

## FORMULATION, STANDARDISATION AND NUTRIENT ANALYSIS OF POPPED LOTUS SEED POWDER INCORPORATED VARKEY

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### Abstract

Lotus (*nelumbo –nucifera*) belonging to a small family of *Nelumbonaceae* and is regarded as an iconic flower grown in freshwater. This plant has various health benefits obtained from the leaf, flower, stem and seeds. Popped lotus seed was used in traditional medicine and it has many beneficial effects such as antioxidant, antihypertensive, antibacterial, anti-inflammatory, hepatoprotective, antihyperglycemic, and anticancer effects. Lotus seeds are a good source of protein, carbohydrates, vitamins A, B and C, essential minerals calcium, potassium and sodium. Popped lotus seed powder were incorporated into bakery products with different substitution including 5%, 10%, 15% and 20% and subjected into sensory evaluation the product was analysed for nutrient content (Ash, moisture, carbohydrate, protein, calcium and phosphorous). Lotus Seed Powder incorporated varkey has an excellent shelf life of up to 20 days. The polythene cover was used as a packaging material for shelf-life study. The cost analysis of the popped lotus seed powder incorporated varkey has slight high cost than standard. To enhance knowledge about the health benefits of popped lotus seed and promote the product to thirty adult women. Before and after the popularisation study, a questionnaire was given to evaluate the program's impact. The popularisation study results showed increase awareness about popped lotus seed.

**Key words:** Popped lotus seed, Varkey, Antioxidant, Anti-microbial, Sensory evaluation.

### 1. INTRODUCTION

Lotus (*nelumbo –nucifera*) belonging to a small family of *Nelumbonaceae* and its regarded as an iconic flower grown in freshwater. This plant has various health benefits obtained from the leaf, flower, stem

and seeds. Baked goods are one of the oldest known consumer goods in the world. Varkey is the versatile baked food consumed nearly by all over the world. Varkey is eaten as accompaniment with hot beverages like tea and coffee by many people. This product has low cost in comparison with other processed foods, nutritional quality and availability, taste and longer shelf life [1]. Popping is a type of process that briefly exposes grains to high temperatures. When the core is separated, it is cooked until the inner wetness increases and escapes through the external layer of the core. Makhana commonly known as Lotus Seed, Fox Nut, Euryale Ferox, Gorgon Nut, Makhana Herb popular in India. The seeds are consumed in raw or roasted forms as well as flour of dried seeds was used as nutritious food products [2]. The seeds contain high amount of protein and carbohydrates. It strengthens the heart, spleen and kidneys. Lotus seed powder contains anti-inflammatory, antioxidant, antihypertensive, antibacterial, anti-inflammatory, hepatoprotective, antihyperglycemic, and anticancer properties [3]. Lotus seeds contain protein, carbohydrates, vitamins A, B and C, essential minerals like calcium, potassium, and sodium [4]. Popped lotus seed powder used in traditional medicine. Popped lotus seed powder consumption helps to lower blood pressure, tumour reduction, decrease the risk of obesity, diabetes and heart disease.

Objectives of the study are

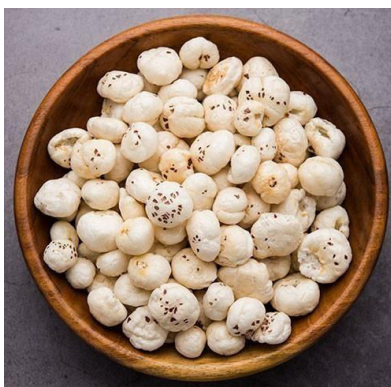
- Formulation of popped lotus seed powder incorporated varkey
- Evaluate the best proportions of popped lotus seed powder incorporated varkey
- Analyze the nutrient content of standard and best variation.
- Evaluate the shelf stability of the products.
- Cost analysis of the standard and best product.
- Popularization of the product among adult women.

## 2. MATERIALS AND METHODS

The methodology pertaining to the study presented under the following headings:

### 2.1 Selection of Ingredient

The identified ingredient for the study was popped lotus seed (*nelumbo –nucifera*). The ingredients were purchased from a supermarket.



**Plate1.** Popped Lotus Seed

## 2.2 Processing of Popped Lotus seed powder

Roasting the popped lotus seed in a pan for 2-3 mins. Then grind into a fine powder and sieve the flour and stored in an airtight container. The processing steps were given in the Plate 2.



**Plate 2.** Processing of Popped Lotus seed powder

## 2.3 Formulation and Standardisation of Popped Lotus Seed Powder Incorporated Varkey

The popped lotus seed powder was formulated into wheat varkey with varying quantities as given in Table 1. Plate 2 shows the standard and popped lotus seed powder incorporated varkey.

**Table 1.** Formulation and Standardisation of Popped Lotus Seed Powder Incorporated Varkey

Product	Wheat Flour (g)	Popped Lotus Seed Powder (g)
Standard	100	-
Sample A	90	5
Sample B	80	10
Sample C	70	15
Sample D	60	20

## 2.4 SENSORY EVALUATION

The varkey prepared by replacing wheat flour was cooked and subjected to sensory evaluation by a panel of thirty semi trained panel members and products were evaluated by 5 point hedonic scale and the best product was selected based on the acceptability of panel members.

## 2.3 NUTRIENT CONTENT

The method of detecting the nutrient content in food is known as nutrient studies. This can be delivered using a variety of accredited laboratory methods, software, online nutritional study and turnkey nutritional study services. Nutrient analysis was carried out for popped lotus seed powder incorporated wheat varkey and standard product. Ash, moisture, carbohydrate, protein, calcium and phosphorous were analysed by standard test method.

## 2.4 SHELF LIFE STUDY

The shelf life of the standard and best product packed in polythene bags at ambient temperatures, were subjected to sensory and microbiological analysis every 10th day to estimate their shelf life.

## 2.5 COST CALCULATION

The cost of the standard and the selected best product were calculated and compared. Cost analysis was done for standard and selected popped lotus seed powder incorporated varkey.

## 2.6 POPULARIZATION OF THE PRODUCT

To promote knowledge about the health benefits of popped lotus seed powder, the product was popularised among thirty adult women. A form was given before and after education to measure the

program's effect. The information gathered was compiled, and the mean and standard deviation were calculated.

### 3. RESULTS AND DISCUSSION

#### 3.1. MEAN SENSORY SCORE OF STANDARD AND BEST PRODUCT

**Table II - Mean Sensory Score for Appearance**

S.NO	SAMPLE	MAX SCORE	MEAN±SD
1	Standard	5	4.7± 0.21
2	Sample A (5%)	5	4.6±0.28
3	Sample B (10%)	5	4.4±0.82
4	Sample C (15%)	5	4.5±0.61
5	Sample D (20%)	5	4.7±0.21

The above results depicted clearly that mean sensory score for appearance of standard product is 4.7±0.21, variation A is 4.6±0.28, variation B is 4.4±0.82, and variation c is 4.5±0.61 variation D 4.7±0.21 thus it was clear that variation D is the best product.

**Table III- Mean Sensory Score for Colour**

S.NO	SAMPLE	MAX SCORE	MEAN±SD
1	Standard	5	4.7±0.21
2	Sample A (5%)	5	4.6±0.28
3	Sample B (10%)	5	4.2±0.94
4	Sample C (15%)	5	4.6±0.28
5	Sample D (20%)	5	4.7±0.21

The above results depicted clearly that that the mean sensory score for colour is 4.7±0.21, 4.6±0.28, 4.2±0.94, 4.6±0.28, 4.7±0.21 for standard, variation A, variation B, Variation C, Variation D respectively. Thus from the result it was clear that variation D scored the nearest mean of the standard.

**Table IV -Mean Sensory Score for Flavour**

S.NO	SAMPLE	MAX SCORE	MEAN±SD
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1	Standard	5	4.7±0.21
2	Sample A (5%)	5	4.5±0.61
3	Sample B (10%)	5	4.3±0.49
4	Sample C (15%)	5	4.5±0.61
5	Sample D (20%)	5	4.6±0.67

The above results depicted clearly that the mean sensory score for flavour of standard product is 4.7±0.21, variation A is 4.5±0.61, Variation B is 4.3±0.49, Variation C is 4.5±0.61, Variation D is 4.6±0.67. Thus it was evidence that the variation D scored the nearest of the standard product.

**Table V - Mean Sensory Score for Texture**

S.NO	SAMPLE	MAX SCORE	MEAN±SD
1	Standard	5	4.7±0.21
2	Sample A (5%)	5	4.6±0.61
3	Sample B (10%)	5	4.4±0.82
4	Sample C (15%)	5	4.6±0.67
5	Sample D (20%)	5	4.7±0.021

The above results depicted clearly that mean sensory score for texture of standard, variation A, variation B, variation C, variation D is 4.7±0.21, 3.3±0.021, 4.4±0.82, 4.6±0.67, 4.6±0.67 respectively. Thus it was clear from the table that variation D scored the nearest mean of the standard product.

**Table VI - Mean Sensory Score for Taste**

S.NO	SAMPLE	MAX SCORE	MEAN±SD
1	Standard	5	4.7±0.21
2	Sample A (5%)	5	4.5±0.021
3	Sample B (10%)	5	4.4±0.82
4	Sample C (15%)	5	4.5±0.67
5	Sample D (20%)	5	4.6±0.61

The above results depicted clearly that the mean sensory score for taste of standard, variation A, Variation B, variation C, variation D were  $4.7 \pm 0.21$ ,  $4.7 \pm 0.21$ ,  $4.4 \pm 0.82$ ,  $4.6 \pm 0.67$ ,  $4.5 \pm 0.61$  respectively. Thus it was clear that variation D scored the nearest mean of the standard product.

### 3.2 COMPARISON OF MEAN SCORES OF STANDARD AND BEST PRODUCT

**Table VII – Mean Score of Standard and Best Product**

CRITERIA	MAX.SCORE	STANDARD PRODUCT	BEST PRODUCT
Appearance	5	4.7	4.7
Color	5	4.7	4.7
Flavor	5	4.7	4.6
Texture	5	4.7	4.7
Taste	5	4.7	4.6

The results shows average sensory scores for the prepared product's overall acceptability when compared to the other samples A, B, and C. Thus it was clear that sample D had the highest mean score.

### 3.3 NUTRIENT CONTENT OF THE STANDARD AND BEST PRODUCT

**Table VIII–Nutrient Content of the Standard and Best Product**

S.NO	NUTRIENTS	STANDARD PRODUCT	BEST PRODUCT
1.	MOISTURE	13	10.4
2.	ASH	0.4	0.5
3.	CARBOHYDRATES	52.54	79.8
4.	PROTEIN	7.05	7.47
5.	CALCIUM	52.15	79.41
6.	PHOSPHOROUS	150	200

The above results shows that standard product had moisture content 13 percent, ash 0.4 percent, carbohydrate 52.54g, protein 7.05g, calcium 52.15mg and phosphorous 150mg respectively. In sample



product moisture 13 percent, ash 0.5 percent, carbohydrates 79.8g, protein 7.47g, calcium 79.41g and phosphorous 200mg respectively. When compared to standard and sample product nutrient content was slightly higher than standard product.

### 3.4 SHELF LIFE TESTING OF THE STANDARD AND BEST PRODUCT

Shelf life testing can help find out how long a product can be kept before it becomes unfit for use, consumption, or sale. Any packaged food product's shelf life can be determined with the use of a shelf life study [5]. The standard and best products were packed in polythene bags and storage stability was tested every 10-day period by analyzing organoleptic qualities and overall microbiological load.

### 3.5 MICROBIAL ANALYSIS OF THE STANDARD AND BEST PRODUCT

**Table IX-Microbial Analysis of the Standard and Best Product**

DAYS	PRODUCTS	MICROBES
Day-1	Standard	Absent
	Best Product	Absent
Day-10	Standard	Present
	Best Product	Absent
Day-20	Standard	Present
	Best Product	Present
No microbial growth was observed		

Microbial analysis is essential to determine the safety and quality of food, as well as testing any microbial activity in the product. To identify microorganisms that affects the product shelflife. Recent technological development has resulted in the development of rapid methods which minimize manipulation, provide results in less time [6]. The result of microbial analysis shows that both the standard and sample product did not have any microbiological growth. The product was confirmed to be safe to consume for a period of 20 days.



### 3.6 COST CALCULATION

The cost estimation of the standard product was Rs.50 and the cost of the sample product was Rs.55. There is a slight difference the cost of standard and selected product. Makhana is better alternative for high calorie snacks.

### 3.7 POPULARIZATION STUDY

The sample product was popularised among thirty adult women as the product was rich in protein, calcium and phosphorous. A set of questions were asked before and after popularisation study. The result shows that after popularisation and education about popped lotus seed among adult women increased knowledge of the sample product.

### 4. CONCLUSION

It can be concluded that twenty percent popped lotus seed powder incorporated varkey had highest score. Popped lotus seed powder has significantly higher nutrient content of carbohydrate, protein, calcium and phosphorous incorporated content when compared to the standard products. The shelflife of the selected product and standard product in polythene bags shows that product was fit for consumption for a period of 20 days. The cost of the best product slightly higher when compared to standard product. The popularisation study shows that most of the adult women know about the importance and organoleptic properties of the popped lotus seed powder varkey.

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### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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