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Original Research Article

Overweight and obesity among higher secondary level students of Tulsipur Municipality, Nepal

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ABSTRACT

Background: The global epidemic of overweight/obesity – termed "globesity" is a major public health problem where rates of obesity have tripled in developing countries over the last 20 years. Factors like studying in private schools, consumption of unhealthy diet, insufficient physical activity and shortened night-time sleep duration are shown to be related with overweight and obesity. Hence, this study aims to assess the prevalence of overweight/obesity and the relationship of BMI with the socio-demographic and lifestyle factors.
Methods: A school based descriptive, cross-sectional study was conducted among 400 participants chosen randomly from grade 11 and 12. Measurements of height and weight were taken to calculate BMI and primary data about determinants of obesity was collected through semi structured questionnaire. The data was entered and analyzed using SPSS 16v.
Results: Prevalence of overweight and obesity was 4.25% and 2.25% respectively. Consumption of fast food and sugary drinks was found among 99% and 95% of the respondents respectively. Higher screening time for TV/Computer, shortened sleep duration and reduced physical activity led to higher prevalence of overweight/obesity. Factors like type of school [esp. private school, (p=0.019, 95% CI)], type of family (p=0.039, 95% CI), occupation of mother (p=0.019, 95% CI) were statistically significant with BMI.
Conclusions: Apart from under-nutrition problem, there exists increasing trend of over-nutrition among higher secondary students in Tulsipur Municipality, Nepal. The shift of under-nutrition problem to over-nutrition says we need to rethink about the consequences of over-nutrition.

Keywords: Higher secondary students, Overweight and obesity, Tulsipur, Nepal

INTRODUCTION

Overweight and obesity is the most prevalent nutritional disorder where there is excessive storage of fat as per height and weight. By definition, the term obesity is the "result of abnormal growth of the adipose tissue because of increase in number of fat cell/size (hypertropic obesity) or increase in fat cell number (hyperplastic obesity) or a combination of both".[1]

Overweight/Obesity can be seen as the first wave of a cluster of non-communicable diseases called 'New World Syndrome' creating an enormous socio-economic and public health burden in poorer countries.[2]

As per WHO (2015), about 70% of global deaths each year are caused by non-communicable diseases, where a majority of the deaths are related to cardiovascular diseases, followed by cancers, respiratory diseases and diabetes where coronary heart disease and stroke were the most common types of cardiovascular diseases which killed 7.4 and 6.7 million individuals respectively. High

BMI is an important factor for cardiovascular diseases and it is also observed that the risk of having a coronary heart disease or stroke is higher among overweight and obese individuals than among those with normal weight.[3,4]

Adolescent overweight/obesity is associated with serious medical problems, including high blood pressure, pulmonary embolism, enlarged heart, fatty liver disease, stroke, adverse lipoprotein profiles, diabetes mellitus, atherosclerotic cerebro-vascular disease, coronary heart disease, colorectal cancer, sleep apnea and many more.[5] Compared to their normal weight peers, overweight/obese young people seem to experience several problems like impaired peer relationships, depression, anxiety, stigma and low self-esteem.[6]

The increase in western fast food franchises, changes in the types of foods sold by local provender and an increase in the number of supermarkets are triggering the prevalence of overweight/obese. Away-from-home eating patterns, changing technological innovations and the development of fast foods are also contributing factors for overweight/obesity.[7] According to a report of nutrition survey in Nepal (2014), adolescents are nutritionally vulnerable due to their high requirements for growth, eating patterns and their susceptibility to environmental influences. However, most health programs overlook adolescents as they are generally considered a healthy population.[8] Classification of BMI in this study was taken according to Asian standards. According to WHO expert consultation, universal BMI criteria are not suitable for an Asian population because of factors like percentage of body fat (increased fat accumulation) and central adiposity is found higher among Asians as compared to European populations.[9-11] Therefore, this study aims to assess the prevalence of overweight and obesity and the relationship of BMI with the socio-demographic and lifestyle factors using Asian classification.

METHODS

A cross-sectional descriptive study was conducted in Tulsipur municipality during October to November 2017. The study area is located in Dang district that lie in the mid-western part of Nepal.

A multistage sampling method was used to select the participants. There were altogether 12 higher secondary schools in this area from which 9 (Private=4 and Government=5) were selected randomly through a lottery method. A total of 400 participants studying in grade 11 and 12 were then selected using systematic sampling method irrespective of courses of study. Self administered, semi-structured, pretested questionnaire assisted by researcher was taken as tool for data collection that included socio-demographic details, socio-economic details, diet and eating behaviour, sedentary life style, physical activity and anthropometric measurements. Standards for the questionnaires for dietary habit were taken according to food frequency questionnaire and IPAQ standards for physical activity. Chi-square tests and likelihood-ratio was performed at 95% of CI with the p-value of 0.05.

To assess the unhealthy diet (fast food/junk food, sugary drinks), lifestyle factors (watching TV/use of computer, use of mobile/smart phone and duration of sleep) and physical activity, scoring method was used. Stature meter and standard digital weighing scale was used for measurement of height and weight respectively. All the standard guidelines were followed to measure height and weight. Height was measured to the nearest 0.1 cm and actual weight measurement was recorded which had an error of 0.1 kg.

RESULTS

Socio-demographic details

More than 50% of the respondents were belonging to private school type and about 64% were living in urban area. The mean age was found to be 16.84 ± 1.16 years and majority of the respondents (60%) were found between 16-17 years of age group followed by 18-19 years (27%). More than half of the respondents (58%) were females. More than two-thirds (69%) were belonging to the nuclear type of family and only 2% were found to be married.

Socio-economic details

The mean income of respondent's family was Nepali Rupees (NPR) 31,087± 26,186.8 and majority of the respondents (28%) had family income of NPR 15,000-25,000 followed by NPR 25,000-40,000 (27%). Regarding parental education, most of the respondents (42%) had father's education upto secondary level and almost one-fourth (24%) had mother's education as illiterate followed by secondary level education (22%). Most of the respondent's fathers (38%) were engaged in agriculture and most of the respondent's mothers (67%) were engaged as homemaker.

Unhealthy diet, sedentary lifestyle factors and physical inactivity

Among total participants, 99% were consuming fast food and 95% were consuming sugary drinks. More than a half (59%) among TV viewers/computer users had average screening duration for >2 hrs/day. Almost half of the respondents (45%) had average time for using mobile/smart phone for >2 hrs/day. About 90% had average sleep duration for <8 hrs/day and majority of the respondents (34%) spent only <10 mins/day for physical exercise.

Nutritional status of the respondents

The prevalence of underweight (<18.5), normal (18.5-22.9), overweight (23-24.9) and obesity (>25) was found

to be 43.5%, 50%, 4.25% and 2.25% respectively. The combined prevalence of overweight and obesity was found to be 6.50% (Table 1).

Table 1: Prevalence of overweight and obesity.

Range of BMI	Frequency	%
<18.5 (Underweight)	174	43.5
18.5-22.9 (Normal)	200	50
23-24.9 (Overweight)	17	4.25
>25 (Obesity)	9	2.25

Gender-wise distribution of anthropometric measurements

Among the respondents, the mean body weight (in kg) was found higher among males as compared to females. Similarly, the mean height (in cm) was also found higher among males. The mean BMI (kg/m²) was found slightly higher among females than male counterparts (Table 2).

Table 2: Gender-wise distribution of anthropometric measurements.

Parameters	Males (Mean ± SD)	Females (Mean ± SD)
Weight (in kg)	50.92 ±7.1	45.67 ± 6.47
Height (in cm)	164 ± 6.49	153.51±5.38
BMI (kg/m²)	18.79±2.24	19.38± 2.54

Total score for key determinants of overweight and obesity

Among the total overweight and obese ones, more than one-third (70%) had poor and average level of consumption of proper diet (includes fruits, vegetables, rice, dal, maize, sprouts, meat). Similarly, among the total overweight ones, 18% had high level of consumption of unhealthy diet and among the total obese ones it was 22%. Among those who were overweight, more than one-third (35%) had the risk of sedentary lifestyle who had achieved a poor score and 11% among those who were obese. Among the total overweight ones, almost two-thirds (64.7%) had poor and average score of physical activities and among the total obese ones, the proportion was also found similar, (66.6%) i.e. more than two-thirds (Table 3).

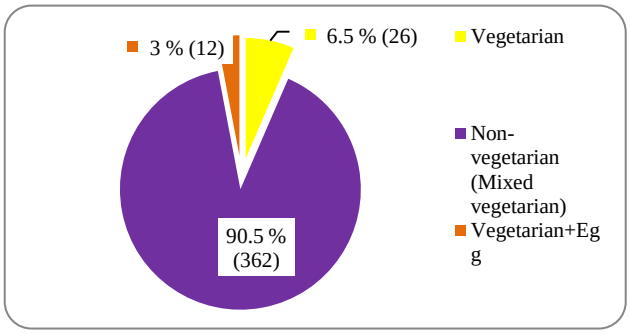

Figure 1: Distribution of respondents according to type of diet followed.

Table 3: Total score for key determinants of overweight and obesity.

Score	Under weight (%)	Normal (%)	Over weight (%)	Obesity (%)	Statistical test	P value
Unhealthy diet (fast food/junk food, sugary drinks)						
<9 (Low)	54 (31)	47 (23.5)	3 (18)	3 (33)	7.873	0.247
2-4 (Medium)	71(41)	106 (53)	11 (64)	4 (45)	Likelihood ratio	
4-6 (High)	49 (28)	47 (23.5)	3 (18)	2 (22)		
Total	174	200	17	9		
Lifestyle factors (TV viewing/use of computer, use of mobile, sleep duration)						
<4 (Good)	50 (29)	62 (31)	2 (12)	5 (56)	6.277	0.393
4-5 (Average)	79 (45)	87 (43)	9 (53)	3 (33)	Likelihood ratio	
5-6 (Poor)	45 (26)	51 (26)	6 (35)	1 (11)		
Total	174	200	17	9		
Various physical activities						
<4 (Poor)	78 (45)	66 (33)	4 (23.5)	3 (33.3)	10.514	0.310
4-5 (Average)	37 (21)	46 (23)	7 (41.2)	3 (33.3)	Likelihood ratio	
5-6 (Good)	23 (13)	40 (20)	3 (17.6)	1 (11.1)		
>9 (Excellent)	36 (21)	48 (24)	3 (17.6)	2 (22.2)		
Total	174	200	17	9		

Distribution of respondents according to type of diet followed

Most of the respondents (90.5%) were following non-vegetarian diet followed by vegetarian (6.5%) and vegetarian+egg (eggetarian) i.e. 3% (Figure 1).

Relationship between BMI and socio-demographic, socio-economic and lifestyle factors

Chi-square or likelihood ratio was used accordingly to determine the relationship and we found that there was statistical significant difference with BMI according to

type of school (p=0.019), type of family (p=0.039) and maternal education (p=0.019).

DISCUSSION

Prevalence of overweight/obesity

The present study was conducted to know the occurrence (prevalence) of overweight/obesity and the associated socio-demographic and lifestyle factors with the BMI of the respondents. The findings concluded that prevalence of overweight and obesity in this municipality was similar to the first nationally representative study (overweight 7.2% and obesity 1.7%) but was lower than the WHO STEPS survey (2013) carried out among adult population.[12,13]

Socio-demographic factors

In this study, prevalence of both overweight and obesity was found higher among females. A study conducted by Maharjan et al in India also found the similar result (overweight/obesity in males: 35% and 23% resp.) and (overweight/obesity in females: 65% and 77% resp).[14] In this study, the combined prevalence was found higher among those who were studying in private school (63%). The result was similar (65%) in a study conducted by Piryani et al in Nepal.[15] Higher purchasing power, higher socio-economic status and more exposure to unhealthy diet may be the contributing factors for respondents being more overweight/obese among private schools. In this study, the combined prevalence was higher among 16-17 years of age group and also it was observed as higher the age, higher was the BMI. A study by Bergh et al in Norway (2016) also found that BMI proportionately increased with the each passing year.[16] In this study, the combined prevalence was found higher among urban respondents (63.5%). A study by Aggarwal et al in India (2016) also found the similar result (urban: 59% and rural 41%).[17] Higher prevalence among urban area may be because of factors like easy availability of unhealthy diet, low physical activity and more access to TV/computer viewing.

Diet, lifestyle factors and physical activity

In this study, non-vegetarians were found to be more overweight/obese which was supported in Chincholikar et al study in India i.e. (overweight/obese non-vegetarians 73% and overweight/obese vegetarians 27%).[18] Non-vegetarian diet such as consumption of fish, meat and meat products has more fat content and more energy leading to weight gain.

Higher prevalence of overweight/obesity was observed among those who consumed fast food/junk (48.5%), sugary drinks (54.5%) for >4 times/week. Similarly, a combined prevalence was found higher among those who spent >2 hrs/day in watching TV (66%), smart phone usage (37.5%), physical activities of <10 mins/day (57%). Regarding the score for physical activity, about two-thirds (65.2%) among overweight/obese participants had poor level of physical activity. A study by Aggarwal et al in India also found higher proportion of overweight/obesity among physically inactive ones (54%) than active ones (46%).[17] More than three-fourth (94%) among overweight/obese had sleep duration for <8 hrs/day. It indicates a higher proportion of overweight and obesity among those who did not have sufficient sleeping duration as per recommended guidelines given by National Sleep Foundation.[19] Earlier, the use of mobile phone, television was only limited with eye sight problems but now it tends person to become lazier with each passing day and falling into the trap of leading a sedentary lifestyle. Computers, laptops, tablets and phones tend to give off a blue light, thought to interfere with the natural hormones, such as melatonin, which help us to sleep.[20]

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