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ASSESSING FOOD CONSUMPTION PATTERNS: A STUDY AMONG THE ADULT KARBIS OF KARBI ANGLONG, ASSAM (INDIA)

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ABSTRACT

Food habits can be defined as conscious, collective and repetitive behaviours that lead people to select, consume and use certain foods or diets in response to social and cultural influences. The global food security and food systems are often threatened due to various factors such as intensification of agricultural production, increasing populations, rapid urbanization and changing lifestyles. These factors not only contribute to the changing production and consumption of food patterns but also affect the overall health and well-being of populations. There is also a growing association between unhealthy food consumption, socio-economic limitations, sedentary lifestyle and the increasing prevalence of cardiovascular diseases. Some dietary changes often involve increased consumption of energy-dense foods which are high in sugar and fat with a reduced consumption of fresh fruits. Methodology: A cross-sectional method of study was carried out for collecting a sample of 344 participants (200 males and 144 females) between the ages 20-45 years. A pre-designed questionnaire was used for collecting socio-demographic data and dietary habits. Anthropometric measurements such as weight, height, waist circumference and hip circumference were also taken to assess nutritional status. Objectives: The objectives are: 1. to study dietary patterns in food 2. to study nutritional status through anthropometric measurements 3. to study the socio-economic status. Results: The results show that rice was the staple food with a high consumption of non-vegetarian diet. The consumption of milk and milk products, fresh fruits was mostly absent. Further, there was also a higher intake of fast food, sweetmeats and beverages. Overweight/obesity was prevalent in both males and females, while waist circumference, waist hip ratio and waist height ratio was found to be at risk among females. Socio-economic status showed that males and females mostly belonged to upper middle class. Conclusion: Food habits and dietary practices are important not only to achieve the nutritional requirements but to attain overall health and well-being.

Keywords: Food Habit, Lifestyle, Socio-Economic, Anthropometric

1. INTRODUCTION

Food habits can be defined as conscious, collective and repetitive behaviors that lead people to select, consume and use certain foods or diets in response to social and cultural influences (https://www.fen.org.es/blog/habitos-alimentarios). The global food security and food systems are often threatened due to various factors such as intensification of agricultural production, increasing populations, rapid urbanization and changing lifestyles. These factors not only contribute to the changing production and consumption of food patterns but also affect the overall health and well-being of populations (Gupta et al., 2023). There is also a growing association between unhealthy food consumption, socio-economic limitations, sedentary lifestyle and the increasing prevalence of cardiovascular diseases (Sogari et al., 2018; Gupta et al., 2023). Some dietary changes often involve increased consumption of energy-dense foods which are high in sugar and fat and a reduced consumption of fruits and vegetables (Mendonca, 2023).

Unhealthy diets are associated with immediate as well as long term health impacts. In short term, inadequate dietary intakes of energy, protein or certain micronutrients will result in slower growth rates, lower reserves of micronutrients and inadequate bone mass. Poor diets are also linked with obesity and its related metabolic abnormalities such as high blood pressure, Type 2 diabetes, metabolic syndrome, sleep disturbances, orthopedic problems, etc. Urbanization, technological development, modernization, has in fact instigated significant demographic and epidemiological changes in most countries with parallel shifts in diet, physical activity and body composition (Story et al., 2002; Institute of Medicine, 2005; Daniels, 2006; Nasreddine et al., 2010; Nasreddine et al., 2012; Nasreddine et al., 2014; Al-Jawaldeh et al., 2020). It is well known that nutrition plays a role in maintaining a healthy immune system, with nutrient deficiencies being able to impair immunity (Barrea et al., 2020; Monroe-Lord et al., 2023).

Radical changes in the global food system and consequently in food environments, economic status and lifestyle, have established new paradigms and changes in food practices and choices (Swinburn et al., 2019; Taylor et al., 2019; Parise, 2020). Food consumption is a basic need of every human being and is one of the determinants of the quality of human resources. The determinants of food quality are the diversity of food types, nutritional balance and food security. It is realized that nutritional imbalances due to food consumption that is less diverse will have an impact on the emergence of nutritional problems, both malnutrition and more (Diansari et al., 2019). High consumption of animal-based products, refined animal fat, edible oil, refined sugar, and alcohol characterize diets in urbanized societies with higher economic development (Kastner et al., 2012; Pandey et al., 2020). Studies show that urbanizing countries are rapidly converging to these diets, increasing human health risks related to conditions such as diabetes, heart disease and stroke (Tilman et al., 2014; Crino et al., 2015; Pandey et al., 2020). Based on these trends and linkages, impending urbanization and associated dietary changes pose significant human health and environmental sustainability challenges (Seto et al., 2016; Pandey et al., 2020). The UN estimates that 90% of future urban population growth will take place in Asia and Africa, with China, India and Nigeria accounting for one-third of the growth between the years 2018-2050. Diets and patterns of urbanization are likely different for different phases of urbanization (Anand et al., 2019; Pandey et al., 2020). Food consumption is one of the main factors for the precocious appearance and early onset of nutritional disorders in all their forms, especially anemia and growth retardation, among other non-communicable chronic diseases.

1.1. AIM AND OBJECTIVE

The aim and objective of the present study are:

1) To study the dietary practice and food habits of the study population.
2) To study the nutritional status using anthropometric parameters.
3) To study the association between socio-economic status and nutritional status.

2. MATERIALS AND METHODS

The present study was carried out among the adult Karbi males and females of Karbi Anglong district of Assam. Karbis are one of the major ethnic tribe in northeast India and mostly concentrated in the hill areas of Assam. The Karbis linguistically belong to the Tibeto-Burman group. Agriculture, especially shifting (*jhum)* cultivation, still remains the predominant economic activity and most of the population (88.18 percent) are still living in the rural areas (Census of India, 2011). In the present study five areas namely, Hanjanglangso, Paklangso, Balipathar, Japrajan, Saphapani and Bormanthi under Bokajan sub-division of Karbi Anglong were selected for conducting the fieldwork. Each area comprised of a cluster of smaller villages and is headed by a village head. For the purpose of data collection, the number of households was randomly selected. A cross-sectional method of study was carried out for collecting a sample of 344 participants (200 males and 144 females) between the ages 20-45 years. Both quantitative and qualitative methods were used in the study.

3. DATA COLLECTION PROCEDURES

1) Socio-economic and demographic data: Pre-structured questionnaires were used for collecting socio-economic and demographic data of each selected household.

2) Food consumption pattern: For studying food consumption pattern, dietary habits such as staple food, non-vegetarian consumption, breakfast intake, fruits and salad intake, consumption of milk and milk products, sweetmeat and beverages intake and consumption of alcohol and tobacco were recorded.
3) Socio-economic status: Socio-economic status was calculated by using the modified socio-economic status scale given by Pareek and Trivedi (Holyachi and Santosh, 2013). The scale consists of items relating to occupation, education, family, house, land, material possession and social participation, with each item containing sub-items. The sub-items are rated with different scores for calculating the socio-economic status of each participant. The weighted scores are based on the scores of five different categories.
4) Anthropometric measurements: Anthropometric measurements such as weight, height, waist circumference and hip circumference were taken.
5) Derived measurements: Body mass index, waist hip ratio and waist height ratio were derived from the measurements and were assessed using recommended cut-off values.
   - Body mass index: It measures weight in kilograms by height in metre square (kg/m^2).

$$\text{Body mass index} = \frac{\text{Weight (kg)}}{\text{Height (m}^2\text{)}}$$

   - Waist hip ratio: It is the ratio of the circumference of the minimum waist to that of the maximum hip.

$$\text{Waist hip circumference} = \frac{\text{Waist circumference (cm)}}{\text{Hip circumference (cm)}}$$

   - Waist height ratio: It is the ratio of the waist circumference to that of the height.

$$\text{Waist height ratio} = \frac{\text{Waist circumference (cm)}}{\text{Height (cm)}}$$

Table 1 Category for assessing socio-economic status (Pareek and Trivedi SES scale)

Grade	Category	Score on scale
A	Upper class	Above 43
B	Upper middle class	33-42
C	Middle class	24-32
D	Lower middle class	13-23
E	Lower class	Below 13

(Source: Holyachi and Santosh, 2013)

Table 2 Classification of BMI for Asian Population

Classification	Range
Underweight	<18.5
Normal	18.5-22.9
Overweight	23.0-27.5
Obese I	>27.5
Obese II	32.5
Obese III	>37.5

(Source: WHO, 2004)

Table 3 Cut off for waist circumference for South Asian Population

Classification	Range	
	Males	Females

Normal	≤90	≤80
Risk	≥90	≥80

(Source: WHO, 2008)

Table 4 Cut off for Waist hip ratio

Classification	Range	
	Males	Females
Normal	<0.95	<0.80
Risk	>0.95	>0.80

(Source: Willet et al, 1999)

Table 5 Cut off for Waist height ratio

Classification	Range
Normal	<0.50
Risk	>0.50

(Source: Ashwell, 2005)

4. ETHICAL APPROVAL AND CONSENT

The following study was conducted in accordance with the Declaration of Helsinki recommendations for human research. Informed consent was obtained from each participant before conducting the study. All consenting members were included in the study, and those of who did not provide their consent were excluded from the study.

4.1. DATA ANALYSIS

In the following study, results were analyzed and obtained using MS Excel Worksheet.

5. RESULT AND DISCUSSION

As of 2016, an estimated 44 percent of adults worldwide are overweight or obese and over 70 percent live in low-middle-income countries. The ever increasing proportion of overweight/obese adults categorized primarily on BMI measure in these countries, has established the fact that obesity is no more a problem of high income countries or urban settings. The prevalence of overweight/obesity is pertinent for low-middle-income countries, where undernutrition is also prevalent and that pose a threat of double burden of malnutrition. This can be said for India as well, which has the third largest overweight/obese population in the world after USA and China, as per WHO estimates (Choudhary et al., 2023). In the present study, malnutrition in the form of underweight and overweight/obesity was found among both males and females, but the prevalence of overweight/obesity was found to be higher and more prominent among males (44.5%) in terms of BMI classification for Asian population, as compared to females (41.6%). A study by Verma et al., 2021, highlighting the rise in prevalence of obesity in the Indian population in majority of the states found that people with overweight and obesity were more in urban areas as compared to rural areas and the increased prevalence was also more prominent amongst males (38.4%) as compared to females (32.2%). It is more representative of the Indian population when obesity is determined at the lower cut-off levels as recommended by the WHO Expert group (WHO,2000), as the WHO international guidelines (WHO, 2020) for BMI cut-offs to determine obesity defines obesity when BMI is ≥30. However, these guidelines are mostly based on studies of Caucasians, who have lesser total truncal, intra-abdominal subcutaneous and ectopic tissue fat at a given level of BMI (WHO, 2000), as compared to aged-matched Asian Indians (Venkatrao et al., 2021). Overweight and obesity are caused by an energy imbalance between calories consumed and calories burned. BMI is a key risk factor for non-communicable diseases such as cardiovascular disease, diabetes, musculo-skeletal problems and several other malignancies. A high BMI value, in general, implies excessive body

fat and is consistently associated with greater health risks and mortality. However, different individuals of the same BMI may have distinct body shapes depending on the distribution of body fat and skeletal muscle (Sruthi et al., 2023).

Waist circumference is a measure of central or abdominal obesity. It is a means of assessing the mass of abdominal subcutaneous and intra-abdominal fat. Intra-abdominal fat produces certain proteins and hormones such as, adipokine, inflammation, angiotensinogen and cortisol which are associated with cardiometabolic diseases like dyslipidemia, coronary heart diseases and hypertension (Darsini et al., 2020). The results of the data analysis by Darsini et al., 2020 showed several health risks related to high waist circumference. As stated by WHO, waist circumference >94 cm in men and >80 cm in women is associated with an increased risk of metabolic complications. The cut-off is lower for Asian population with males >90 cm and females >80 cm (Sruthi et al., 2023). According to the ICMR-INDIAB study in India, the prevalence of obesity was found to be around 11.8%-31.3% and that of central obesity was found to be 16.9%-36.3% (Ahirwar and Mondal, 2019). In the present study, the distribution of high risk prevalence of waist circumference (27.1%), waist hip ratio (69.5%) and waist height ratio (42.4%), was found to be higher among females as compared to males. A series of cross-sectional studies from 1995-2015 conducted in Jaipur, India had concluded that obesity measured in terms of increased BMI, waist circumference and waist hip ratio was significantly associated with the increasing risk of hypertension among adults. High-risk waist circumference was observed among 9% males and 37% females. Furthermore, 75% of males and 78% of females had a high-risk waist hip ratio (Muhammad et al., 2022). A study among women aged 21-45 years from the urban slums of Mumbai, India, found that a little more than half of the studied population (51.9%) had waist height ratio ≥0.50 which indicates a potential of developing early health problems (Malshe et al., 2017). Similarly, waist height ratio ≥0.50 showed a significantly higher risk of increased blood pressure in a study among women conducted by Cao et al., 2024. Shrestha et al., 2021 found that the overall prevalence of abdominal obesity by waist hip ratio was 32.76% with a higher prevalence among women (40.1%) than men (23.8%).

Physical inactivity is increasing as a result of the increasingly sedentary character of many types of jobs, changing modes of transportation and expanding urbanization. In addition, environmental and societal changes linked with development frequently lead to changes in food and physical activity patterns (Sruthi et al., 2023). Factors such as age, marital status, use of tobacco and alcohol were found to be significantly associated with overweight and obesity (Verma et al., 2021). The prevalence of overweight and obesity in India also varies due to age, gender, geographical regions as well as socio-economic status (Ahirwar and Mondal, 2019). In the present study, most participants were found to be in upper middle class with males (77.5%) and females (55.6%) while in the lower middle class the number of females (44.4%) was higher than males (22.5%). The rise of the middle class group has doubled in size during the eight-year period of 2004-2012. By 2015, the number of the middle class in India was between 300 and 600 million, according to Deutsche Bank Research, and that fewer than 19 percent of Indians lived below the poverty line in 2011. The rates of the Indian household savings also increased rapidly between 2005 and 2015 and this paved the way for many to have a significant disposable income. The middle class population is expected to grow rapidly in the next decade, and by 2027, the size of this group is expected to be larger than that of China, United States and Europe (Roy, 2018).

In the present study, the assessment of food consumption was based on self-reported information regarding habitual food patterns. No other standard dietary assessment methods were used to collect data. According to the distribution of food consumption pattern, rice was found to be mostly consumed and forms a staple diet, followed by substantial consumption of non-vegetarian diet. Breakfast was regular among (91.9%) and irregular among (8.1%). The percentage of salad and fresh fruits consumption was (45.6%) and (39.2%) respectively, while (54.4%) and (60.8%) did not consume salad and fresh fruits respectively. Consumption of milk and milk products showed varying differences. Only (4.1%) consumed milk while (95.9%) did not. However, on the other hand, (48.5%) consumed milk products while (51.5%) did not. The differences in milk and milk product consumption could be due to a mere personal food choice or issues relating to digestive health. Sweetmeat and beverage intake was (61.3%) and (58.7%) while (38.7%) and (41.3%) did not consume any type of sweetmeat and beverage respectively. Tobacco use was found to be higher (55.5%) than alcohol consumption (43.9%) while (56.1%) and (44.5%) did not consume alcohol and tobacco respectively. Literature shows that dietary changes appear to be shifting universally toward a diet dominated by higher intakes of animal and partially hydrogenated fats, sugar and lower intakes of fiber. Large scale decreases in food prices have also increased access to supermarkets and the urbanization of both urban and rural areas is another key underlying factor of nutrition transition (Popkin, 2006).

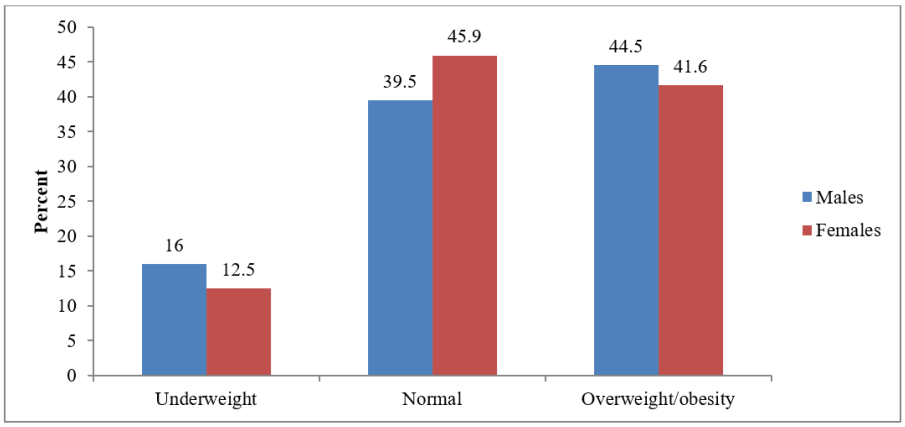

Figure 1 Distribution of Nutritional Status According to on BMI

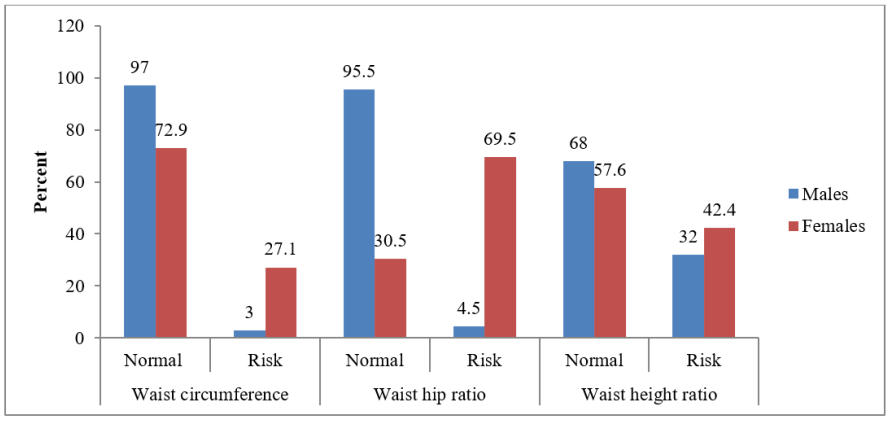

Figure 2 Distribution According to Waist Circumference, Waist Hip Ratio and Waist Height Ratio

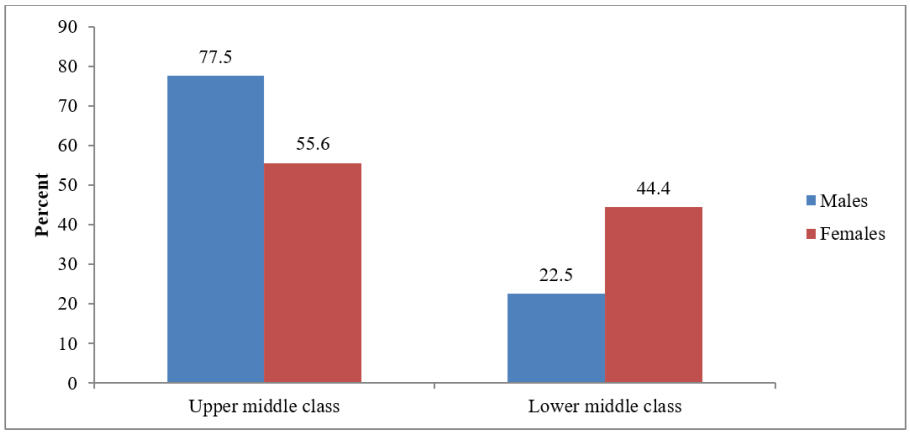

Figure 3 Distribution of Socio-Economic Status According to SES Scale by Pareek and Trivedi

Table 1 Distribution of Food Consumption Pattern

Dietary habits	Percent
Rice consumption	100
Non-vegetarian consumption	100
Regular breakfast	91.9

Salad intake	45.6
Fruits intake	39.2
Consumption of milk	4.1
Consumption of milk products	48.5
Sweetmeat intake	61.3
Beverage intake	58.7
Alcohol consumption	43.9
Tobacco use	55.5

6. CONCLUSION

Food habits and dietary practices are important not only to achieve the nutritional requirements but to attain overall health and well-being. Socio-economic determinants have a large influence on the food choices and purchasing capacity of individuals. It is also equally important to maintain a healthy-balanced diet to reduce the risk of any long term health condition. The findings of the present study revealed that consumption of non-vegetarian diet is very high with lesser amounts of fruits and dairy. Further, consumption of alcohol and tobacco is predominant among the adult members.

CONFLICT OF INTERESTS

None.

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None.

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