International Journal of Home Science 2017; 3(2): 06-09

International Journal of Home Science

ISSN: 2395-7476
IJHS 2017; 3(2): 06-09

www.homesciencejournal.com
Received: 03-03-2017
Accepted: 04-04-2017

P Sadhukhan
J D Birla Institute, 11, Lower Rawdon Street, Kolkata-19. India

A Sarkar
J D Birla Institute, 11, Lower Rawdon Street, Kolkata-19. India

Correspondence
P Sadhukhan
J D Birla Institute, 11, Lower Rawdon Street, Kolkata-19. India

A study on the acceptability, nutrient composition and shelf life of '*Sandesh*', a Bengali sweetmeat, developed from soymilk and enriched with finger millet and sesame seeds

P Sadhukhan and A Sarkar

Abstract
A study was conducted on the acceptability, nutrient composition and shelf life of '*Sandesh*', a Bengali sweetmeat, developed from Soymilk and enriched with finger millet and sesame seeds. The developed sandesh was evaluated organoleptically and its nutritional composition was studied using respective protocols of analysis. The shelf life of the product was studied by sensory evaluation and by microbiological methods to check the growth of colonies on storage.

Keywords: Soymilk, Non-dairy milk, Lactose Intolerance, Sandesh

1. Introduction
It has been years the animals were solely considered for milk source. Nowadays however availability of milk from non dairy sources are in the picture. These milks are obtained from plant sources such as soybean, almond, rice and hemp. Of these, milk obtained from soybeans is most common. Soymilk is rich in protein, omega-3-fatty acids and iso-flavones. Being free from lactose and cholesterol, soymilk proves to be an excellent milk substitute for lactose intolerant and cardiovascular disease patients correspondingly. [1] Considering the mentioned benefits of soymilk, it is believed that development of 'sandesh' from soymilk would be the need of the day. Sandesh is a sweet delicacy made from 'chhena', that is, cottage cheese. It is famed as a specialty of Bengal. But it is generally made from a dairy source of milk which prevents lactose intolerant patients or people following vegan diet from consuming it. Hence this study was aimed at developing sandesh from soymilk and enriching it with finger millet and sesame seeds, which adds on to the calcium and other mineral content.

2. Materials and Method
Sensory and nutritional comparison of 'chhena' obtained from cow milk and soymilk
The 'chhena' was prepared from cow milk and soymilk using calcium lactate. The 'chhena' was evaluated organoleptically based on 9 point hedonic scale. The nutritional comparison of the two samples of 'chhena' was also carried out.

Product Development
The basic recipe of *Sandesh* was developed using soymilk 'chhena', sugar, cardamom powder, raisins. The variations were prepared by adding varying amounts of finger millet powder and sesame seeds. The basic recipe was prepared using soymilk chhena, powdered sugar, cardamom powder and raisins for garnish.
The basic recipe along with its variations was evaluated organoleptically based on 9 point hedonic scale. [2] The subjects were asked to rank each trait through nine point hedonic scale, ranging from 9 as "like extremely" to 1 as "dislike extremely". The scores of sensory attributes that is, appearance, colour, taste, texture and odour were recorded in the sensory evaluation ballot sheet. A comparative study was done with the average scores and was illustrated in the form of bar graphs.

Table 1: Variations of Basic Recipe

Variations	Additional Ingredients	Amount
Variation B	Finger millet powder	1g
Variation C	Finger millet powder	1.5g
Variation D	Finger millet powder	2g
Variation E	Finger millet powder	1.5g
	Sesame seeds	1g
Variation F	Finger millet powder	1.5g
	Sesame seeds	2g
Variation G	Finger millet powder	1.5g
	Sesame seeds	3g

Estimation of Nutrient Composition: Estimation of the macronutrients and micronutrients of the basic and the best product was carried out using respective aliquots of analysis.
The moisture content of the samples was using hot air oven. The difference in weight was registered and calculated as the amount of moisture present in it.
The protein estimation was done using Biuret's reagent. The Optical Density (O.D) of each tube was measured at 550nm.
The fat was determined by acid digestion method.
The carbohydrate of the sample was estimated by anthrone method. The absorbance was measured at 630 nm.
The total mineral content was measured by ashing measured amount of samples in a hot air oven at 600°C. The weight of the ash estimated was the total mineral content of the samples.
The calcium content of sample was estimated using end point method. The ortho-cresolphthalein complexone combines with calcium at alkaline pH to form a purple color complex, the absorbance of which was measured at 578 nm.
The phosphorus content of the sample was estimated by Molybdate U.V method. The phosphate ions in an acidic medium react with ammonium molybdate to form a phosphomolybdate complex. The absorbance of which was measured at 340 nm.
The iron content of the sample was estimated by ferrozine method. The intensity of the complex formed was directly proportional to the iron present in the sample, the absorbance of which was measured at 570 nm.

Shelf-life study: The sensory evaluation of the stored products was conducted using the best variation. It was stored in air tight containers in the refrigerator. A sample was taken out on each of the 2nd, 3th and 4th day of storage for sensory evaluation. It was evaluated for appearance, color, taste, texture and odour by using 9-point hedonic scale rating. The microbial study was conducted for the refrigerated samples. It was done using Total Plate Count (TPC). The prepared petri dishes were incubated in inverted position at 35°C for 48±2 hours. The colonies were counted once after 24 hours and again after 48 hours of incubation. In the dishes which contain 30-300 colonies, the number of Colony Forming Units (CFU) was obtained by the formula:

$$\text{CFU/ml} = \frac{\text{Number of colonies}}{\text{Amount plated} \times \text{dilution}}$$

3. Result and Discussion

Comparison of organoleptic evaluation of all the variations: The appearance of the basic recipe was best. The creamy colour of the soymilk is contributed by the poly unsaturated fatty acids (PUFA) present in it. Hence the 'chhena' and consequently the 'sandesh' were found to be creamy in colour. The colour of basic recipe was best accepted. The taste of the products was basically contributed by the sugar present in it. However the presence of finger millet powder along with sesame seeds suppresses the sweetness of the variations. The odour was same for all since equal amount of cardamom powder was used in all the variations. From the overall scores it was found that variation F was the most accepted.

Table 2: Organoleptic scores of product

Product Code	Appearance	Colour	Taste	Texture	Odour	Overall Rating
A	8.2±0.05	7.23±0.6	8±0.03	8.5±0.14	7±0.32	8.8±0.11
B	8.15±0.01	7.2±0.26	7.9±0.05	8±0.06	8±0.3	8.5±0.18
C	8±0.24	7.2±0.42	7.8±0.04	7.7±0.08	7.8±0.16	8.5±0.09
D	8±0.12	7.19±0.6	7.6±0.11	7±0.14	7.6±0.17	7.5±0.2
E	8.1±0.2	7.22±0.05	7.9±0.16	7.7±0.06	7.4±0.2	8.4±0.18
F	8.1±0.08	7.22±0.05	8±0.21	7.7±0.19	8.5±0.24	8.9±0.04
G	7.5±0.06	7.21±0.03	7.8±0.34	7.4±0.16	7.25±0.3	7.9±0.16

Comparison of the nutritional composition of basic (A) and best (F) variation

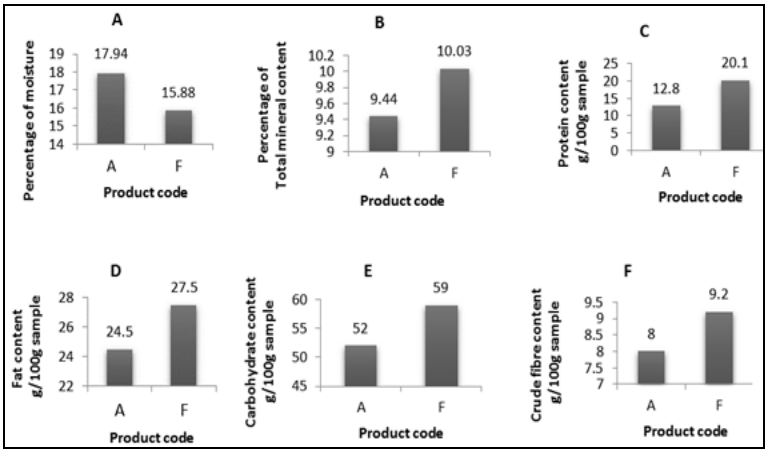

Fig 1: A- Moisture, B- Total mineral content, C- Protein, D-Fat, E- Carbohydrate, F- Crude Fibre

The moisture content of Product A was found to be higher than that of F. The presence of Finger millet powder in product F made the product drier compared to product A. The total mineral content of product F is much higher compared to product A because of the added ingredients that increases its mineral content. Sesame seeds are a powerhouse of organic minerals, especially calcium. These are also rich in zinc, phosphorus, magnesium, copper, potassium, vitamin B, dietary fiber and phytochemicals called lignans. [3] Finger millet is a storehouse of calcium. Its high content of calcium and lower cost makes it an effective fortificant in various foods. [4] The protein content of product F is higher than A. Finger millet majorly contains carbohydrate followed by protein. Finger millet is a remarkable source of protein making it perfect for vegetarian diets. The amino acids that are mainly present in finger millet includes leucine and valine. The fat content of product F is high mainly due to the presence of sesame seeds. It contains 50-60% oil. It contains ample amount of oleic acid (43%), linoleic acid (35%), palmitic acid (11%) and stearic acid (7%). [5, 6] Total carbohydrate content of finger millet has been reported to be in the range of 72 to 79.5%. The carbohydrates include starch as the main constituent being 59.4 to 70.2%. This increases carbohydrate of product F. The crude fibre content of soymilk itself is very high since it is of plant source. Along with that the finger millet and sesame seeds increase the fibre content of Product F. Finger millet has 3.6% crude fibre content and has hypoglycemic effect. High fibre diets containing complex carbohydrates are slowly digested and absorbed thus bring reduction in postprandial glucose. [7]

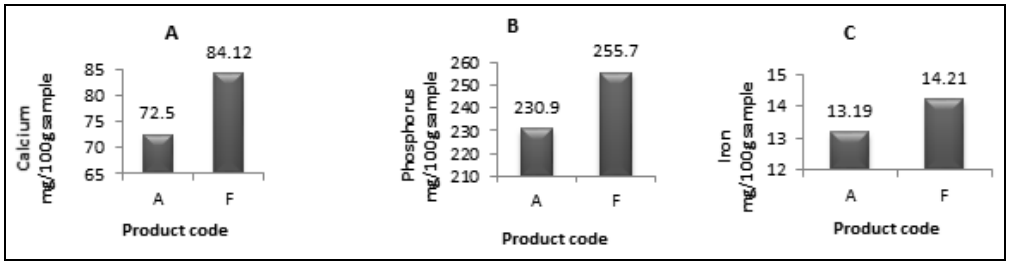

Fig 2: Micronutrients A- Calcium content, B- Phosphorus content, C- Iron content

Finger millet, along with sesame seeds increases the calcium content of product F. Finger millet is rich in calcium. Calcium content of 36 genotypes of finger millet ranged from 162 to 487 mg per 100g with mean value of 320.8 mg per 100g [8] The calcium content of sesame is highest among rest of its mineral contents. Its whole seed contains higher amount of calcium compared to the dehulled seeds and the hulls itself. Hence the best way to consume these seeds is by taking the whole seed without removing hulls. [9] After calcium, phosphorus is the second highest amount of mineral present in sesame (466.0–482.8 mg/100 g), thus increasing the phosphorus content of Product F. [9] Cow milk contains a very low amount of iron. Whereas soymilk has a higher content of iron, which is increased further due to presence of finger millet in the best product, that is, product F. [10]

Shelf life study

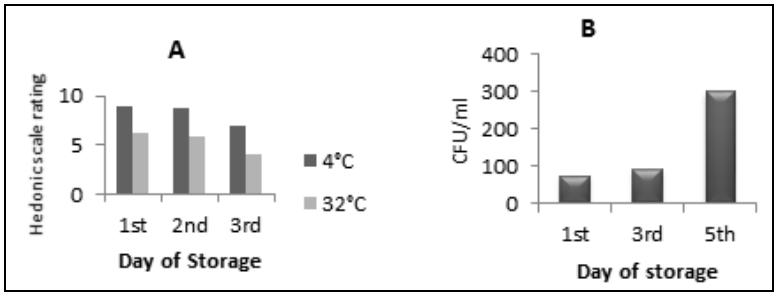

Fig 3: A- Comparative study of overall rating of the stored product, B- Total Plate Count of stored product

Sensory evaluation done on the basis of overall rating, as illustrated in Figure A, showed that the refrigerated sandesh was much more accepted organoleptically compared to the ones stored at room temperature. The acceptability declined on third day of storage. Thus soymilk sandesh can be kept at refrigerator up to 2 days for a good acceptance among the consumers. From the microbial study, as illustrated in figure B, it can be inferred that the microbial count increased with increase in number of days of storage. A drastic deterioration is observed on the fifth day of storage. Refrigeration is employed to control the rate of certain chemical and enzymatic reactions as well as rate of growth of food microorganisms [11]. Food spoilage slows down as molecular motion slows which retards growth of bacteria that causes food to spoil. [12] However, studies have shown that perishable food will deteriorate, even at refrigerator temperature, due to spoilage because of microorganisms, enzymes and oxidation. [13, 14]

4. Conclusion and Recommendation

The comparative study of the sensory attributes showed that the sensory quality of a product influences its acceptability. The taste and texture of soymilk ‘chhena’ was well-accepted by the panel members. The comparative study of nutritional composition showed that ‘Chhena’ obtained from soymilk can be used as a substitute for dairy milk for product development if it is nutritionally enhanced, especially if the calcium content is increased since soymilk is deficient of calcium. The sensory evaluation of the sandesh developed showed that there was a good acceptance of the basic recipe and its variations. The shelf life study showed that the sandesh when stored at refrigerated condition had a better acceptance compared to the

ones stored at room temperature. It can be kept at refrigerator up to 2 days for a good acceptance among the consumers. Thus it can be concluded by saying that soymilk must be incorporated in the diet with additional sources of calcium such as ragi and sesame seeds. Hence the product developed, that is, soymilk sandesh can be a vehicle to deliver proper nutrition to the population while satisfying their taste buds.

5. Acknowledgement
The authors are grateful to our principal, faculty for the support during this course of study and their excellent technical assistance and college management for the infrastructure.

6. References

1. Beasley S, Tuorila H, Saris P. Fermented soymilk with a monoculture of *Lactococcus lactis*', International Journal of Food Microbiology. 2000; 81:159-162.
2. Chambers E. The 9-Point Hedonic Scale: Dr. David R. Peryam's early papers on the most widely used sensory scale in the world, Peryam & Kroll Research Corporation. 4-4-4-5.
3. Kumar CM, Singh SA. Bioactive lignans from sesame (*Sesamum indicum L*.): evaluation of their anti-oxidant and anti-bacterial effects for food applications, Journal of Food Science and technology. 2015; 52:2934-2941.
4. Makinde FM, Akinoso R. Comparison between the nutritional quality of flour obtained from raw, roasted and fermented sesame (Sesamum indicum L.) seed grown in Nigeria, ACTA Scientarium Polonorum Technologia Alimentaria. 2014; 13:309-319.
5. Onsaard E. Sesame proteins, International Food Research Journal. 2012; 19:1287-1288.
6. Prasad N, Prasad DS, Vijay N, Kothari R, Swamy N. A Review on Nutritional and Nutraceutical Properties of Sesame Seeds, Journal of Nutrition and Food science. 2012; 2:1-2.
7. Singh UM, Metwal M, Singh M, Tai G, Kumar A. Identification and characterization of calcium transporter gene family in finger millet in relation to grain calcium content, Gene. 2015; 566:37-46.
8. Ahanian B, Pourahmad R, Mirahmadi F. Effect of substituting soymilk instead of skim milk on physicochemical and sensory properties of sesame ice cream, Indian Journal of Scientific Research. 2014; 7:1134-1135.
9. Vadivoo AS, Joseph R, Garesan NM. Genetic variability and calcium contents in finger millet (*Eleusine coracana L.Gaertn*) in relation to grain colour, Plant Foods Human Nutrition. 2008; 52:353-364.
10. Makinde FM, Akinoso R. Nutrient composition and effect of processing treatments on anti-nutritional factors of Nigerian sesame (*Sesamum indicum* Linn) cultivars, International Food Research Journal. 2013; 20:2293.
11. Shobana S, Krishnaswamy K, Sudha V, Malleshi NG, Anjana RM, Mohan V. Finger Millet (*Eleusine coracana L.*): A Review of its Nutritional Properties, Processing, and Plausible health benefits, Advances in Food and Nutrition Research. 2013; 69:17-18.
12. Srivastava RP, Kumar S. Fruit and Vegetable Preservation: Principles and Practices, Lucknow: International Book Distributing Co. 2002, 29-36.
13. Whitman WC, Johnson WM, Tomczyk JA. Refrigeration and Air Conditioning Technology Thomson Publications, New Delhi, 5th Edition. 2005, 88-91.
14. Jay MJ. Food Analysis: Theory and Practices, CBS Publishers and Distributors, New Delhi, 3rd Edition. 2000, 69-75.