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Association of Dietary Factors with Body Mass Index in Obese Patients at a Tertiary Care Hospital

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ABSTRACT

Obesity is a major public health issue characterised by excessive fat buildup and is associated with illnesses such as hypertension, diabetes, and dyslipidaemia. This study explores the relationship between dietary habits and Body Mass Index (BMI) in obese patients. A cross-sectional survey of 156 obese patients aged 20 to 60 years was enrolled, and a pretested questionnaire assessed dietary factors in different domains (meal pattern, fatty foods intake, and other diet-related factors. The results of the study showed that the majority of respondents, 38.3% had reported no regular eating pattern. About 48.3% of respondents had consumed fruit occasionally. A substantial majority of the respondents' daily intake of high-calorie foods like fried (36.7%), processed (51.7%), and junk (35%) was significantly linked to elevated BMI in obese patients ($p < 0.05$). This study also found significant associations between meal patterns and low fruit intake with BMI ($p < 0.05$). This study underscores the significant link between unhealthy dietary patterns and elevated BMI in obese patients. Implementing focused nutritional strategies is crucial for combating obesity and enhancing overall well-being.

Keywords: Obesity, dietary patterns, Body mass index

INTRODUCTION

Obesity is classified as a chronic, multicausal condition marked by an excessive buildup of fat, significantly contributing to the global prevalence of non-communicable diseases such as type 2 diabetes, cardiovascular problems, and metabolic syndrome. (WHO, 2000). This escalating morbidity creates a challenge to the health infrastructure and service delivery systems of nations, particularly in developing countries (Poobalan et al., 2016). In the 21st century, obesity has proliferated in low- and middle-income nations throughout all global regions (Caballero, 2007; WHO, 2020). The prevalence of obesity has been escalating quickly in India and worldwide. Currently, obesity is regarded as one of the most serious health concerns globally. Consequently, the lapse of time has rendered obesity not merely a local issue but a global concern. Obesity is considered one of the most significant global health concerns. It has already impacted almost one-third of the global population, and this statistic is rising precipitously (WHO, 2021).

Body Mass Index (BMI) is a commonly utilised anthropometric measure for evaluating obesity and associated negative health effects. Dietary patterns significantly

influence BMI, especially in persons receiving treatment at tertiary hospitals where lifestyle-related disorders are common. Comprehending the correlation between particular dietary elements, like the frequency of fruit and vegetable consumption, intake of high-fat foods, and meal patterns with BMI might guide focused nutritional interventions and public health initiatives (Xie et al., 2025).

The rising incidence of obesity, especially in emerging nations such as India, has become a significant public health issue. A secondary data study of the National Family Health Surveys (NHFS) in India, employing Asia-specific cutoffs, revealed that 34.4% of men and 36.2% of women aged 18 years and older were classified as overweight or obese in 2015–16 (Verma et al., 2021).The INDIAB-ICMR survey revealed that 54.5% of Indians were physically inactive, with urban residents (60%) exhibiting higher inactivity rates than their rural (50%) counterparts, and women being more inactive than males (Anjana et al., 2014).

Dietary patterns marked by a regular consumption of refined cereals, red meat, and processed foods, commonly referred to as the "Western" diet, were linked to an increased prevalence and incidence of overweight, obesity, cardiovascular diseases, type 2 diabetes, and cancer (Mertens et al., 2017; Fung et al., 2004).

The association between diet and obesity is well documented in the literature. Research on dietary determinants linked to excess weight and obesity over the past decades has concentrated on particular dietary components, including macronutrients and fibre (San-Cristobal et al., 2020).

Many of the extrinsic factors that contribute to weight growth can be changed, and dietary considerations have a significant impact on the energy balance equation. The identification of dietary components that may contribute to their prevention has emerged as a significant priority for researchers and public health agencies. The early focus of nutrition research was on individual nutrients or foods; however, current efforts have shifted towards the identification and study of dietary consumption patterns (Cespedes et al., 2015).

Objective

The present study aimed to examine the association between dietary factors and Body Mass Index (BMI) among obese patients aged 20 to 60 years attending a tertiary care hospital.

METHODOLOGY

Study Design: A cross-sectional study was conducted in the General Medicine Outpatient Department (OPD) of a tertiary health care center, where 156 obese patients aged 20-60 years were enrolled. The study was conducted from July 2024 to November 2024.

Ethical Clearance: Ethical approval was obtained from the Ethics Committee of the Institute of Science (BHU), Reference No: ECR/226/Indt/UP/2014/RR-22. Informed consent was secured from all participants, with confidentiality assured. Participants were questioned about the study objectives only after they had agreed to take part.

Method of sampling - The purposive sampling method (non-probability) was used for the sample selection.

Sample Selection - Participants have been selected according to the obesity classification established by the WHO (2000) Asian cut-off points (BMI $\geq$ 25.00 kg/m^2). The responders were evaluated based on their initial anthropometric data, including height, body weight, and body mass index (BMI). These obese patients were chosen after doctors consulted their BMI, blood pressure, and biochemical characteristics gathered from their medical records. Respondents having severe complications, pregnant and lactating mothers, and respondents who were unwilling to participate in the study were excluded from the study.

Anthropometric measurements comprised weight, assessed using a digital scale in kilogrammes; height, determined with a stadiometer; and body mass index (BMI), calculated using the formula weight/height² in kg/m². The BMI range for evaluating normal weight, underweight, overweight, or obesity in the individual was derived from the Asia Pacific guidelines:

Category	**(BMI) kg/m² [Asia Pacific Range]**
Under Weight	<18.5
Normal Weight	18.5-22.9
Over Weight	23-24.9
Obesity	> 25

Tools and Techniques- A validated questionnaire evaluated dietary characteristics across various domains, including meal patterns, consumption of fatty foods, and other diet-related behaviours. Socio-demographic data were evaluated employing the B. G. Prasad scale (revised 2023). Dietary information was obtained by a food frequency questionnaire. The data was processed and analysed using version 25.0 of the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were presented using the mean, standard deviation, and percentages. Pearson's Chi-square test was employed for the association testing. Fisher's exact test was employed when the anticipated values in the table cells were below five or when the total of the column values was below twenty.

RESULTS AND DISCUSSION

Table 1. General Characteristics of the obese patients in the study (N = 156)

SOCIO-DEMOGRAPHIC PROFILE Mean + SD	
Age (Years)	44.2 +9.07
BMI (kg/m²)	30.91+3.16
GENDER n (%)	
Male	60 (38.3)
Female	96 (61.7)
MARITAL STATUS n (%)	
Married	137 (88.3)
Unmarried	19 (11.7)
AREA OF RESIDENCE n (%)	
Rural	65 (41.7)
Urban	39 (25)
Semi Urban	52 (33.3)
SOCIO ECONOMIC STATUS n (%)	
Upper	21 (13.3)
Upper Middle	23 (15)
Middle	57 (36.7)
Lower Middle	44 (28.3)
Lower	11 (6.7)
FOOD HABIT n (%)	
Vegetarian	31 (20)
Eggetarian	57 (36.7)
Non-Vegetarian	68 (43.3)

Table 1 indicates that the study sample comprised 156 obese patients with a mean age of 44.2 years (SD ±9.07), signifying a predominance of middle-aged adults. The BMI was 30.91 (SD ±3.16), categorising the subjects as obese according to the WHO (2000) Asian cut-off criteria (BMI ≥ 25.00 kg/m²), indicating an increased risk for cardiometabolic problems. Females constituted a greater percentage (61.7%) than males (38.3%). This disparity mirrored national patterns, with women exhibiting a higher propensity for obesity attributable to variables including hormonal fluctuations, social standards, and diminished physical activity levels (Xie et al., 2025). A

substantial majority of participants were married (88.3%), potentially impacting lifestyle behaviours, including eating habits and physical exercise. Prior research indicated that married status may correlate with elevated BMI as a result of shared domestic behaviours and diminished incentive for weight management (Onubi et al., 2016). The majority of the grouping comprised people from rural areas (41.7%), followed by semi-urban participants (33.3%) and urban participants (25%). This distribution demonstrated that obesity was no longer restricted to urban people and has progressively impacted rural communities, possibly due to nutritional change and diminished physical labour (Anjana et al., 2014). Non-vegetarians (43.3%) and eggetarians (36.7%) surpassed vegetarians (20%). The majority of participants were from the middle class (36.7%) and lower-middle class (28.3%). This pattern aligned with studies indicating that persons from lower-income demographics were more susceptible to obesity due to restricted access to nutritious foods and sedentary employment. Ball et al. (2005).

Table 2. Various dietary factors and their association with BMI (N =156)

Dietary Factors		**Number of respondents (n)**	**Percentage of respondents (%)**	**p value**
Meal per day	4 Meals	15	10.0	**.003**
	3 Meal	34	21.7	
	2 Meal	47	30.0	
	No Regular Eating Pattern	60	38.3	
Water intake (Number of glasses)	2–5	18	11.7	**0.971**
	6–8	60	38.3	
	> 8	78	50	
Consumption of oil /day	More than recommended	96	61.7	**0.923**
	Recommended or less	60	38.3	
Consumption of Fruits	Daily	13	8.3	**0.023**
	2–3 times per week	24	15	
	2–3 times per month	44	28.3	
	Occasionally	75	48.3	
Green Leafy Vegetables	Daily	21	13.3	**0.303**
	2–3 times per week	31	20	
	2–3 times per month	39	25	
	Occasionally	65	41.7	

Table 2 indicates that the predominant proportion of respondents had reported an irregular eating pattern (38.3%), whereas 30% had consumed two meals daily. The majority of participants had reported sufficient water intake, with 50% consuming more than 8 glasses each day. Regarding oil consumption, 61.7% had exceeded the recommended intake. Fruit consumption had been significantly low, with only 8.3% consuming fruits daily, while approximately 48.3% had consumed them occasionally. Similarly, the intake of green leafy vegetables had been inadequate, with just 13.3% consuming them daily and 41.7% indicating occasional intake—underscoring a nutritional deficiency that may have contributed to increased BMI. These findings had aligned with international studies indicating that insufficient fruit consumption was a significant dietary risk factor for obesity and related chronic illnesses (Hähnel et al., 2025). Fruit intake and meal patterns had shown a significant association with BMI among obese patients ($p < 0.05$), while no significant associations had been observed between water intake, oil consumption, or

green leafy vegetable intake and BMI ($p >$ 0.05).

Table 3. Distribution of study subjects according to the frequency of intake of High-Calorie Foods (N =156)

High-Calorie Foods		Number of respondents (n)	Percentage of respondents (%)	p value
Fried Foods	Daily	57	36.7	**.008**
	2–3 times per week	44	28.3	
	2–3times per month	29	18.3	
	Occasionally	26	16.7	
Processed Foods	Daily	80	51.7	**.000**
	2–3 times per week	31	20	
	2–3times per month	24	15	
	Occasionally	21	13.3	
Junk Foods	Daily	55	35	**.000**
	2–3 times per week	70	45	
	2–3 times per month	21	13.3	
	Occasionally	10	6.7	

Table 3 reveals that more than one-third (36.7%) of respondents had reported daily consumption of fried foods. The regular intake of fried foods had likely led to increased energy consumption and body fat accumulation. Over 51.7% of participants had reported daily consumption of processed foods. This pattern had indicated a transition to energy-dense, nutrient-poor foods, aligning with global obesity trends. Additionally, 35% of respondents had consumed junk food every day, while 45% had consumed junk food two to three times a week. This emphasized the influence of regular consumption of sugary, salty, and ultra-processed snacks on weight gain. The findings had been consistent with prior research demonstrating a strong association between diets rich in fried, processed, and junk foods and obesity, as well as metabolic disorders. One study had demonstrated that regular consumption of ultra-processed foods significantly elevated the risk of obesity, particularly among low- and middle-income populations (Monda et al., 2024). The consumption of high-calorie foods, including fried, processed, and junk foods, has shown a significant correlation with BMI in obese patients ($p < 0.05$).

CONCLUSION

This cross-sectional study showed that there is a link between eating habits and Body Mass Index (BMI) among obese patients aged 20 to 60 years in a tertiary care hospital. Eating behaviors that are not regular, not consuming enough fruits and vegetables, and eating a lot of high-calorie meals like fried, processed, and junk foods were all linked to a higher BMI ($p < 0.05$). These findings showed that people were moving towards diets that were low in quality and high in calories. Obesity was more common in middle-aged adults, women, married people, and people from rural and low-income areas, who were thought to be more likely to have bad eating habits. To help with these results, nutritional plans should be made to promote regular meal times and eating fresher, fiber-rich foods. Based on these results, it is important to have personalized nutrition programs, public health education, and behavior change methods that focus on getting people to eat more frequent meals, fiber-rich foods. Targeted initiatives in healthcare systems, especially at the tertiary care level, can be very important in reducing the health problems caused by obesity and improving the health of people who are affected.

Declaration by Authors
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