the texture, flavor, and overall quality of paneer. In traditional paneer making, lemon juice or vinegar are commonly used as acidic coagulants, while enzymes like rennet or microbial cultures are used as enzymatic coagulants. These coagulants work by lowering the pH of the milk, which causes the proteins in the milk to denature and form curds. When making coconut milk paneer, similar principles apply, but the composition of coconut milk is different from regular milk, as it is derived from the grated flesh of coconuts. Coconut milk is naturally high in fat and contains lower levels of proteins compared to regular milk. Therefore, the choice of coagulant and the amount used can impact the final texture and taste of coconut milk paneer.
5.3 PHYSIOCHEMICAL ANALYSIS OF COCONUT MILK PANEER

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>COCONUT MILK PANEER VALUE</th>
<th>MILK PANEER VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIBER</td>
<td>1.4 g</td>
<td>0%</td>
</tr>
<tr>
<td>MOISTURE</td>
<td>58%</td>
<td>50%-54%</td>
</tr>
<tr>
<td>pH</td>
<td>5.9</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Due to incorporation of Coconut milk, Coconut milk paneer is rich in crude fiber content, which reduces the risk of chronic disease such as diabetes, obesity, cardiovascular disease and diverticulitis. The moisture content was in excess compared to whole milk or industry Paneer due to non availability of proper equipments. The pH is slightly alkaline which has a meager impact and same proportion with milk Paneer.

5.4 NUTRITIONAL ANALYSIS OF COCONUT MILK PANEER

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>COCONUT MILK PANEER VALUE</th>
<th>MILK PANEER VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAT</td>
<td>25.6g/100g</td>
<td>20-25g/100g</td>
</tr>
<tr>
<td>PROTEIN</td>
<td>16.2/g</td>
<td>15-17g/100g</td>
</tr>
<tr>
<td>CARBOHYDRATE</td>
<td>6.4g/100g</td>
<td>5.3g/100g</td>
</tr>
</tbody>
</table>

There is increase in the presence of carbohydrate and fat content due to incorporation of Coconut milk in paneer and there is not much difference in protein between coconut milk paneer and milk paneer. Coconut milk paneer has high nutritional value compared to the milk paneer.

5.5 SENSORY ANALYSIS OF COCONUT MILK PANEER

<table>
<thead>
<tr>
<th>Panelist</th>
<th>Panelist 1</th>
<th>Panelist 2</th>
<th>Panelist 3</th>
<th>Panelist 4</th>
<th>Panelist 5</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>5</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Taste/ Flavor</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Texture/ Consistency</td>
<td>6</td>
<td>7</td>
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<td>Aroma</td>
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<td>Overall acceptability</td>
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FIG 5.9 PANEER 65 FOR SENSORY EVALUATION

Coconut Milk Based Paneer was made into Paneer 65 and subjected to sensory evaluation by using 9 point hedonic scale. The data were obtained from a group of 10 untrained panels. Sensory attributes were evaluated by an untrained panel for appearance, flavor, texture, taste and over all acceptability.

5.6 COMPARISON WITH MILK PANEER

The sensory evaluation which compares Coconut milk paneer and normal Paneer is given below. On comparison it was concluded that the Coconut milk paneer is rich in Taste and Aroma than normal Paneer while it lags a bit in Appearance and Texture. However the Overall acceptability of Coconut milk paneer was almost in same level with Normal Paneer.
6. CONCLUSION

Paneer made with Coconut milk had higher protein, calcium and iron as compared to standard paneer and can therefore be helpful for people suffering from malnutrition. From the present investigation it may be concluded that an acceptable paneer can be prepared by using cow’s milk and coconut milk with ratio of 85:15, it gives the best results with good flavour, texture, colour and odour with good consistency. This product will have a good market potential for Indian market. This in turn will promote the economy of the country by providing revenue for farmers. Further research and development are need to optimize the production process and improve the overall quality of the coconut milk paneer, but this project represent a promising step towards a more sustainable future.

REFERENCE


