

# Impact of breakfast skipping on the health status of the population

Raksha Goyal, Sandeep Julka<sup>1</sup>

Departments of Dietetics, and <sup>1</sup>Endocrinology, Synergy Hospitals, Indore, Madhya Pradesh, India

## ABSTRACT

**Background:** Obesity has become a worldwide epidemic and its prevalence continues to increase at a rapid rate in various populations and across all age-group. The effect of meal skipping, both behaviorally and physiologically, may have an impact on the outcome of weight-loss efforts. **Aims and Objectives:** Therefore, the aim of this study was to examine the prevalence of breakfast skipping and obesity in subjects. **Materials and Methods:** A retrospective analysis of the patients visited to a metabolic clinic of the city was done. **Results:** One hundred and eighty-six eligible subjects were included for the study. A questionnaire was used for data collection which included information regarding dietary factors and exercise schedule/physical activity. A 24-hour dietary recall method was used to assess the amount of food consumed. Anthropometric measurements were taken. **Results:** Overweight is generally higher in females than males. The prevalence of overweight was higher among those who consumed more than recommended calories than those who were taking recommended or fewer calories per day. The average intake of fat and protein by the study subjects was quite different than the recommended intake of these food items. There was positive association between fat (oil) intake and overweight status and a negative association between protein intake and overweight status which was statistically significant. **Conclusion:** The higher prevalence of overweight and obesity in the present study could be because of imbalance in the diet and faulty food habits prevalent in the region.

**Key words:** Breakfast skipping, health status, obesity

## INTRODUCTION

Obesity has become a worldwide epidemic and its prevalence continues to increase at a rapid rate in various populations and across all age-group.<sup>[1-4]</sup>

Obesity is a complex metabolic disorder that is thought to result from an imbalance of energy intake and energy expenditure leading to the excess accumulation of fat in various adipose tissues and organs.

Obesity as a risk factor of several major health problems including hypertension, diabetes, heart diseases, certain

cancers, and other chronic diseases.<sup>[5,6]</sup> Thus, finding the factors contributing to obesity is of utmost importance.

The dramatic increase in the occurrence of overweight and obesity over the past several decades is attributed in part to changes in dietary and lifestyle habits, such as rapidly changing diets, increased availability of high-energy foods, and reduced physical activity of peoples in both developed and developing countries.<sup>[7]</sup>

The effect of meal skipping, both behaviorally and physiologically, may have an impact on the outcome of weight-loss efforts. Daily meal frequencies, and breakfast skipping in particular, have been linked to risk for overweight and obesity in UK, USA, and Australian populations, and are associated with female gender, lower socioeconomic status (SES), urban environments, and older age.<sup>[8-10]</sup> Cross-sectional and longitudinal studies have shown that regularly skipping breakfast is associated with greater body mass index (BMI) in all age-groups;<sup>[11-17]</sup> However, the mechanisms that might explain the relation

Access this article online	
Quick Response Code:	Website: www.ijem.in
	DOI: 10.4103/2230-8210.139233

**Corresponding Author:** Ms. Raksha Goyal, Synergy Hospital, Scheme No. 74c, sector B, Vijay Nagar, Indore-452 010, Madhya Pradesh, India.  
E-mail: rakshagoyal20@gmail.com

between breakfast consumption and body weight are not yet well understood.<sup>[18]</sup> However, it remains unclear whether breakfast skipping plays a causal role in overweight or is associated with other factors impacting BMI such as parental involvement in food decisions.<sup>[19]</sup>

Physical activity is a component of energy balance that is particularly important in the pathogenesis of obesity and in its treatment. The components of energy expenditure are resting (basal)-energy expenditure (REE), diet-induced thermo genesis, and physical activity.<sup>[20]</sup> Preventive or therapeutic strategies to control obesity should target these abnormalities.

We could identify no published studies that examine the prevalence of breakfast skipping and its correlation with obesity in central part of India.

Therefore, the aims of this study were (1) to examine the prevalence of breakfast skipping and obesity in subjects and (2) to evaluate the hypothesis that breakfast skipping would be cross-sectionally associated with elevated odds for obesity in this sample.

## MATERIALS AND METHODS

A retrospective analysis of the patients visited to a metabolic clinic of the city during a 3 month's period was done. A total of 250 patients were visited to the clinic and out of them 186 were eligible to be included. Exclusion criteria included patients on steroids or immunosuppressive drugs on past, patients with any infection, patients who were pregnant, patients with diabetes mellitus and hypothyroidism.

A pre-designed questionnaire was used for data collection. The questionnaire included information regarding dietary factors and exercise schedule/physical activity. A 24-hour dietary recall method was used to assess the amount of food consumed. Standing height and weight were measured with the subjects in light clothes without shoes and BMI ( $\text{kg}/\text{m}^2$ ) was calculated. It was derived by dividing weight in kilogram by square of height in meters.<sup>[21]</sup> The classification of obesity was done on the basis of recommendations by World Health Organization (WHO).<sup>[22]</sup>

### Breakfast skipping

Definitions of breakfast skipping vary widely across studies and feature differential methodological costs and benefits. These inconsistencies present a challenge when evaluating and comparing studies as it has been shown that whether or not an association exists between breakfast skipping and BMI can potentially depend on how breakfast skipping is defined. For example, breakfast skipping assessed on a

dietary survey day may accurately represent point prevalence but not reflect seasonal or other fluctuation in dietary habits over time. Other studies assessing breakfast skipping on a specific number of days per week or other defined time period may better capture such fluctuations but are susceptible to recall biases. Lastly, studies assessing the construct in more qualitative terms<sup>34</sup> capture participants' self-perceptions as breakfast skippers, which may or may not accurately correspond to actual meal consumption frequency.

Statistics was done using statistical package for the social sciences (SPSS) 21.0. All the values were expressed as mean  $\pm$  standard deviation (SD), percentage, Chi-square test and z test. Statistical significance was considered to be present when the two-tailed probability was less than 0.05.

## RESULTS AND DISCUSSION

Table 1 shows the classification of adults according to body mass index (BMI).

Table 2 shows the prevalence of obesity was found to be 58.6% in the study population at the confidence interval of 51.52–65.68. [Figure 1]

In the present study, normal BMI patients mean age was  $48.96 \pm 9.6$  where as obese had  $43.8 \pm 7.7$  years. [Table 3 and Figure 2]

**Table 1: Classification of adults according to body mass index**

Classification	BMI
Underweight	<18.5
Normal	18.5-24.99
Overweight	$\geq 25.99$
Obese	$\geq 30$

BMI: Body mass index

**Table 2: Distribution of stud subjects according to weight status**

	n (%)	95% CI
Normal BMI	77 (41.39)	34.31-48.47
Obese	109 (58.6)	51.52-65.68

CI: Cumulative incidence

**Table 3: Clinical status of normal weight and obese patients**

	Normal weight	Obese
Age	$48 \pm 9.6$	$43.8 \pm 7.7$
Height	$165.9 \pm 8.3$	$160.8 \pm 7.2$
Weight	$61.39 \pm 8.7$	$83.8 \pm 7.8$
BMI	$22.44 \pm 1.2$	$32.5 \pm 4.01$

BMI: Body mass index

Table 4 shows the general breakfast consumption status of participants; about 132 (71%) patients reported that they don't consume breakfast regularly. Out of these 84 (63.6%) falls in obese group and 48 (36.3%) falls in normal BMI group.

A BMI-specific multivariate analysis was used to determine the relationship between breakfast consumption practices and body weight profile. In both groups, frequent breakfast eaters had significantly lower levels of BMI ( $X^2 = 4.74$ ,  $P = <0.05$ ) compared to those of infrequent breakfast eaters.

Table 5 shows the exercise routine of the participants; about 95 (51%) patients reported that they don't exercise regularly. Out of these, 78 (72%) are obese ( $X^2 = 4.21$ ,  $P = <0.01$ )

Table 6 shows the prevalence of obesity was higher in the females than males. The difference was statistically significant ( $X^2 = 14.46$ ,  $P < 0.01$ ) [Table 7].

On observing the effect of dietary factors, it was found that the prevalence of overweight and obesity was higher among those who consumed more than recommended amount of fat (oil) than those who were taking recommended or less amount of fat (oil). The difference was found to be statistically significant ( $z = 9.0$ ,  $P < 0.01$ ). Whereas the protein consumption was also significantly associated with the obesity ( $z = 10.6$ ,  $P < 0.01$ )

**Table 4: Breakfast habits of study population**

	Normal weight	Obese	$X^2$	P value
Regular breakfast	29	25	4.74	<0.05
Breakfast skipping	48	84		

**Table 5: Exercise schedule of study population**

	Normal weight	Obese	$X^2$	P value
Regular exercise	60	31	44.21	<0.01
No exercise	17	78		

**Table 6: Classification of study population as per gender**

	Normal weight	Obese	$X^2$	P value
Male	40	27	14.46	<0.01
Female	35	82		

**Table 7: Weight status of study subjects according to oil and protein consumption**

	Obese	Normal weight	Z test	P value
Fat (oil)	55.51±11.25	42.05±9.1	9.0	<0.01
Protein	39.48±3.62	49.24±7.4	10.6	<0.01

## DISCUSSION

The higher prevalence of overweight and obesity in the present study could be because of imbalance in the diet and faulty food habits prevalent in the region.

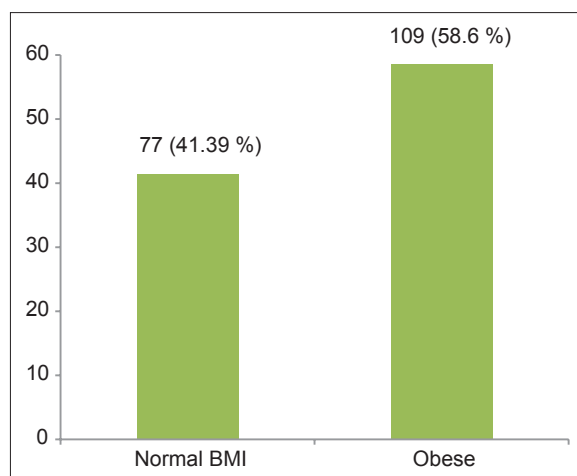
Gender is one of the biological factors affecting the weight status. It was observed in the present study that the prevalence of overweight is generally higher in females than males. Finding of studies conducted in India by Gopinath *et al.*, Gopalan, Mohan *et al.*, Mishra *et al.*, Ramchandran *et al.*, Reddy *et al.*, Shukla *et al.*, revealed a much higher percentage for obesity/overweight in females than in males. In females, extra energy gets converted into fat. This pattern of energy usage, or "nutrient partitioning," in females contributes to further positive energy balance and fat deposition. Due effort should be undertaken to decrease overweight or obesity in females to make an impact on overall prevalence.

We lack a strong scientific basis for answering the question of how much physical activity is required to prevent weight gain in the population. There is a lack of prospective, randomized trials that address the question of how much, what type, what intensity, and what duration of physical activity are required to prevent weight gain. Furthermore, the amount of physical activity required to prevent weight gain may differ in different populations and may differ at different times during the life span.

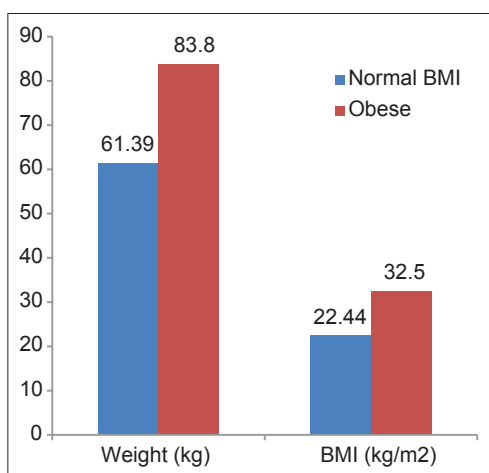
Dietary energy intake is one end of the energy balance equation. The intake of calories more than our body requirement leads to positive energy balance and so obesity. This fact was confirmed in the present study. It was found that the prevalence of overweight was higher among those who consumed more than recommended calories than those who were taking recommended or fewer calories per day. The difference was found to be statistically significant.

Among other factors in dietary consumption, the skipping of breakfast impacted overweight positively while eating habits either vegetarian or both (vegetarian and non vegetarian) did not affect the weight status of subjects significantly.

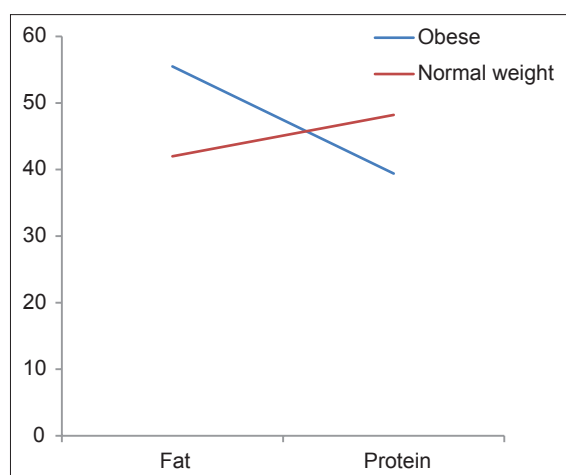
The average intake of fat and protein by the study subjects was quite less than the recommended intake of these food items. Also, there was a difference in the amount of consumption of these foods in overweight and normal weight groups. The amount of fat (oil) intake was more among overweight than normal weight subjects and mean intake of protein was less among the overweight subjects than their normal weight counterparts. Thus, there was positive association between fat (oil) intake and overweight status and a negative association



**Figure 1:** Percentage prevalence of the study subjects according to body mass index (BMI)



**Figure 2:** Mean weight and body mass index (BMI) of the subjects



**Figure 3:** Protein and fat consumption of the subjects

between protein intake and overweight status which was statistically significant. Similar findings were observed in the study of National Foundation of India (1998) which

indicated that the consumption of refined oil and saturated fats (ghee and vanaspati) was significantly higher among the obese individuals ( $P < 0.05$ ) [Figure 3].

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**Cite this article as:** Goyal R, Julka S. Impact of breakfast skipping on the health status of the population. *Indian J Endocr Metab* 2014;18:683-7.  
**Source of Support:** Nil, **Conflict of Interest:** None declared.