FORMULATION OF FOOD PRODUCTS USING PEANUT MILK AND

ITS RESIDUE

**ABSTRACT**

Peanut milk is gaining popularity as a viable plant-based substitute for dairy , providing a natural and nutritious choice for people with lactose intolerance, dairy sensitivities, or those on vegan and plant-based diets. Being entirely free of lactose, it offers a comfortable and health- conscious option for a wide range of consumers. Peanut milk is made by blending peanuts and water together, and then straining it. Two products were formulated during the research from peanut milk and its residue which was Peanut Milk custard and nutri-dense chocoballs and was treated with different ratios . The products was reconstituted in different ratios and was optimized by using multi objectives, that is to prepare the Peanut Milk Custard and Nutri-Dense Chocoballs using the selected ingredients, to evaluate the sensory acceptability of both the products to asses chemical and nutritional quality. The study was performed in lab of Food Nutrition and Public Health , Ethelind College of Community Science, SHUATS , Prayagraj . The sensory evaluation of the food products for their acceptability was conducted using a 9-point Hedonic Scale **(Srilaxshmi,2010).** The nutritional analysis was done by using the AOAC (2010) method. Sensory evaluation of prepared products indicated that Treatment 3 of Peanut Milk Custard (75g peanut milk + 10g custard powder + 15g jaggery ) and Treatment 3 of Nutri-dense choco balls (40g peanut extract + 40g date palm + 15g almond + 5g chocolate compound) was highly acceptable with regards to colour and appearance, consistency, taste and flavour and overall acceptability. Nutrient content of custard and nutri dense chocoballs made was found (Treatment 3) per 100g Fiber (0.54g), Fat(4.27g), Carbohydrate (9.69g), Protein(3.05g), Energy(64.7kcal) Iron (0.45mg) per 100g and Fiber (4.16g) , Fat (2.94g), Carbohydrates (12.64g), Protein (4.05g), Energy (120.4g) Iron (1.28mg) per 100g respectively. Cost of best treatment in Peanut Milk custard and nutri-dense chocoballs was Rs. 2.54 and 50.05 per 100g respectively. T3 treatment showed the highest sensory and nutritional scores, offering a viable, cost-effective alternative for functional food development . It is concluded that peanut milk and its residue based products can be a healthy and acceptable choice for consumers.

Keywords: Peanut, Lactose free, nutrient , formulation, plant-based, sensory evalution.

**Introduction**

Peanuts (*Arachis hypogaea*) are one of the most widely consumed legumes worldwide, known for their versatility, rich flavour, and impressive nutritional profile (Toomer,2018) . Native to South America, peanuts are now cultivated globally, playing a central role in many cuisines and serving as an essential food source in both developed and developing nations. Despite being botanically classified as legumes, peanuts are often grouped with tree nuts due to their similar culinary uses and nutrient composition, including healthy fats, proteins, and micronutrients (Katarzyna Suchoszek-Łukaniuk,2011). It is an important food or cache crop in the Sudan and in 2007 the country produced about 460.000 tons of the total world production of peanuts, and ranked number nine in the world (FAO, 2008). The cost-effectiveness of peanuts compared to other nuts, such as almonds or cashews, allows peanut milk to be produced at a lower price point. This makes it more accessible to a broader range of consumers, particularly in developing countries or among lower-income populations. Additionally, the long shelf life of peanuts contributes to the economic viability of peanut milk, as the production and storage costs are lower. Peanut milk offers a high-quality, plant-based protein source that can support muscle recovery, growth, and overall athletic performance (Sarah Nichele, *et al*., 2022). Peanut milk may be produced by soaking and grinding full fat raw peanuts with water to get a slurry, subject to filtration. Many ways of producing peanut milk have been done by various researchers (Benchat and Nail, 2006). Peanuts offer several health benefits, making them a valuable component of the human diet (Mattes et.al.,2008) .They are a high-quality protein source, containing all nine essential amino acids, which are crucial for tissue repair, immune function, and muscle development. Additionally, peanuts are rich in monounsaturated and polyunsaturated fats, particularly oleic acid, which supports cardiovascular health by lowering bad cholesterol levels and reducing the risk of heart disease. (Settaluri *et al*., 2012) The nuts are also an excellent source of vitamins and minerals, including vitamin E, magnesium, phosphorus, and folate, which contribute to overall health and well-being. Peanuts are not only important for their nutritional content but also for their role in food security ([Shalini S Arya](https://pubmed.ncbi.nlm.nih.gov/?term=%22Arya%20SS%22%5BAuthor%5D), *et al.,* 2015). Their ability to grow in a variety of climates, relatively low production costs, and long shelf life make them an accessible and affordable protein source for many populations, especially in regions where protein deficiency is prevalent. Furthermore, peanuts and their derivatives, such as peanut butter and peanut milk, offer a wide range of food products that can be tailored to different dietary preferences, including plant-based, gluten-free, and low-carb diets. It has been used as a major source of edible oil and protein meal and considered highly valuable for human and animal nutrition in developing countries (Fekria *et al.,* 2012). This research explores the nutritional profile, health benefits of peanuts in modern food systems, with a focus on their role in promoting sustainable nutrition.

**METHODOLOGY**

The present investigation was carried out in the Department of Food, Nutrition and Public Health, Ethelind College of Home Science, SHUATS, Prayagraj between June 2024 to July 2025.

**PROCUREMENT OF RAW MATERIAL**

The raw materials for the development of food products like Raw Peanuts , Jaggery, Date Palm, Custard Powder, Almonds , Grated Dry Coconut, Dark Chocolate and White Chocolate Compunds.

**DEVELOPMENT OF PRODUCT**

* Peanut Milk
* Custard using peanut milk
* Nutri- Dense Choco Balls from Peanut Residue

**PREPARATION OF PEANUT MILK**

Clean Peanut

Washed

Soaking (6-8 hours)

Drained water

Removal of outer layer

Grinding

Straining with muslin cloth

Collected Peanut milk

Storing Residue

(**Source**: J. David, 2016)





**Raw Peanuts Peanut Milk Peanut Residue**

**Fig. 1 Flow chart for the preparation of Peanut Milk**

Peanut milk was produced by soaking and grinding full fat raw peanuts with water to get a slurry, subject to filtration. Many ways of producing peanut milk have been done by various researchers (Benchat and Nail, 2006). The residue which was derived after peanut milk , was later on dried and used for another product development.

**PREPARATION OF PEANUT MILK CUSTARD**

Boil peanut milk

Added custard powder

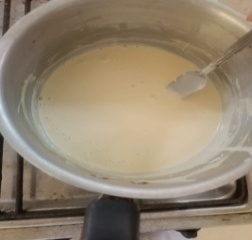
Added jaggery

Mix well with Spoon

Custard dessert

Keep in Fridge (4oC)

Ready to Serve

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**Boiling of Peanut Milk Added Custard Powder and Jaggery Peanut Milk Custard**

**Fig. 2 Flow chart for the preparation of Peanut Milk Custard**

To make Peanut Milk Custard , first peanut milk was boiled the custard powder was added into it. After the milk was boiled , jaggery powder was added in certain amount . Then it was kept for cooling , garnishing and then serving.Once the product was developed the panel members were served for judgement by 9-point hedonic scale rating. This Product was Developed and four Treatment were made according to ratio.

**PREPARATION OF NUTRI-DENSE CHOCO BALLS**

Washing Dates

De-Seeding

Mincing of Dates

Roasting & Mixing Dried Peanut Residue

Adding Almond

Making round shape

Dipping in Chocolate at room temprature

Keeping It to Set

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**Ingridents Dough Before dipping Nutri-dense After dipping Nutri- Dense**

**Balls into chocolate Balls into chocolate**

**Fig 3 : Flow chart for the preparation of Nutri-Dense Choco Balls**

This experiment was carried out in laboratory of department of food and nutrition , Where all ingredients Such as Almonds, Date Palm , Dark Chocolate and White Chocolate Compounds were bought and used for further procdure. For developing nutri-dense choco balls , first dates were washed and deseeded with hands then minced using Knife . After that roasting and mixing of dried peanut extract (which was derived after straining of peanut milk) was done. Than grinded almond was added and round shape balls were made using hands and dipped into Dark chocolate compound which was procured from Local Market. For few hours it was left for set. Once the product was developed the panel members were served for judgement by 9-point hedonic scale rating. This Product was Developed and four Treatment were made according to ratio.

**PRODUCT FORMULATION :**

Peanut was used for the development of each of the products namely , **“Peanut Milk Custard , Nutri-Dense Choco Balls”.** The whole experiment had one control (T0) and four treatments as T1 , T2 ,T3 andT4 . The whole experiments was replicated five times.

**TREATMENT AND REPLICATION OF PEANUT MILK CUSTARD**

**Table 1 : Ingredients and Experimental Treatments of Peanut Milk Custard**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Experimental treatments** | | | **Replications** |
|  | **Ingredients** |  |  |  | | |  |
|  |  |  |  |  |  |
|  |  | **T0** | **T1** | **T2** | **T3** | **T4** |  |
|  | **Cow Milk** | 90 | \_ | \_ | **\_** | \_ |  |
| **Peanut Milk Custard** | **(ml)** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | **Peanut**  **Milk**  **(ml)** | \_ | 85 | 80 | 75 | 70 | 5 |
|  | **Custard Powder** | 5 | 5 | 8 | 10 | 12 |  |
|  | **(g)** |  |  |  |  |  |  |
|  | **Jaggery (g)** | 5 | 10 | 12 | 15 | 18 |  |



**Fig 4 : Peanut Milk Custard**

**Details of Treatments:**

**Preparation of Peanut Milk Custard :**

* **T0 (Control) :** The product was prepared using 90 % of Cow Milk, 5% of Custard Powder, 5% of Jaggery.
* **T1 :** The products was prepared using 85 % of peanut milk , 5 % of Custard Powder , 10% of Jaggery.
* **T2 :** The products was prepared using 80 % of Peanut Milk , 8 % of Custard Powder, 12 % of Jaggery.
* **T3 :** The products was prepared using 75 % of Peanut Milk . 10% of Custard Powder , 15 % of Jaggery.
* **T4 :** The products was prepared using 70 % of Peanut Milk . 12% of Custard Powder , 18 % of Jaggery.

**TREATMENT AND REPLICATION OF NUTRI-DENSE CHOCO BALLS**

**Table 2 : Ingredients and Experimental Treatments of Nutrient-Dense Choco Balls**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Experimental treatments** | | | **Replications** |
|  | **Ingredients** |  |  |  | | |  |
|  |  |  |  |  |  |
|  |  | **T0** | **T1** | **T2** | **T3** | **T4** |  |
|  | **Coconut powder** | 45 | \_ | \_ | **\_** | \_ |  |
| **Nutri-Dense** | **(g)** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **Choco Balls** | **Peanut extract**  **(residue)**  **(g)** | \_ | 55 | 45 | 40 | 30 | 5 |
|  | **Date palm** | 40 | 30 | 35 | 40 | 45 |  |
|  | **(g)** |  |  |  |  |  |  |
|  | **Almond (g)** | 10 | 10 | 15 | 15 | 20 |  |
|  | **Chocolate Compund (g)** | 5 | 5 | 5 | 5 | 5 |  |

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**fig 5 : Nutri- Dense Chocoballs**

**Details of Treatments:**

**Preparation of Nutri- Dense Chocoballs :**

* **T0 (Control) :** The product was prepared using 45 % of Coconut powder, 40 % of date palm, 10% of almond, 5% of chocolate compound.
* **T1 :** The products was prepared using 55 % of Peanut Extract , 30 % of Date Palm , 10% of Almond , 5% of chocolate compound .
* **T2 :** The products was prepared using 45 % of Peanut Extract , 35 % of Date Palm, 15% of Almond, 5% of chocolate compound.
* **T3 :** The products was prepared using 55 % of Peanut Extract , 40 % of Date Palm, 15 % of Almond , 5% of chocolate compound.
* **T4 :** The products was prepared using 55 % of Peanut Extract , 45 % of Date Palm, 20% of Almond, 5% of chocolate compound.

**ORGANOLEPTIC EVALUATION OF THE COOKED PRODUCTS**

Sensory evaluation of the food products for their acceptability was done on the day of production by a panel of 5 judges selected from , Ethelind College of Community Science‟, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj. The judges were requested to analyze the prepared products with the help of a score card based on the 9- point Hedonic Scale (Color and Appearance, Consistency, Taste and Flavor and Overall Acceptability). **(Srilakshami, 2018).**

**DETERMINATION OF NUTRITIVE VALUE OF DEVELOPED FOOD PRODUCTS**

The nutrient composition as available in **Gopalan’s (2017)** publication were used for calculating nutritive value of the developed food products. Protein , fat , carbohydrates , energy , iron, calcium of the control and enriched products were thus assessed by calculation.

**Formula Used:**

Nutrient / 100g of the product = ingredient used (g) x nutritive value of ingredient

100

**DETERMINATION OF THE NUTRITIONAL COMPOSITION OF THE BEST TREATMENT OF PREPARED PEANUT MILK CUSTARD AND NUTRI-DENSE CHOCO BALLS**

1. Determination of protein content ( Lowry method)(AOAC,2010)
2. Determination of moisture content (oven drying) (AOAC,2010)
3. Determination of ash content (AOAC, 2010)
4. Determination of fat content (FSSAI,2010)
5. Determination of carbohydrate content (Tollen’s test) (AOAC,2010)

**COST EVALUATION OF THE DEVELOPED PRODUCTS**

Cost of the developed products was calculated taking into account the cost of individual raw ingredients per 100g used in the preparation of food products as the prevailing market price.

**STATISTICAL ANALYSIS**

The data was statistically analyzed by using statistical analysis of variance (ANOVA) and critical difference technique. A significant difference between the treatments was determined by using CD (Critical Difference) test (**Gacula and Singh 2008).**

**RESULTS AND DISCUSSION**

Finding of present study entitled **“Formulation of Food Products Using Peanut Milk and Its Residue”** on different aspects as per the methodology have been and analysed statistically. The entire experiment was undertaken to make healthy and protein enriched products i.e., *peanut milk custard and nutri-dense choco balls* with peanut milk and its residue.

**Table 3. Average sensory score of different parameters in control and treated sample of “Peanut Milk Custard”.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Experimental**  **Treatment** | **Colour and**  **Appearance** | **consistency** | **Taste and**  **flavour** | **Overall**  **Acceptability** |
| **T0** | 8.6 | 8.0 | 8.3 | 8.3 |
| **T1** | 8.4 | 7.8 | 8.2 | 8.1 |
| **T2** | 8.1 | 7.6 | 7.8 | 7.8 |
| **T3** | 9.0 | 8.0 | 9.0 | 8.9 |
| **T4** | 7.8 | 6.8 | 7.3 | 7.3 |
| **F cal** | 19.24 | 59.53 | 25.46 | 52.46 |
| **F tab** | 4.75 | 4.75 | 4.75 | 4.75 |
| **CD (P ≤ 0.05)** | 0.367 | 0.253 | 0.477 | 0.252 |

**Fig. 6 sensory evaluation of Peanut Milk Custard**

It can be observed from the above **Table 3** that mean sensory scores of Peanut Milk Custard in T3 had the highest score (9, 8, 9, 8.9 ) repectively. It is quite obvious from above **Table 1** that treatment T3 containing 75 g Peanut milk, 10g custard powder and 15g jaggery was liked very much and T2 and T3 were liked moderately. Statistical analysis revealed that these differences were significant (p < 0.05), indicating that the observed preferences were not due to chance. This suggests that the combination of ingredients in T3 was most preferred .

It was observed that all four experimental treatments of peanut milk custard showed increased intensity of colour because of the addition of increasing proportion of peanut milk , custard powder and jaggery which gave the treatment yellowish colour in comparison to T2 a n d T1 which included has more intense yellow colour as compared to other treatments little lighter colour **(Murugkar *et al*.,)**

**Table 4 Average sensory score of different parameters in treated sample of “Nutri-Dense Choco Balls”**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Experimental**  **Treatment** | **Colour and**  **Appearance** | **Body and Texture** | **Taste and**  **flavour** | **Overall**  **Acceptability** |
| **T0** | 7.6 | 8.0 | 7.2 | 7.7 |
| **T1** | 8.3 | 7.8 | 8.5 | 8.2 |
| **T2** | 8.1 | 7.7 | 8.1 | 8.0 |
| **T3** | 8.9 | 8.8 | 8.9 | 8.9 |
| **T4** | 7.7 | 7.8 | 7.5 | 7.6 |
| **F cal** | 24.29 | 9.21 | 76.59 | 40.71 |
| **F tab** | 4.75 | 4.75 | 4.75 | 4.75 |
| **CD (P ≤ 0.05)** | 0.293 | 0.442 | 0.240 | 0.231 |

**Fig. 7 sensory evaluation of Nutri Dense Choco Balls**

It can be observed from the above **Table 4** that mean sensory scores of Nutri- Dense Choco Balls in T3 had the highest score (8.9, 8.8, 8.9, 8.9) respectively. It is quite obvious from above **Table 2** that treatment T3 containing 40g peanut residue, 40g date palm, 15 g almond, 5g chocolate compound, was liked very much and T2 and T3 were liked moderately. Statistical analysis revealed that these differences were significant (p < 0.05), indicating that the observed preferences were not due to chance. This suggests that the combination of ingredients in T3 was most preferred .The finding of the entire study is reported as follows: The observations were recorded, tabulated and results were statistically analyzed by analysis of variance technique(ANOVA) , critical difference and t-test. The result is supported by the finding of Apoorva Jaiswal (2020) find out the acceptability of Peanut energy bar containing five different combinations of roasted peanut, jaggery, pumpkin seed powder, amaranth seed.

It was observed that all five experimental treatments of nutri-dense choco balls showed increased intensity of colour because of the addition of date palm in increasing proportion which gave the experimental Nutri-Dense Choco balls treatment reddish colour in comparison to T2 which included same ingredients but in a different amount. It was observed that all five experimental treatments and control of Nutri-Dense Choco balls showed increased intensity of colour because of the addition of increasing proportion of Date palm , which gave the treatment a brownish red colour.

#### NUTRITIVE VALUE OF DEVELOPED FOOD PRODUCTS

**COMPARISION OF NUTRIENTS IN CONTROL AND TREATED SAMPLE OF “PEANUT MILK CUSTARD**”:

**Table 5** : **Nutrient Comparison Between Control and Treated Samples of Peanut Milk Custard**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Nutrients** | **To** | **T3** | **Difference** | **T-Cal** | **T-Tab** | **Results**  **(P ≤ 0.05)** |
| **Energy (Kcal)** | 34.75 | 64.7 | 29.95 | 0.29 | 2.776 | S\* |
| **Fiber (g)** | 0.03 | 0.54 | 0.51 | 0.37 | 2.776 | S\* |
| **Carbohydrates (kcal)** | 4.56 | 9.69 | 5.13 | 0.09 | 2.776 | S\* |
| **Fat (g)** | 2.05 | 4.27 | 2.22 | 0.58 | 2.776 | S\* |
| **Protein (g)** | 1.07 | 3.05 | 1.98 | 0.81 | 2.776 | S\* |
| **Moisture (%)** | 43.84 | 35.39 | 8.44 | 0.89 | 2.776 | NS\* |
| **Ash (%)** | 0.2 | 0.5 | 0.3 | 0.60 | 2.776 | S\* |
| **Calcium (mg)** | 62 | 16.12 | 45.87 | 0.51 | 2.776 | NS\* |
| **Iron mg)** | 0.16 | 0.45 | 0.29 | 0.05 | 2.776 | S\* |

From the above **Table 5** it can be observed that in peanut milk custard the amount of Energy, carbohydrates , fat, moisture, calcium is highly noticable. It is clear from the observation T3 is being the best treament among all four treaments and control, in relation to appearance , texture , and flavour respectively. It is a good source for lactose intolrant people and for muscle gaining.

From the above table.5 its quite obvious that T3 is being good in comparison to T0 in context with energy , fiber, carbohydrates and protien because as peanut is highly rich in protein and carbohydrates.

**COMPOSITION OF NUTRIENTS IN CONTROL AND TREATED SAMPLE OF “NUTRI-DENSE CHOCO BALLS”:**

**Table 6 : Nutrient Comparison Between Control and Treated Samples of Nutri-Dense Choco Balls**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Nutrients** | **To** | **T3** | **Difference** | **T- cal** | **T- tab** | **Result**  **(P ≤ 0.05)** |
| **Energy (Kcal)** | 107.45 | 120.4 | 12.95 | 0.80 | 2.776 | S\* |
| **Fiber (g)** | 2.07 | 4.16 | 2.08 | 0.94 | 2.776 | S\* |
| **Carbohydrates (kcal)** | 12.20 | 12.50 | 0.26 | 0.98 | 2.776 | S\* |
| **Fat (g)** | 9.05 | 2.94 | 6.11 | 0.36 | 2.776 | NS\* |
| **Protein (g)** | 1.42 | 4.05 | 2.63 | 0.38 | 2.776 | S\* |
| **Moisture (%)** | 7.01 | 7.12 | 0.11 | 0.98 | 2.776 | S\* |
| **Ash (%)** | 0.51 | 0.68 | 0.17 | 0.90 | 2.776 | S\* |
| **Calcium (mg)** | 15.94 | 21.57 | 5.63 | 0.61 | 2.776 | S\* |
| **Iron mg)** | 1.11 | 1.28 | 0.17 | 0.58 | 2.776 | S\* |

From the above table 6 it can be observed that in Nutri-dense chocoballs the amount of Energy, carbohydrates , fat, protien , moisture, calcium , iron is highly noticable. It is clear from the observation T3 is being the best treament among all four treaments and control, in relation to appearance , texture , and flavour respectively. It is a good source muscle gaining.

**TO CALCULATE THE COST OF THE PREPARED PRODUCTS**

**C.1 Average cost of the prepared product called “Peanut Milk Custard based on raw ingredients per 100g:**

Table 7 : **Control, treatments and average cost of Peanut Milk Custard based on raw ingredients per 100g**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ingredient s**  **(g)** | **Actual rate/K g**  **(Rs)** | **Control and treatments** | | | | | | | |  | |
| **Ingredients** |  | **T**o | | **T**1 | | **T**2 | | **T**3 | | **T4** | |
|  |  | Quantity  (g) | Cost (Rs) | Quantity (g) | Cost (Rs) | Quantity (g) | Cost (Rs) | Quantity (g) | Cost (Rs) | Quantity (g) | Cost (rs) |
| Peanut  (40 gm) | 120 | ---- | ---- | 85 | 1.92 | 80 | 1.44 | 75 | 0.84 | 70 | 0.6 |
| Cow Milk | 60 | 100 | 6 | ---- | ----- | ---- | ----- | ----- | ----- | ------ | ----- |
| Custard powder  (250 gm) | 160 | 5 | 0.8 | 5 | 0.8 | 5 | 0.8 | 5 | 0.8 | 5 | 0.8 |
| Jaggery  (100 gm) | 60 | 5 | 0.3 | 10 | 0.6 | 12 | 0.72 | 15 | 0.9 | 18 | 1.08 |
| **Total** | **400** |  | **7.1** |  | **3.32** |  | **2.96** |  | **2.54** |  | **2.48** |

The average cost of prepared peanut milk custard for T0 is (7.1) T1 is (3.32) T2 is (2.96) T3 is (2.54) T4 is (2.48) . In peanut milk custard 100 g was observed high in T0 (Rs.7.1) then T1 (Rs. 3.32) , T2 (Rs. 2.96) , T3 (Rs. 2.54), T4 (Rs. 2.48) .

**TO CALCULATE THE COST OF THE PREPARED PRODUCTS**

**C.2 Average cost of the prepared product called “ Nutri-Dense Choco Balls” based on raw ingredients per 100g:**

**Table 8 : Control, treatments and average cost of Nutri-Dense Choco Balls based on raw ingredients per 100g**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ingredient s**  **(g)** | **Actual rate/K g**  **(Rs)** | **Control and treatments** | | | | | | | |  | |
| **Ingredients** |  | **T**o | | **T**1 | | **T**2 | | **T**3 | | **T4** | |
|  |  | Quantity  (g) | Cost (Rs) | Quantity (g) | Cost (Rs) | Quantity (g) | Cost (Rs) | Quantity (g) | Cost (Rs) | Quantity (g) | Cost (rs) |
| Date palm  (250 gm) | 800 | 40 | 32 | 30 | 24 | 35 | 28 | 40 | 32 | 45 | 36 |
| Almond (100gm) | 800 | 10 | 8 | 10 | 8 | 15 | 12 | 15 | 12 | 20 | 16 |
| Coconut powder  (50 gm) | 160 | 45 | 7.2 | ----- | ----- | ----- | ----- | ----- | ----- | ---- | ----- |
| Chocolate Compound | 250 | 5 | 1.25 | 5 | 1.25 | 5 | 1.25 | 5 | 1.25 | 5 | 1.25 |
| **Total** | **2,010** |  | **48.45** |  | **33.25** |  | **41.25** |  | **45.25** |  | **53.25** |

In Nutri-Dense Choco Balls Average cost was observed high in T4 (Rs. 53.25) , T3 (Rs. 50.05) . T2 ( Rs. 46.65), T1 (Rs. 39.85), T0 (Rs. 48.45).

On the basis of findings of the study undertaken, it is concluded that the products such as “Nutri-dense choco Balls” and “Peanut Milk Custard” can be successfully made with Peanut Milk and by storing its Residue. On comparing the sensory attributes of the products prepared “Peanut Milk Custard” T3 was considered as good product which consist of Peanut Milk , cuatard powder and jaggery and “Nutri-Dense Choco Balls ” T3 was considered as a good product which consist of Peanut Residue , Almonds, Date Plams and chocolate compunds . The cost of “Peanut Milk Custard ” in T3 was (Rs. 2.54) and Nutri-Dense Choco Balls in T3 was (Rs.50.05) ; and energy in T3 “and Nutri-Dense Choco Balls” was (120.4) , protein was (4.05 ) , fat (2.94) , carbohydrate was (12.24) , dietary fiber (4.165) , calcium was (21.57) and iron was (1.28) ; while in “Peanut Milk Custard” T3 energy was (64.7), protein was (0.635) , fat was (4.27) , carbohydrate was (9.85) , dietary fiber was (0.54) , calcium was (16.125) and iron was(0.458) .

**RECOMMENDATIONS**

* Peanut milk is a great source of protein and carbohydrates, making it an excellent post-workout recovery drink for gym enthusiasts. The protein helps repair muscles, while the carbs replenish energy stores.
* For those with lactose intolerance, peanut milk is a fantastic dairy-free alternative that provides similar nutritional benefits without the digestive issues. It's rich in protein, vitamins, and minerals like potassium and magnesium.
* The high protein content in peanut residue makes it an excellent supplement for muscle growth and repair. The fiber content in peanut residue supports healthy digestion and can help regulate bowel movements.
* The healthy fats and antioxidants in peanut residue may help support heart health by reducing inflammation and improving lipid profiles. The fiber and healthy fats in peanut residue may help regulate blood sugar levels and improve insulin sensitivity.
* To make it highly nutritious fortification of peanut milk is needed .

**CONCLUSION**

The products were successfully developed by using different ingredients in different amounts and all the treatments were replicated five times. On the basis of sensory acceptability, it was observed in “Peanut Milk Custard” that T3 was highest in terms of colour and appearance, body and texture, taste and flavor and overall acceptability. In “Nutri-Dense Choco Balls” T3 (was considered as highest in terms of colour and appearance, body and texture, taste and flavor and overall acceptability) and T3 shows the reasonable cost , making it a viable option for both ‘ Peanut Milk Custard’ and ‘ Nutri-Dense Chocoballs.’

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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