



# DEVELOPMENT AND STANDARDIZATION OF WHEY SYRUP RASAGULLA INCORPORATED WITH PISTACHIO (*Pistachio vera*) AND PALAK SPINACH (*Spinacia oleracea*)

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**Abstract:** The objective of the study was to prepare ready to eat product using whey syrup which could be used by all people starting from children to adult. Whey syrup, palak spinach, lemon, sunflower seeds, pistachios were used in the preparation of whey syrup incorporated rasagulla with vitamin B6. Sensory properties, nutritional composition, physio-chemical properties, cost calculation, packaging and labelling of the whey syrup rasagulla of the selected variation sample was discussed. Spinach is a rich source of vitamins, iron, calcium and many other nutrients. Like most other plants spinach contains a series of powerful antioxidants such as flavonoids, p-coumaric acid, carotene and other water-soluble antioxidants, such as ascorbic and folic acids. Finding shows that the sample with increased amount of palak spinach extraction is suitable for consumption and more liked by everyone. The effect of various treatments on the non-enzymatic browning of lemon juice and model systems under aerobic conditions has been studied. Because of the high acidity (pH 2.5) of this product, it was unlikely that browning was due to sugar-amine condensation and the results showed that ascorbic acid was the main precursor. Browning of lemon juice and model systems was proportional to the level of ascorbic acid; the presence of amino-acids in model systems increased the intensity of browning. A tiny sunflower seed is a package of healthy unsaturated fats, protein, fiber and other important nutrients like vitamin E, selenium, copper, zinc, folate, iron and phytochemicals.

**Index Terms** - Milk , Palak ,whey syrup , pistachio

## INTRODUCTION

Rasagulla (a sweet syrup cheese ball) most popular in the regions of South Asia, manufactured from Chhana (a precipitate obtained by heat and acid coagulation of milk) balls. 100g of Rasagulla contains 186 calories and out of which carbohydrate, fat and protein provide 153, 17, and 16 calories, respectively. Rasagulla is defined as popular Indian sweetmeat with high textural values and also common milk product. Rasagulla is prepared in batch process by traditional and unmechanized ways in local markets, but research have been done to mechanize the operation in preparing rasgullas by continuous process

Whey protein fraction represents about 18-20% of total milk proteins. This fraction contains four major proteins:  $\beta$ -lactoglobulin ( $\beta$ -Lg),  $\alpha$ -lactalbumin ( $\alpha$ -La), blood serum albumin (BSA) and immunoglobulin (Ig). These proteins represent 20%, 50% and 10% of whey protein fraction, respectively.

Palak or Spinach beet (*Beta vulgaris* var. *bangalensis*) is one of the most common leafy vegetable grown and consumed in India. It is primarily used as pot herb. Spinach beet is most probably a native of Indo-Chinese region. (Narayan et al.) .

Spinach (*Spinacia oleracea* L.) is an important leafy vegetable, rich in various essential nutrients required for human health. However, it may also accumulate hazardous materials in edible parts, and subsequently poses human health risk. Evaluation of variation in essential nutrients and hazardous materials in spinach genotypes is important for breeding desired genotypes for human consumption.

Lemon is an important medicinal plant of the family Rutaceae. It is cultivated mainly for its alkaloids, which are having anticancer activities and the antibacterial potential in crude extracts of different parts (viz., leaves, stem, root and flower) of Lemon against clinically significant bacterial strains has been reported (Kawaii et al., 2000). Flavonoids can function as direct antioxidants and free radical scavengers, and have the capacity to modulate enzymatic activities and inhibit cell proliferation (Duthie and Crozier, 2000). In plants, they appear to play a defensive role against invading pathogens, including bacteria, fungi and viruses (Sohn et al., 2004).

A sunflower seed is a package of healthy unsaturated fats, protein, fiber and other important nutrients like vitamin E, selenium, copper, zinc, folate, iron and phytochemicals. After palm, soy and rapeseed oil, sunflower oil ranked fourth with a worldwide production of about 10.6 million metric tons during 2006 (FAO-STAT, 2008). Pistachios have been part of the human diet since prehistoric times and have been consumed by past civilizations because of their nutritional and potential disease-management properties. The pistachio (*Pistacia vera* L., Anacardiaceae family) is an ancient nut with a storied history.

The health benefits of nuts, mainly in relation to the improvement of dysmetabolic conditions such as obesity, type 2 diabetes mellitus and the related cardiovascular diseases, have been widely demonstrated. Compared to other nuts, pistachios have a lower fat and caloric content, and contain the highest levels of unsaturated fatty acids, potassium,  $\gamma$ -tocopherol, phytosterols and xanthophyll carotenoids, all substances that are well known for their antioxidant and anti-inflammatory actions. (S Terzo, S Baldassano, GF Caldara... - Natural product ..., 2019)

## II. METHODS

All the raw materials are procured from the local market of Coimbatore, Tamil Nadu and it is stored in a refrigerator condition. The good quality of Palak, lemon, sunflower seeds, sugar, milk were selected and it is stored.

### 2.1 PRE-PREPARATION:

The milk is boiled at 97 degree Celsius and curdled by adding lemon juice. After curdling process the whey is separated from the precipitated casein. The pistachios were roasted and powdered. Lemon juice is extracted using a sieve. The palak spinach is washed cleaned, boiled, blanched and grinded. The juice is extracted from it.

### 2.2 PREPARATION OF THE PRODUCT:

Milk is boiled at 95 degree Celsius for 10 minutes over a medium boiled heat. The extracted lemon juice is added. The curdling process takes place. It is then filtered using muslin cloth, immediately it is rinsed in water to remove the lemon flavour. wrap the channa in a cloth and rinse it well under running water until it cools down. Make a knot of the cloth. Squeeze up and remove as much as excess water as possible it is hook for one hour. Remaining channa is used for the preparation of rasagulla. Knead the channa for 5 minutes, by adding the pistachios powder, and sunflower seeds powder. Divide it into balls.

### 2.3 WHEY SYRUP PREPARATION:

Whey syrup is taken. Sugar is added. Cardamom pods are sprinkled. The kneaded balls are added in the whey syrup and boiled.

## III. RESULT AND DISCUSSION

### 3.1 Standardisation of whey syrup .

INGREDIENTS	VARAIATION-I	VARIATION-II	VARIATION-III
MILK	130	125	120
LEMON	10	10	10
SUGAR	35	30	25
PISTACHIOS	10	10	10
SUNFLOWER SEEDS	5	5	5
PALAK	10	15	20

**TABLE 1: STANDARDISATION OF WHEY SYRUP RASAGULLA INCORPORATED WITH PISTACHIO AND PALAK SPINACH**

TABLE 1: The standardized products were standardized in terms of amount of ingredients, procedure and serving size. For the purpose of standardized products, a number of preliminary trials were conducted. It was formulated into three different variations. Different variations of Whey syrup rasagulla were prepared by altering the proportion of all the ingredients for standardization.

3.2 Result of Organoleptic evaluation

Criteria	Variation I	Variation II	Variation III
APPEARANCE	8±0.6	7.8±0.5	8.7±0.4
FLAVOUR	7.8±0.41	7.8±0.7	8.68±0.5
TEXTURE	7.8±5.8	7.8±0.7	8.6±0.5
TASTE	7.6±0.5	7.7±0.7	8.64±0.6
OVERALL ACCEPTANCE	7.7±0.4	7.8±0.4	8.8±0.5

TABLE 2: ORGANOLEPTIC EVALUATION OF FORMULATED RASAGULLA:

TABLE 2: Organoleptic evaluation of has given to 50 semi trained panel members using the score card with a ten hedonic scale. In evaluation, the qualities of the product were asked to judge by 50 semi trained panel members with respect to appearance, colour, consistency, texture, taste and overall acceptability. The individual mean sensory scores for variation I, variation II, variation III are noted.

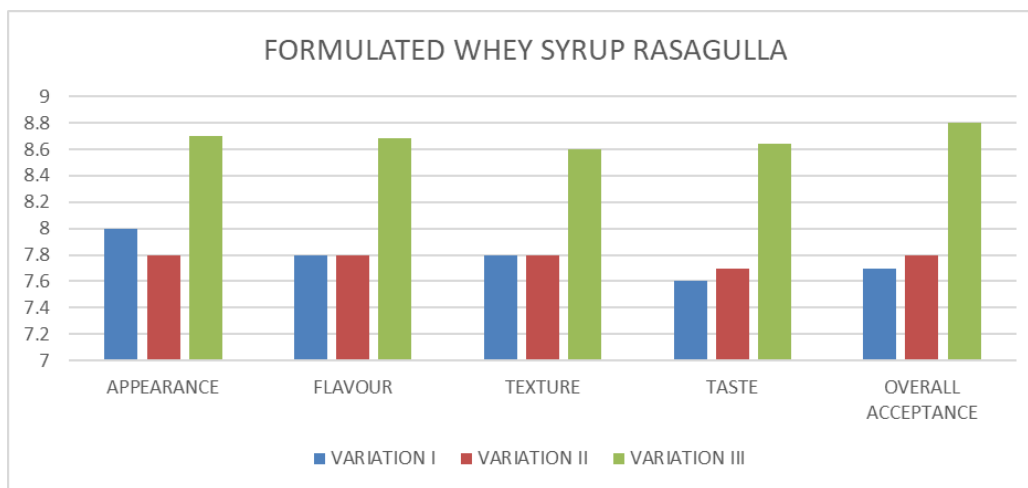


FIGURE 1: FIGURE OF ORGANOLEPTIC EVALUATION OF FORMULATED RASAGULLA

3.3 Result of physiochemical analysis:

SNO	NUTRIENTS	QUANTITY/100 g
1.	MOISTURE	52.3g
2.	ASH	13.6 g

TABLE 3 PHYSIOCHEMICAL ANALYSIS OF FORMULATED RASAGULLA:

The physiochemical analysis are analysed like moisture and ash using a standard AOAC method. The microbial analysis are done like total bacterial count @ 37<sup>o</sup>c.

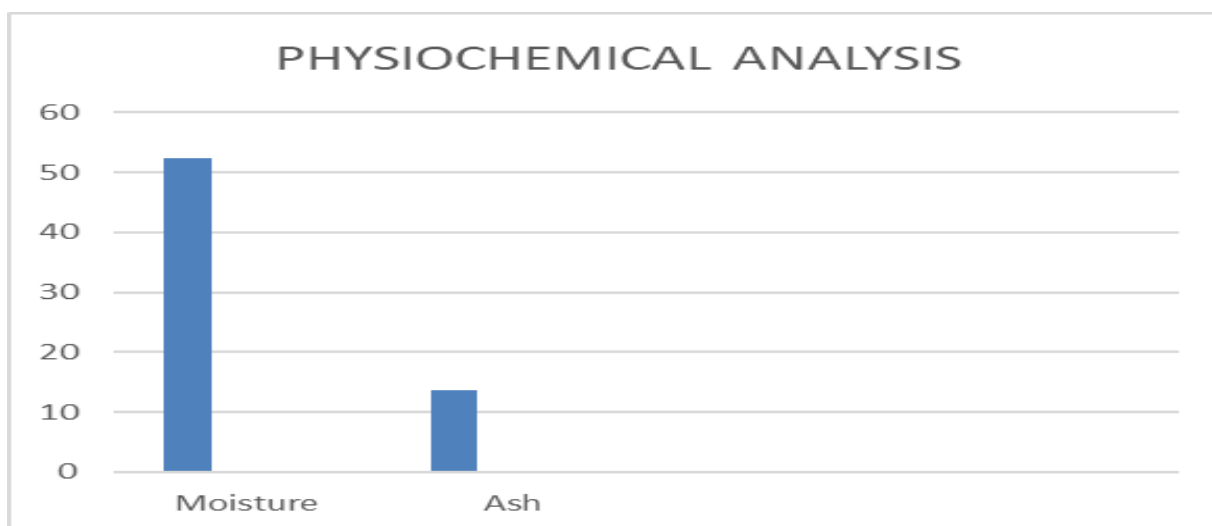


FIGURE 2: FIGURE OF PHYSIOCHEMICAL ANALYSIS OF FORMULATED RASAGULLA.

3.4 Result of nutritional analysis:

S.NO	NUTRIENTS	PARAMETERS
1	ENERGY	154.8kcal
2	CARBOHYDRATES	28.2g
3	PROTEIN	3g
4	FAT	3.3g
5	FIBRE	1.02mg
6	VITAMIN B6	0.64

TABLE 4 NUTRITIONAL ANALYSIS OF FORMULATED RASAGULLA.

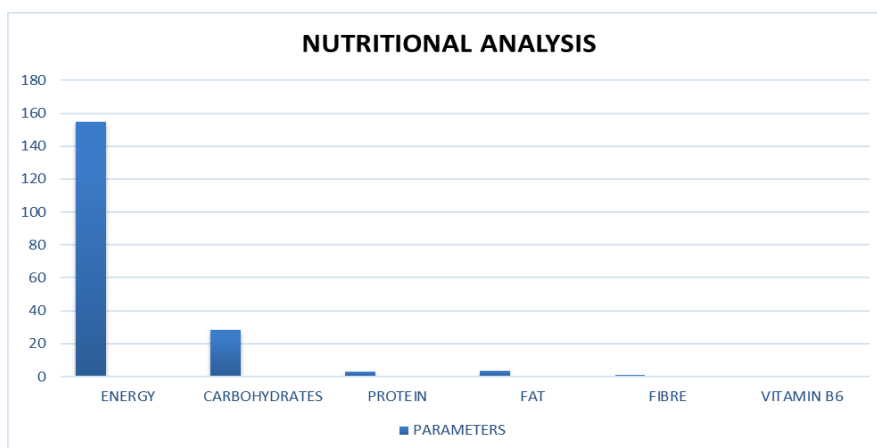


FIGURE 3: NUTRITIONAL ANALYSIS OF FORMULATED RASAGULLA.

3.5 Result and discussion of cost calculation:

Ingredients	Cost of ingredients kg/rs	Variation III	Cost(rupees)
Milk	50	150 ml	12
Lemon	269	5ml	10
Sugar	55	30g	1.65
Sunflower seeds	495	10g	4.9
Pistachio	900	5g	9
Palak	20	30g	10

TABLE 5: COST CALCULATION OF FORMULATED RASAGULLA.

Raw material count = 78

Overhead charges(40%) = 30

Processing & packaging = 15

Total cost = 123/-

The price for 100g of the formulated WHEY SYRUP RASAGULLA is 123/- including all the overhead charges.

The total cost of production of the selected formulation of whey syrup rasagulle incorporated with pistachios and palak (variation III) was estimated to be Rs 123 / 100g of the developed product. When compared to the commercial product it is more nutritious and affordable price to buy this product.

### 3.6 Labelling and packaging :



PET is a biologically inert material that doesn't react with foods or beverages and is resistant to attachment by microorganisms. It has been thoroughly reviewed and approved as safe for contact with foods and drinks by the FDA, Health Canada, the European Food Safety Authority, and other health safety agencies. It has also been used by consumers around the world for more than 30 years without any known adverse effects. Extensive testing of PET and PET packaging has repeatedly shown it to be safe.

### IV. CONCLUSION:

The formulated product was nutrient-rich whey syrup rasagulla, standardized and incorporated with pistachios and palak. The developed whey syrup rasagulla is rich in carbohydrate, fat, fibre, protein, iron, and vitamin B6. The sensory characteristics were acceptable according to the consumer members and semi-panel members. The overall acceptability of the product is excellent. The shelf life of the product is excellent. It is healthy for consumption and it is naturally safe and environment-friendly for consuming and disposing.

### REFERENCE

- Ajay Jamnani., & Prasad Daddikar. (2015), Market potential and growth opportunities for bakery products: An empirical analysis with special reference to pai bread, Belgaum, Elk Asia Pacific Journal of Marketing and Retail Management, volume -6, ISSN 2349.
- Sheng ZW, Ma WH, Jin ZQ, Bi Y, Sun ZG, Dou HT and Han L N (2010), Investigation of dietary fiber, protein, vitamin E and other nutritional compounds of banana flower of two cultivars grown in China, African Journal of Biotechnology, 9(25), pp 3888-3895.
- Bagavan A, Rahuamn A.A, Kaushik N.K and Sahal D (2010), In vitro antimalarial activity of medicinal plant extracts against Plasmodium falciparum, Parasitology Research, 1-8.
- Jonnalagadda S.S, Harnack L, Liu R.H, Mckeown N, Seal C, Liu S, and Fahey G.C (2011), Putting the whole grain puzzle together: Health benefits associated with whole grains-summary of American society for nutrition satellite symposium, The Journal of Nutrition, 141 (5), 10115- 10225.
- Baenziger PS, Dweikat I, and Wegulo S (2009), The future of plant breeding, African Crop Science Conference Proc, pp 537-540.
- Shen J, Song Z, Qian X and Liu W (2009), Modification of papermaking grade fillers: A brief review, Bio Resources 4(3), pp 1190-209.
- Gani (2012), Whole - grain cereal bioactive compounds and their health benefits, Journal of Food Process Technol, 3(3), pp 1- 10.
- Adom KK and Liu RH (2002), Antioxidant activity of grains, Journal of Agriculture, Food Chem, 50, pp 6182- 6187.
- Adam ML, Lombi E, Zhao FJ and Mcgrath SP (2002), Evidence of low selenium concentrations in UK bread making wheat grain, Journal of the science of food and agriculture, 82, pp 1160- 1165.
- Solomon S, Singh J and Kumar D (2013), Manufacturing jaggery, a product of sugarcane, as health food, Agro Technol, S11, 1-3.
- Walker GM and White NA (2005), Introduction to fungal physiology, In: Kavanagh K (ed.) Fungi: Biology and Applications, UK: John Wiley & Sons, chapter- 2, pp 1-34.
- Fredlund E, Druvefors U, Boysen ME, Lingsten KJ and Schnurer J (2002), Physiological characteristics of the biocontrol yeast Pichia anomala Journal 121, pp 395 - 402.