



CALORIE DENSITY AND NUTRIENT CONTENT OF COMMONLY CONSUMED SWEETMEATS OF JASHORE DISTRICT IN BANGLADESH

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ABSTRACT

The purpose of the current study was to analyze the nutrient content of some commonly consumed sweetmeats of Jashore district in Bangladesh and calculation of their calorie densities. The selected samples for the study were as follows: Rosogolla (sponge, white), Kalojam, Laddu (mewa), Chomchom (black, brown, white), Shondesh (para, chinir, cake), Doi (mishit, tok, tok-mishiti). Sweetmeats were collected from three different popular shops of Jashore Sadar in Jashore district during the period of October, 2019 to December, 2019. Proximate analysis of the samples was conducted in triplicate by various standard methods and calorie densities were calculated by amount of energy per gram of food. Ash content ranged from 2 to 5.33%, moisture content ranged from 25.66 to 69.3%, protein content ranged from 2.19 to 4.05%, fat content ranged from 0.64 to 2.55%. In case of dietary fiber, highest fiber content was found in laddu (1.37%) and lowest fiber content was found in kalojam (0.73%). However, carbohydrate content was measured by subtraction method and highest carbohydrate content was found in chinir sondesh (64%) and lowest carbohydrate content was found in tok doi (22.68%). Afterwards, Sweets were ranked in descending order according to their calorie densities. It was seen that chinir sondesh was the most calorie densest foods and tok doi was the least amongst the studied samples.

KEYWORDS: Calorie density, nutrient, sweetmeats, Jashore, Bangladesh.



INTRODUCTION

The word 'Sweetmeat' means a food which is rich in sugar with milk. Everyone loves to eat sweets. The same picture is obvious in Bangladesh also. Bangladeshis like to eat milk made sweets [1]. The sweetmeats are enjoyable, wholesome, nutritious and very popular item in Bangladesh [2]. Occasions and sweetmeats are the two intimate part of Bengali tradition as Bangladeshi people are fond of sweetmeats a lot. In this country people could not imagine to rejoice any opportune events without sweetmeats. Bangladeshi sweetmeats also renowned all over the world. In any kind of entertainment, either at household or national level, sweetmeats are a must to have [3]. There have been a variety of sweetmeats produced and also available in the markets of Bangladesh such as Rosogolla, Rasomalai, Doi, Chomchom, Kalojam, Malaikari, Sondesh, Rasokadam, Kachagolla, Peda, Rajvog, Amirti, Chanar, Polao, Monda etc.

The food market is continuously changing which leads to a growing diversity of available foods [4]. Among these varieties of foods, sweetmeats and other sweet products are mentionable. It was observed in a government study that about 10% of the total milk produced in Bangladesh are used for the preparation of chhana and finally for sweetmeat making [5] and about 4% of the milk is used for Yoghurt preparation [6]. Not only they are palatable but also supply essential nutrients like Proteins, Vitamin-B, Calcium and Phosphorus along with numerous other essential major and minor substances [7].

Information of the nutrient content of all kinds of foods is crucial for nutritional research and various applied nutrition projects, including the interpretation of food consumption studies, the nutritional assessment of food supplies, and the planning of nutritionally adequate diets. Food composition databases (FCDBs) are essential tools in these regard. In dietary treatment of diseases, knowledge of food intake and its chemical composition is essential [8]. FCDBs need to be of high quality, reliable, up-to-date and representative of the foods consumed by the population [4, 9]. There have been some recently published FCDBs for Bangladeshi foods [10, 11] but none of those included commonly consumed sweetmeats of Bangladesh. Hence, the objective of the current study was to explore the nutrient content of some commonly consumed sweetmeats of Jashore district in Bangladesh and to calculate their calorie density.

METHODOLOGY

Sample Selection

A short market survey was conducted prior to selection of the samples. Findings from the market

survey suggested to finally short listed the selected samples for the study. Thirteen samples of different varieties were selected. They were as follows: Rosogolla (sponge, white), Kalojam, Laddu (mewa), Chomchom (black, brown, white), Shondesh (para, chinir, cake), Doi (mishit, tok, tok-mishti).

Sampling Area and Sample Collection

Samples were collected from three locally popular sweet shops of Jashore sadar in Jashore district. Samples were collected in air tight bags immediately followed by bringing the samples in the Food Analysis Laboratory of Jashore University of Science and Technology. Samples of same varieties were homogenized at first and then taken for further analysis.

Proximate Analysis

The proximate analysis of was conducted by using standard methods [12]. Each samples were analyzed in triplicate.

Moisture

Samples were analyzed for moisture content in a dry air oven at 105°C. Following formula was used: Moisture content (%) = [Final weight (in gram)/ Raw sample weight (in gram)]x 100

Here, Final weight= (Crucible + dried sample)- (Crucible+ Raw sample)

Ash (total minerals)

Ash content was measured by using a muffle furnace. Following formula was used:

Ash content (%) = [Final weight (in gram)/ Raw sample weight (in gram)] ×100

Here, Final weight= [(Crucible+ ash)- Empty crucible]; Raw sample weight= [(Crucible+ Raw sample)- Empty crucible]

Protein

Protein content of the samples was estimated by micro-kjeldahl method. The following formulas were used:

Nitrogen (%) = [(S-B) × N×14×100]/ (Raw sample weight ×1000)

Crude protein (%) = Nitrogen (%) ×6.25 [13]

Here, S= Titration reading for sample; B= Titration Reading for blank, N=Strength of acid.

Fat

The crude lipid content was estimated by using Soxhlet organic extraction apparatus [14]. The samples were dried prior to the extraction with petroleum ether.

Following formula was used: Crude lipid (%) = [(A-B)/ W] ×100

Here, A=Conical flask weight+ extracted oil; B= Conical flaks weight; W= Sample weight

Total Dietary Fiber (TDF)

Modified-Prosky method [12, 15] was used to measure total dietary fiber. Following formula was used:



TDF (%) = $\frac{R - (A + P + B)}{\text{Sample weight (mg)}} \times 100$
 Here, R = Average residue weight (mg); A = Average ash weight (mg); P = Average protein weight (mg); B = Blank weight

Carbohydrate

Carbohydrate content was measured by the difference [16]. It was calculated by following equation:

Carbohydrate (%) = $100 - [\text{Moisture (\%)} + \text{Ash (\%)} + \text{Crude protein (\%)} + \text{Crude lipid (\%)}]$.

Calorie Density

Calorie density was estimated by amount of energy per gram of food and foods were ranked in descending order according to their calorie densities thereafter.

RESULTS AND DISCUSSION

Table 1 shows the nutrient content of the selected sweetmeats. Para sondesh contained about 2.67% ash, 34.6% moisture, 3.87% protein, 2.15% fat, 0.77% DF and 55.95% CHO; Para sondesh contained about 4% ash, 39.13% moisture, 4.05% protein, 2.07% fat, 0.92% DF and 50.75% CHO; Chinir sondesh contained about 3.67% ash, 25.66% moisture, 3.43% protein, 1.99% fat, 0.78% DF and 64.47% CHO; Black

chomchom contained about 5.33% ash, 44.18% moisture, 4.05% protein, 1.62% fat, 0.88% DF and 43.93% CHO; Brown chomchom contained about 4% ash, 40.1% moisture, 3.38% protein, 1.26% fat, 0.96% DF and 50.29% CHO; White chomchom contained about 3.67% ash, 32.8% moisture, 3.71% protein, 1.58% fat, 1.13% DF and 57.12% CHO; Rosogolla contained about 2% ash, 34.67% moisture, 2.32% protein, 0.73% fat, 0.90% DF and 59.38% CHO; Sponge rosogolla contained about 2.67% ash, 45.47% moisture, 2.5% protein, 0.64% fat, 1.12% DF and 47.61% CHO; Kalojam contained about 2% ash, 35.2% moisture, 2.19% protein, 1.42% fat, 0.73% DF and 58.46% CHO; Laddu contained about 3.33% ash, 50.53% moisture, 2.36% protein, 1.32% fat, 1.37% DF and 41.09% CHO; Tok doi contained about 2% ash, 69.27% moisture, 2.74% protein, 2.29% fat, 1.03% DF and 22.68% CHO; Tok misti doi contained about 2% ash, 53.17% moisture, 3.8% protein, 2.06% fat, 1.17% DF and 37.81% CHO; Misti doi contained about 2% ash, 46.2% moisture, 3.63% protein, 2.55% fat, 0.95% DF and 44.87% CHO.

Table 1: Nutrient content of the selected samples expressed as g/100g.

Name of sweets	Ash (g/100g)	Moisture (g/100g)	Protein (g/100g)	Fat (g/100g)	DF (g/100g)	CHO (g/100g)
Para sondesh (mean± SD)	2.67±1.15	34.6±9.89	3.87±0.95	2.15±0.55	0.77±0.12	55.95±9.10
Cake sondesh (mean± SD)	4±0	39.13±6.40	4.05±0.58	2.07±0.86	0.92±0.38	50.75±6.80
Chinir sondesh (mean± SD)	3.67±2.52	25.66±2.09	3.43±1	1.99±0.69	0.78±0.12	64.47±4.43
Black chomchom (mean± SD)	5.33±1.15	44.18±12.49	4.05±0.77	1.62±0.14	0.88±0.35	43.93±10.99
Brown chomchom (mean± SD)	4±2	40.1±4.66	3.38±0.53	1.26±0.07	0.96±0.21	50.29±5.61
White chomchom (mean± SD)	3.67±0.58	32.8±11.56	3.71±0.58	1.58±0.21	1.13±0.56	57.12±11.44
Rosogolla (mean± SD)	2±0	34.67±6.50	2.32±0.18	0.73±0.07	0.9±0.22	59.38±6.74
Sponge rosogolla (mean± SD)	2.67±1.15	45.47±2.89	2.5±0.18	0.64±0.33	1.12±0.19	47.61±3.20
Kalojam (mean± SD)	2±0	35.2±5.70	2.19±0.72	1.42±0.32	0.73±0.08	58.46±5.83
Laddu (mean± SD)	3.33±1.15	50.53±7.56	2.36±0.42	1.32±0.44	1.37±0.14	41.09±8.56
Tok doi (mean± SD)	2±2	69.27±10.86	2.74±0.51	2.29±0.4	1.03±0.26	22.68±11.06
Tok misti doi (mean± SD)	2±0	53.17±8.26	3.8±0.72	2.06±0.72	1.17±0.38	37.81±9.73
Misti doi (mean± SD)	2±0	46±2.163	3.63±1.19	2.55±0.21	0.95±0.13	44.87±1.67

N.B.: g=gram, DF= dietary fiber, CHO= carbohydrate, SD= standard deviation.

Figure 1a and 1b depicts the ash and moisture content of the selected samples. Ash content of the sweets ranged from 2.0 to 5.33 g/100g. About 2g ash was found in rosogolla, kalojam, tok doi, tok misti doi and misti doi. Highest ash content was found in black

chomchom. On the other hand, cake sodesh and black chomchom contained about 4g ash per 100 g. In case of moisture content, highest moisture content was found in tokdoi (69%) and lowest moisture content was found in chinir sodesh (25%).

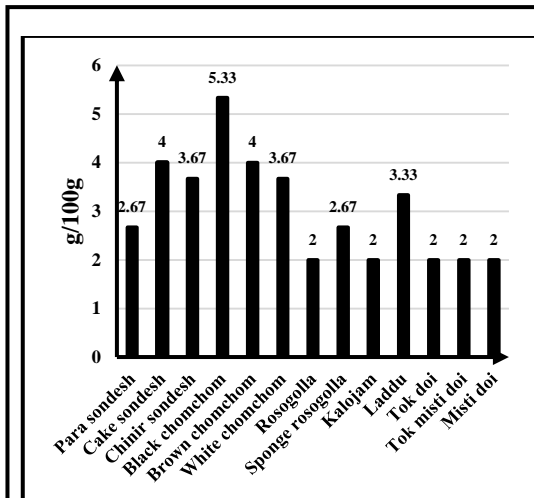


Figure 1a: Ash content of the selected samples.

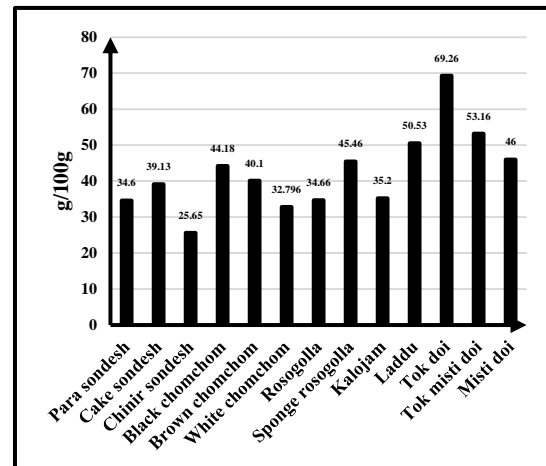


Figure 1b: Moisture content of the selected samples.

Figure 2a and 2b depicts the protein and fat content of the selected samples. Protein content of the sweets ranged from 2.19 to 4.05 g/100g. About 3.43g protein was found in chinir sodesh, 2.32 g ash in rosogolla. Highest protein content was found in black

chomchom. On the other hand, tok misti doi contained about 2.73g protein per 100 g. In case of fat content, highest fat content was found in misti doi (2.55%) and lowest fat content was found in sponge rosogolla (0.64%).

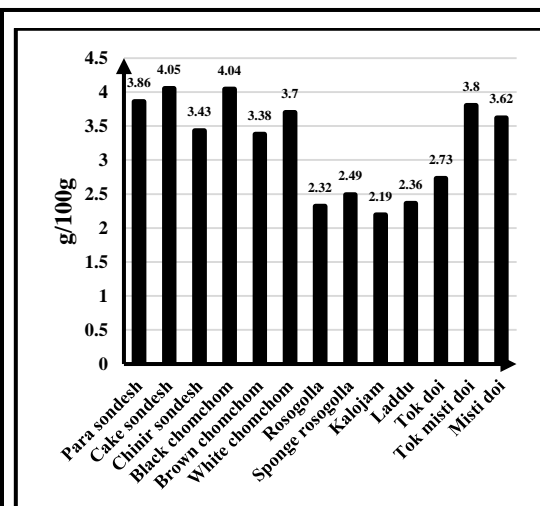


Figure 2a: Protein content of the selected sample

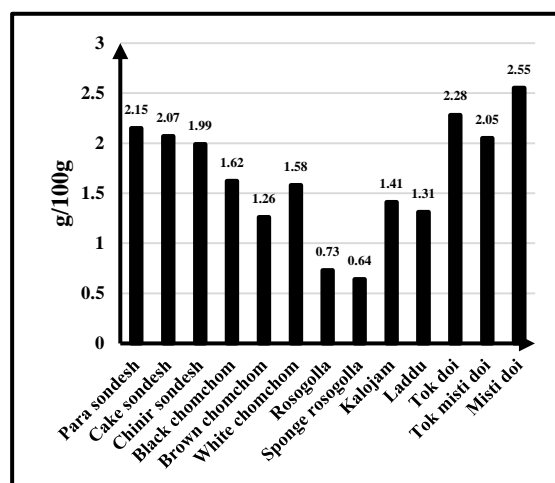


Figure 2b: Fat content of the selected samples.

Figure 3a and 3b depicts the total dietary fiber and carbohydrate content of the selected samples. Dietary fiber content of the sweets ranged from 0.73 to 1.36 g/100g. About 0.78g fiber was found in chinir

sodesh, 0.9 g fiber in rosogolla. Highest fiber content was found in laddu. On the other hand, tok misti doi contained about 1.03g fiber per 100 g. In case of carbohydrate content, highest carbohydrate content was



found in chinir sondesh (64.47%) and lowest carbohydrate content was found in tok doi (22.67%).

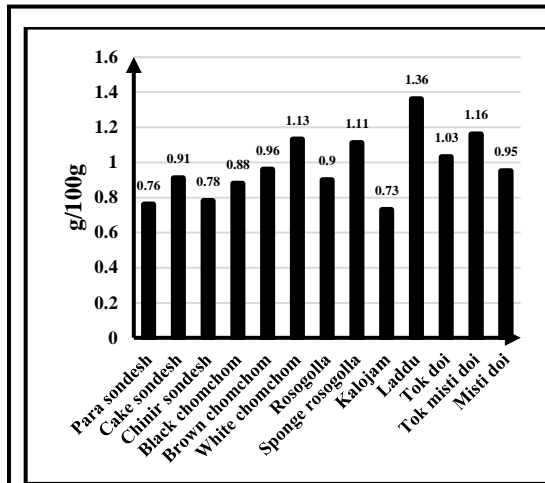


Figure 3a: Dietary fiber content of the selected samples.

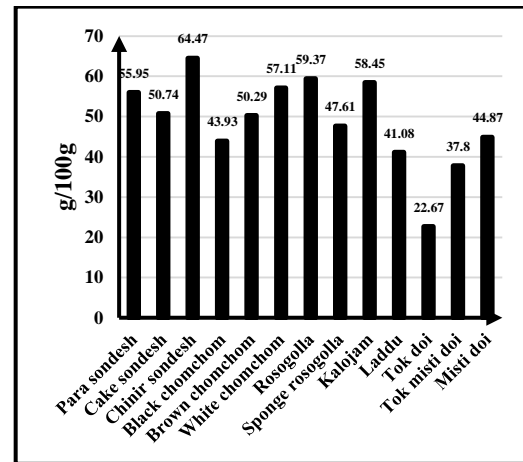


Figure 3b: Carbohydrate content of the selected samples.

Table 2 demonstrates the calorie densities of the sweets studied. It was seen that energy content of the sweets ranged from 122.23 kcal to 289.52 kcal per 100 g of sweets. Subsequently, calorie densities were calculated and ranked in descending order. After

ranking, it was observed that, chinir sondesh made to the top of the list since its calorie density was 2.90 (highest among the samples) and tok doi occupied the bottom of the list and ranked last amongst the samples (1.22).

Table 2: Calorie densities of the selected sweets

Name of sweets	Kcal per 100 g	Calorie density	Ranking
Para sondesh	258.62	2.59	2
Cake sondesh	237.82	2.38	6
Chinir sondesh	289.52	2.90	1
Black chomchom	206.5	2.07	9
Brown chomchom	226.06	2.26	7
White chomchom	257.51	2.58	3
Rosogolla	253.4	2.53	5
Sponge rosogolla	206.2	2.06	10
Kalojam	255.35	2.55	4
Laddu	185.65	1.86	11
Tok doi	122.23	1.22	13
Tok misti doi	184.95	1.85	12
Misti doi	216.95	2.17	8

N.B.: Kcal= kilocalorie, g=gram.



CONCLUSION

This study was the first of its kind in Bangladesh to reveal the calorie density and nutrient content of different varieties of commonly consumed sweetmeats of Bangladesh. Although the nutrient content and calorie densities obtained from this study may not be regarded as conclusive since these may vary due to variations in recipes and qualities may vary from place to place but the results might be useful for dietary analysis for the determination of nutrient intake in various nutrition surveys and research along with decision making in the formulation of a more cautious and insightful healthy diet plan.

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