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# Assessment of Macro- and Micro-Nutrients in Street-Vended Food Sold in the City of Kolkata, West Bengal, India

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**Abstract:** ***Street foods are ready-to-eat foods for the Indian people. The present study was attempted to estimate the macro- and micronutrient nutrient content in street-vended food especially Chinese rice in Kolkata compared to homemade (HM) food. Based on the current evaluation of the macro- and micro-nutrient contents, this food is nutritionally diverse, with large variations depending on the ingredients, cooking techniques, serving size, cooking oil, and vendor practices. In conclusion, Chinese Rice is a well-known street food sold from open areas. In the present study, the macro-nutrients viz. carbohydrate and fat were observed higher, and protein obtained lower values in street food when compared to homemade food while sodium content was higher in the studied food, but all the macro- and micro-nutrients obtained below the RDA value. It is suggested to analysis macro- and micro-nutrients among other street foods within these study sites.***

**Keywords:** Chinese Rice, Macronutrients, Micronutrients, Street food, Street-vending

## 1. Introduction

One of the informal food economy's fastest-growing industries is the market for street-vended foods. [1] The reliance on ready-to-eat foods sold by street sellers has significantly increased with a result of quick urbanization, shifting lifestyles, higher workforce participation, and migration.[2-4]

Approximately 2.5 million people enjoy street food in India.[5] Traditional regional cuisine, fried snacks, sweets, beverages, fruits, and entire meals are all examples of street meals in Kolkata.[6,7]

It is essential to determine macro- and micro-nutrients in the street foods because the proper nutrition in diet is mandatory for the benefit of health. The present study was attempted to estimate the macro- and micronutrient nutrient content in street-vended food especially Chinese rice in Kolkata compared to homemade (HM) food.

## 2. Materials and Methods

As per our previous study, we selected different 4 locations for collecting Chines Rice[8] and proceeded for macro- and micro- nutrient analysis in the above-mentioned food samples.

For the analysis, the standard protocol was followed for each parameter.

The statistical analysis was performed by using PSPP tool (version, 1.3). The data obtained from nutrient contribution of street food especially Chinese Rice was statistically analyzed. The mean ± standard deviation for duplicate samples in each parameter of each location was compared by HM food as per student's 't' test. P value less than 0.05 was considered significant.

## 3. Results

Table 1 exhibits the level of occurrence of the macronutrients in street food viz. Chinese Rice.

The carbohydrate content (gm) was significantly ($p<0.001$ and $p<0.01$) increased in L2 (33.69 ± 0.3) followed by L4 (32.36 ± 0.4), L1 (32.07 ± 0.8) but L3 (11.95 ± 0.2) did not show significant change when compared to HM (21.03 ± 0.6). The level of protein content (gm) was significantly ($p<0.01$ and $p<0.05$) reduced in L4 (5.25 ± 0.3) followed by L3 (5.66 ± 0.6), L2 (5.74 ± 0.5) and L1 (6.005 ± 0.04) when compared to HM (7.66 ± 0.1). The level of fat content (gm) was significantly ($p<0.01$ and $p<0.05$) increased in L2 (4.68 ± 0.1) followed by L1 (4.43 ± 0.5), L4 (4.41 ± 0.3), and L3 (4.34 ± 0.3) when compared to HM (2.55 ± 0.3). The level of fiber content (gm) was reduced in all locations without any significant differences when compared to HM. The level of moisture content (%) was significantly ($p<0.05$) increased in L1 (62.15 ± 1.13) followed by L3 (62.11 ± 0.2), L2 (62.04 ± 0.5), and L4 (60.27 ± 0.1) and when compared to HM (56.15 ± 1.1). There were no significant statistical differences between the locations ($p>0.05$).

**Table 1:** Macronutrient uptake (% of RDA) by consumption of Pani Puri from various locations in Kolkata

| Components | L1 | L2 | L3 | L4 | HM | RDA (gm/day) |
|---|---|---|---|---|---|---|
| Carbohydrate (per 100 gm) | 32.07 ± 0.8** | 33.69 ± 0.3* | 31.09 ± 0.9 | 32.36 ± 0.4** | 21.03 ± 0.6 | 100 |
| Protein (per 100 gm) | 6.005 ± 0.04** | 5.74 ± 0.5*** | 5.66 ± 0.6*** | 5.25 ± 0.3** | 7.66 ± 0.1 | 50 |
| Fat (per 100 gm gm) | 4.43 ± 0.5*** | 4.68 ± 0.1** | 4.34 ± 0.3*** | 4.41 ± 0.3*** | 2.55 ± 0.3 | 54 |
| Fibres (per 100 gm gm) | 0.33 ± 0.1 | 0.27 ± 0.1 | 0.31 ± 0.2 | 0.25 ± 0.1 | 0.69 ± 0.3 | 35 |
| Moisture (%) | 62.15 ± 1.13*** | 62.04 ± 0.5*** | 62.11 ± 0.2*** | 60.27 ± 0.1*** | 56.15 ± 1.1 | --- |

*p<0.001; **p<0.01; ***p<0.05; RDA = Recommended Dietary Allowance

Table 2 depicts the level of occurrence of the energy value (Kcal) of the macronutrients in street food viz. Chinese Rice. The mean ± SD carbohydrate equivalent energy values significantly (p<0.001 and p<0.01) increased in L2 (134.76 ± 1.4) followed by L4 (129.44 ± 1.5), L1 (128.28 ± 3.3) and L3 (124.36 ± 3.6) when compared to HM (84.12 ± 2.3). The mean ± SD protein equivalent energy values significantly (p<0.001, p<0.01 and p<0.05) increased in L1 (23.02 ± 0.1) followed by L2 (22.94 ± 2.0), L3 (22.64 ± 2.4) and L4 (21.00 ± 1.2) when compared to HM (30.64 ± 0.4). The mean ± SD fat equivalent energy values significantly (p<0.01 and p<0.01) increased in L2 (18.70 ± 0.6) followed by L1 (17.70 ± 2.0), L4 (17.66 ± 1.3) and L3 (17.36 ± 1.3) when compared to HM (10.20 ± 1.0). No significant statistical differences were recorded in food energy from carbohydrate, protein and fat in any of these locations.

**Table 2:** Food energy (Kcal) of macronutrients in Chinese Rice from different locations in Kolkata compared to homemade (M ± SD; n = 2 in each location)

| Components | L1 | L2 | L3 | L4 | HM |
|---|---|---|---|---|---|
| Carbohydrate | 128.28 ± 3.3** | 134.76 ± 1.4* | 124.36 ± 3.6** | 129.44 ± 1.5** | 84.12 ± 2.3 |
| Protein | 23.02 ± 0.1* | 22.94 ± 2.0*** | 22.64 ± 2.4*** | 21.00 ± 1.2** | 30.64 ± 0.4 |
| Fat | 17.70 ± 2.0*** | 18.70 ± 0.6** | 17.36 ± 1.3*** | 17.66 ± 1.3*** | 10.20 ± 1.0 |
| Total | 169.06 | 176.40 | 164.36 | 168.10 | 124.96 |

*p<0.001; **p<0.01; ***p<0.05

Table 3 exhibits the level of occurrence of micronutrients in street food viz. Chinese Rice. The sodium content (mg) was significantly (p<0.001) increased in L1 (25.17 ± 0.40) followed by L2 (24.67 ± 0.46), L4 (24.09 ± 0.21) and L3 (23.70 ± 0.51) when compared to HM (9.14 ± 0.21). The potassium content (mg) was significantly (p<0.05 and p<0.01) increased in L2 (3.44 ± 0.35) followed by L4 (2.74 ± 0.35), L1 (2.63 ± 0.40) and L3 (2.29 ± 0.41) when compared to HM (1.13 ± 0.06). In other locations, the value was decreased without significant change. The calcium content (mg) was significantly (p<0.05) decreased in L2 (2.17 ± 0.20) followed by L3 (2.14 ± 0.18) but other two location also decreased without significant change when compared to HM (3.09 ± 0.14) (Fig 18). In other locations, the value was decreased without significant change. The iron content (mg) was significantly (p<0.05) decreased in L1 (8.16 ± 0.21) followed by L2 (8.23 ± 0.16), L4 (8.43 ± 0.28) and L3 (8.50 ± 0.49) when compared to HM (10.66 ± 0.42). The vitamin C content (mg) was significantly (p<0.01 and p<0.05) decreased in L1 (1.83 ± 0.20) followed by L2 (1.92 ± 0.34), L4 (1.65 ± 0.46) and L3 (2.67 ± 0.34) when compared to HM (4.32 ± 0.30) (Fig 20). There were no significant statistical differences in each parameter between the locations (p>0.05).

**Table 3:** Micronutrient content in Chinese Rice from various locations in Kolkata compared to homemade (M ± SD; n = 2 in each location)

| Components | L1 | L2 | L3 | L4 | HM | RDA (mg/day) |
|---|---|---|---|---|---|---|
| Na (mg) | 25.17± 0.40* | 24.67 ± 0.46* | 23.70 ± 0.51* | 24.09 ± 0.13* | 9.14 ± 0.21 | 2000 |
| K (mg) | 2.63 ± 0.40*** | 3.44 ± 0.35** | 2.29 ± 0.41** | 2.74 ± 0.35*** | 1.13 ± 0.06 | 3500 |
| Ca (mg) | 2.34 ± 0.32 | 2.12 ± 0.13*** | 2.14 ± 0.18*** | 2.27 ± 0.28 | 3.09 ± 0.14 | 1000 |
| Fe | 8.16 ± 0.21*** | 8.23 ± 0.16*** | 8.50 ± 0.49*** | 8.43 ± 0.28*** | 10.66 ± 0.42 | 24 (av) |
| Vitamin C | 1.83 ± 0.20** | 1.92 ± 0.34*** | 2.67 ± 0.34*** | 1.65 ± 0.46*** | 4.32 ± 0.30 | 75 (av) |

*p<0.001; **p<0.01; ***p<0.05; RDA = Recommended Dietary Allowance

## 4. Discussion

Foods sold on the street are a crucial part of the Indian food system because these foods help inexpensive, reachable, and culturally appropriate snacks or meals to millions of customers each day.[9-11] Based on the current evaluation of the macro- and micro-nutrient contents, this food is nutritionally diverse, with large variations depending on the ingredients, cooking techniques, serving size, cooking oil, and vendor practices. Street foods are frequently high in fat, refined carbohydrates, and sodium, and relatively low in dietary fiber and critical micronutrients, while many of them provide significant energy and certain nutrients.

## 5. Conclusion

By offering affordable and easily accessible meals, street-vended food especially Chinese rice is crucial to the diets of millions of Indians. Their nutritional content, however, varies greatly. Many commonly consumed street foods are high in fat, sodium, and refined carbohydrates, and relatively low in dietary fiber and essential micronutrients, despite the fact that many traditional foods provide beneficial carbohydrates, proteins, vitamins, and minerals. In order to lessen the load of non-communicable diseases linked to diet while maintaining the cultural and economic importance of India's street food industry, it may be possible to enhance the nutritional quality

of these meals through better ingredients, better cooking methods, vendor education, and policy interventions.

**Conflict of interest**

Authors declare no conflict of interest.

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