

Assessment of Macronutrients in Street Food Especially Pao Bhaji Collected from the Metropolitan City of Kolkata, West Bengal, India

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Abstract: *Street foods are well-known edible foods for the local people in a fast-growing city. The objective of the study was attempted to evaluate the macronutrient compositions of street foods, especially Pao Bhaji collected from four different areas of Kolkata metropolitan city. This study deals with the distribution level of macronutrients, energy contribution, amount of supply per day requirement and comparing homemade foods and street food prepared by street vendors in different places. In the present study, homemade food is more suitable than the street food related to energy (kcal) uptake and macronutrient consumption as Recommended Dietary Allowance (RDA%) by the local people. In conclusion, Pao Bhaji is a well-known street food sold from open areas. In the present study, the macronutrients viz. carbohydrate and fat observed higher values in street food when compared to homemade food, but all the macronutrients obtained below the RDA value. It is suggested to analysis macronutrients among other street foods within these study sites.*

Keywords: Macronutrients, Pao bhaji, Street food, Street vendors

1. Introduction

According to the FAO, street food is defined as already cooked foods sold on streets or other public places by hawkers.^[1] The World Health Organization (WHO) defines street vended foods are prepared and/or sold by vendors in streets and other public places for immediate consumption or consumption at a later time without further processing or preparation.^[2]

Generally, edible foods that are commonly sold in open areas within the streets and places without surrounding walls like shops, are known as street foods.^[3,4] These food vendors play unique roles in the community and largely drive economic activity. Street foods consist of variety of traditional foods, tasty, quickly served and available at reasonable rates and thus have been forcing many town and city dwellers to eat their major daily meals out of home. In many countries, street foods are beneficial for all income groups, nutritional values diversify diets among the local people.^[5-7] For many people in poor countries, food vendors provide a convenient diet. Moreover, street foods are also characterized by regularity, consistency and frequency of consumption in all income groups, especially the urban poor and children.^[6]

Rapid advancement of economic and industrial developments followed by tremendous increase in urban population, street foods that are ready to eat foods prepared and sold by street vendors and are getting more attractions. In global perspectives, an increasing number of individuals depending on street foods because of how it is easily accessible, affordable and convenient to many millions of people.^[7]

In Kolkata city, many small vendors are situated in different parts to sell edible food to the consumers throughout the year^[8] and have been established as a promising vehicle for nutrient fortification due to inexpensive, easily available and

are an integral part of the diet to all categories of consumers.^[9] It provides considerable amounts of valuable nutrients, depending on the raw ingredients used.^[10,11]

Nutrients are the most essential substances needed for the sustenance of any biotic life including human beings.^[12] These are very active ingredients for the body's growth, maintenance, and overall health. They provide energy, build and repair tissues, and regulate bodily functions.^[13] Humans need a wide range of nutrients to lead a healthy and active life. Nutrients like carbohydrates, lipids, and proteins need relatively large quantities in the body, are major sources of energy and are termed as macronutrients. On the other hand, micronutrients are required in lesser amounts but are still essential for bodily functions and include all the essential minerals and vitamins.^[9]

Present study is an attempt to highlight the macronutrient compositions of street foods, especially Pao Bhaji collected from four different areas of Kolkata metropolitan city. This study deals with the distribution level of macronutrients, energy contribution, amount of supply per day requirement and comparing homemade foods and street food prepared by street vendors in different places.

2. Materials and Methods

The study was carried out in the four sites of the metropolitan area of Kolkata, India. The study locations are i) North Kolkata where majority of the customer, belonged to cream class and middle class of the society (L1); ii) South Kolkata where customers of vended food generally belongs to middle class family (L2); iii) East Kolkata customers are from middle class of the society used to come frequently for vended food (L3) and iv) West Kolkata where customers belongs to all the classes of the society (L4). Homemade (HM) food samples

were also collected which were prepared during holidays for family use.

Collection of samples

Freshly prepared food items by vendors were collected randomly in sterilized plastic containers during daytime. These samples were individually homogenized using the mixer and from the composite samples about 200 gm sample was packed immediately. These containers were stored in freezer and analyses of all components were completed as early as possible. HM food samples were also collected, homogenized and preserved along with samples collected from vendors and kept of analysis.

Analysis of nutrients

In the laboratory the food samples were oven dried at 105°C overnight to assess moisture content. All other analysis was accomplished following the standard procedures as outlined by Sadashivam & Manickam^[14] and Standard procedure of AOAC.^[15] Recommended Dietary Allowance (RDA%) was calculated for the macronutrients studied.

Averages of duplicate analysis were represented in all cases, and the statistics of paired t test were performed to find the significant differences.

3. Results

The level of occurrence of the macronutrients in Pao Bhaji was highlighted (Table 1 and Table 2). The carbohydrate content in different areas varied from 11.95 to 15.45% with maximum at L3 and minimum at L2. There were no significant statistical differences between the locations ($p>0.05$). However, lower amount (10.62%) was recorded in homemade (HM) food and there was found distinct difference ($p<0.05$) between HM and food prepared at L3 (Table 1). The carbohydrate equivalent energy values varied 45.12 to 61.80

kcal with an average of 52.20 kcal per 100 gm of foods, and this was slightly higher than the energy value in HM food (Table 2).

The level of protein values ranged between the minimum 3.30 to the maximum 5.90% (Table 1). Only between the L2 and L3, significant statistical differences ($p<0.01$) were observed in protein levels signifying different mode of preparation through using different quantity of ingredients. On the other hand, protein content in L3 Pao Bhaji registered significantly ($p<0.01$) higher levels (5.92%) in comparison to food prepared in HM (7.24%). Protein origin energy level ranged between 6.60 to 11.85 kcal with an average of 8.63 kcal which was almost same in quantity to the energy produced from HM food (Table 2).

Fat content showed to vary from the minimum 7.22% at L3 to the maximum (9.64%) at L2. No significant statistical differences were recorded in fat content in any of these locations. The HM food (3.55%) contained significantly ($p<0.01$) lower fat value than the foods prepared in any other locations (Table 1). The amount of energy produced from fat (Table 2) recorded the minimum values (35.10 kcal) at L3 and maximum values (55.20 kcal) at L4. The average energy obtained from fat was 106.32 kcal per 100 gm of food consumption. The combined food energy evolved during digestion of carbohydrates, protein and fat ranged between the minimum values of 100.0 kcal at L2 to the maximum values of 114.0 kcal at L4. The average total energy value was 106.32 kcal that was considerably higher than the HM food (66.8 kcal).

The levels of fiber registered minimum values (3.50%) at L3 to the maximum of 6.65% at L2. Except between the locations of 3 and 4, other locations showed almost equal levels of fiber. However, comparatively higher fiber levels were always found in HM food (Table 1).

Table 1: Macronutrient uptake (% of RDA) by consumption of Pao Bhaji from various locations in Kolkata

Components	L1	L2	L3	L4	Mean $\pm$ SD	HM	RDA (gm/day)
Carbohydrates	12.53	11.95	15.45*	13.52	13.36 $\pm$ 1.33	10.62	100
Protein	4.28	3.30	5.92a*	3.76	4.31 $\pm$ 0.99	7.24	50
Fat	9.44*	9.64*	7.22*	8.55*	8.71 $\pm$ 0.95	3.55	54
Fibres	4.00	6.65	3.50	6.00	5.03 $\pm$ 1.32	9.70	35

* $p<0.01$; ^a $p<0.01$; RDA = Recommended Dietary Allowance

Table 2: Food energy (kcal) uptake through macronutrients in Pao Bhaji from different locations in Kolkata

Components	L1	L2	L3	L4	Mean $\pm$ SD	HM
Carbohydrates	45.12	47.8	61.8**	54.1	52.20 $\pm$ 6.43	42.5
Protein	8.56	6.60	11.85*	7.52	8.63 $\pm$ 1.98	7.2
Fat	42.30	45.40	35.10	55.20	44.50 $\pm$ 7.22	17.1
Total	101.40	100.00	109.90	114.00	106.32 $\pm$ 5.83	66.8
% RDA	4.22	4.16	4.56	4.72	4.41	2.78

^a $p<0.01$; * $p<0.01$; ** $p<0.05$; RDA = Recommended Dietary Allowance

4. Discussion

Carbohydrates, proteins and fat are very important macronutrients present in food.^[13] These components produce energy for safe operation of physiological activities in the body.^[9] Moreover, higher fat content in street foods may produce higher energy during digestion of foods. Total combined energy of all these macronutrients was found to

constitute within the values of 4.16 and 4.72 kcal of the total energy with an average of 4.41 kcal on consumption of this food in a day needed to perform all the physiological activities during a day for an adult, which is ascribed as Recommended Dietary Allowance (RDA).

It was reported that Indian citizen consumed cereals in higher amounts and neglected the intake of proper amounts of

protein-based foods while in western countries, consumption of a higher quantity of animal protein is established. ^[16,17] This study is an agreement with earlier study related to higher levels of carbohydrate consumption.

Dietary fiber delays the intestinal transit of the food consumed. It is important for proper bowel function and to reduce chronic constipation, hemorrhoids coronary heart diseases, plasma cholesterol, diabetes and obesity. Besides, the protective role of dietary fiber against colon cancer has long been recognized. ^[18]

5. Conclusion

The Pao Bhaji is a well-known street food sold from open areas as 4 study sites. In the present study, the macronutrients viz. carbohydrate and fat observed higher values in street food when compared to homemade food, but all the macronutrients obtained below the RDA value. It is suggested to analysis macronutrients among other street foods within these study sites.

Conflict of interest

Authors declare no conflict of interest.

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