

Prevalence of Overweight and Its Associated Factors Among School Going Adolescents of Butwal, Nepal: A School-based Cross-sectional Study

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ABSTRACT

Introduction: Adolescent overweight can cause various health problems and increase adulthood obesity and non-communicable diseases (NCDs). Incidences of non-communicable diseases are preventable and if prevented at an early stage, it can reduce the risk of health issues. This study aimed to explore the prevalence of overweight and its associated factors among school-going adolescents.

Methods: A descriptive cross-sectional study was conducted in four randomly selected schools of Butwal, Rupandehi district from December 2021 to March 2022. For anthropometric assessment WHO Anthro Plus Software V.10.4 was used to monitor the BMI-for-age of adolescents. Descriptive analysis data was calculated in terms of frequency, percentage, mean, and standard deviation using the Statistical Package for social sciences (SPSS v26).

Results: In this study, the prevalence of overweight was 21.5% (95% CI: 17.9 to 25.1) among adolescent students. Studying in Government schools, upper socioeconomic class, consuming junk food on a daily basis, and aerated drinks were found to be associated with being obesity.

Conclusions: Understanding the current situation of consistently prevalent and rising overweight, it should be emphasized and considered a public health concern. Governmental and non-governmental collaboration, public awareness, school-based educational programs, physical activity and the importance of dietary management

INTRODUCTION

Obesity and Overweight are characterized as abnormal or excessive fat buildup that can have negative health consequences.¹ Also, they are recognized as key risk factors for non-communicable diseases (NCDs) such as diabetes, high blood pressure, and heart disease. Previously, overweight problems have been seen in developed states, however, the change in rapid globalization and shift in lifestyles including the pattern

of high energy-dense diets that are rich in calorie and fat content has brought a serious public health concern in both developed and developing countries. Thus, prevalence is increasing among all age groups in both industrialized and developing countries around the world, and it is known as the New World Syndrome.²

Nepal is going through a transition where under-nutrition co-exists with obesity; however, there is a lack of well-documented information on childhood overweight or obesity in Nepal³. The goal of this

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study will help in estimating the local prevalence and associated variables of overweight among adolescents, bridging the knowledge and information gap in this field that can assist in organizing primordial and primary prevention accordingly.

This study aimed to determine the prevalence of overweight and its associated factors among school-going adolescents of Butwal sub-metropolitan city.

METHODS

A cross-sectional descriptive study was conducted among adolescents of government and private schools of Butwal Sub Metropolitan City, Rupandehi, Nepal. The study duration was for 6 months from November 2021 to May 2022. Ethical clearance was granted by the institutional review board of the Universal College of Medical Sciences (UCMS/IRC/187/21). Written informed consent was taken from schools' authorities and participants.

The study population was students of classes 8, 9, and 10. Students of selected secondary schools of the Butwal sub-metropolitan city were included in the study. Students who were absent during data collection and severally ill students were excluded.

Sample size

The study published on the title 'Prevalence of overweight and its associated risk factors among adolescents: A cross-sectional study in peri-urban area of Nepal' in 2021, shows that the prevalence of overweight among adolescents was 9.31%.

Hence, using 9.31% as prevalence, we calculated the sample size by the following Cochran's formula as,

$$n = z^2 pq / d^2$$

where,

p = prevalence of overweight among students, = 0.0931

q = 1-p, i.e. (1-0.0931) = 0.9069

d = allowable error (0.03)

z = standard variable at the 95% confidence interval level (z=1.96)

therefore, $n = (1.96)^2 (0.0931) (0.9069) / (0.03)^2$

n = 360.39 ≈ 360

Including 10% non-response the total sample size becomes 360+36= 396

Sampling technique

Multi-Stage sampling technique was used to divide total secondary schools of Butwal Sub- Metropolitan City into two categories of government and private secondary schools. Then after, two private secondary schools and two government secondary schools were selected

through a simple random sampling technique (lottery method). Shining Star English Boarding School and Lumbini English Boarding School were selected from the private category likewise, Gyanodaya Secondary School and Nabin Audhyogic Kadar Bahadur Rita Secondary School were selected from the government category. In the selected schools, students of classes 8, 9, and 10 were taken as the study population. Only one section was taken from each class. Data was collected from all the students of the selected section of the respective class.

A structured questionnaire was used to collect all data and information. Digital weighing machines & metallic measuring tape were used to measure the weight and height of respondents respectively. Moreover, the calibration of the weighing machine was checked before each data collection. Self-administered questionnaires were used as techniques including Anthropometric measurement (BMI- for- age).

Data Processing and Analysis

Each collected data was checked at the end of each day to ensure its consistency, accuracy and completeness. The collected data were coded and entered in Microsoft Excel 2019 and Statistical package for social sciences (SPSS v26). For the anthropometric assessment WHO Anthro Plus Software V.1.0.4 was used to monitor the BMI-for-age of adolescents. Both descriptive as well as inferential statistics were used to analyze the data. Descriptive analysis data was calculated in terms of frequency, percentage, mean, and standard deviation. Likewise, the association of overweight with different variables was assessed through bivariate analysis with odds ratio at 95% CI. And the association was considered significant when p-value was <0.05.

RESULTS

Before data collection, the sample size was calculated as 396, however, due to a greater number of students in some selected sections of schools, our total findings are calculated among 414 adolescent students.

Table 1 represents the prevalence of overweight among adolescent students of Butwal Sub- Metropolitan City. Among 414 adolescent students, the prevalence of Overweight was found to be 21.5% (95% CI: 17.9 to 25.1) when accessed through WHO Anthro plus Software by using BMI-for- age Z-score. (BAZ >1SD).

Prevalence of Overweight

Table 1. Prevalence of Overweight (N=414)

Overweight	Frequency N (%)
Yes	89 (21.5)
No	325 (78.5)

Bivariate Analysis

Association between Socio-demographic Variables and Overweight

Table 2 represents the association between different socio-demographic factors and Overweight. The findings through the binary logistic regression showed that the

Government School Type and overweight were highly significantly associated with *p*-value 0.001 (OR=4.209; CI=2.377 to 7.454) while holding the private school type constant whereas sex of the student, age group, grade, ethnicity, family type, family size, and birth order were not found to be significantly associated with overweight.

Table 2. Association between Overweight and Sociodemographic Variables

Variables	Overweight		p-value	COR (95% CI)
	Yes (%)	No (%)		
Sex				
Male	49 (22.8)	166 (77.2)	0.506	1.173 (0.733-1.879)
Female (Ref)	40 (20.1)	159 (79.9)		1
Age Group				
Early adolescents (10 to 13)	13 (31.0)	29 (69.0)	0.613	1.295 (0.475-3.525)
Middle adolescents (14 to 16)	67 (19.9)	270 (80.1)	0.417	0.717 (0.321-1.602)
Late adolescents (17 to 19) (Ref)	9 (25.7)	26 (74.3)		1
School Type				
Government	72 (30.6)	163 (69.4)	<0.001**	4.209 (2.377-7.454)
Private (Ref)	17 (9.5)	162 (90.5)		1
Grade				
Class 8	27 (19.3)	113 (80.7)	0.282	0.731 (0.413-1.294)
Class 9	28 (20.6)	108 (79.4)	0.424	0.793 (0.449-1.400)
Class 10 (Ref)	34 (24.6)	104 (75.4)		1
Ethnicity				
Brahmin/Chhetri	33 (17.3)	158 (82.7)	0.302	0.691 (0.352-1.388)
Janjati	41 (25.9)	117 (74.1)	0.653	1.166 (0.590-304)
Other	15 (23.1)	50 (76.9)		1
Family Type				
Nuclear	59 (21.1)	221 (78.9)	0.140	0.632 (0.344-1.162)
Joint	11 (15.7)	59 (84.3)	0.056	0.442 (0.191-1.021)
Extended (Ref)	19 (29.7)	45 (70.3)		1
Family Size				
3 members	8 (17.4)	38 (82.6)	0.469	0.718 (0.292-1.762)
4 members	38 (23.5)	124 (76.5)	0.886	1.045 (0.574-1.900)
5 members	21 (19.3)	88 (80.7)	0.548	0.814 (0.415-1.594)
>5 members (Ref)	22 (22.7)	75 (77.3)		1
Birth Order				
1st	39 (21.0)	147 (79.0)	0.911	1.041 (0.515-2.104)
2nd	37 (22.6)	127 (77.4)	0.712	1.143 (0.562-2.326)
3 or more than 3 (Ref)	13 (20.3)	51 (79.7)		1

Note: * in p-value denotes significance, ** in p-value denotes highly significance

Association between Overweight and Socioeconomic Class

Table 3 represents the binary logistic regression where statistics showed the significant relationship between socioeconomic class and overweight with upper

socioeconomic class having 9.291 times (*p*-value 0.001) odds of being overweight (CI=3.318 to 26.018) while middle class having 1.755 times (*p*-value 0.111) odds of being overweight (CI=0.879 to 26.018) when holding lower socioeconomic class constant.

Table 3. Association between Overweight and Socioeconomic Class

Socioeconomic Class	Overweight		p-value	COR (95% CI)
	Yes (%)	No (%)		
Upper Class	14 (58.3)	10 (41.7)	0.001*	9.291 (3.318-26.018)
Middle Class	64 (20.9)	242 (79.1)	0.111	1.755 (0.879-3.503)
Lower Class (Ref)	11 (13.1)	73 (86.9)		1

Note: * in *p*-value denotes significance

Association between Overweight and Fast-food Consumption

Table 4 represents the association between overweight and fast-food consumption. The findings through the binary logistic regression showed that the frequency of junk food consumption daily was found to be significantly associated with overweight with *p*-value 0.001 (OR=3.112; CI=1.641 to 5.904); twice a week *p*-value 0.001 (OR=2.963; CI=1.541 to 5.698); once

a week *p*-value 0.375(OR=1.582; CI=(0.57 to 4.361) holding occasionally variable constant.

Similarly, the frequency of aerated drinks and beverage consumption daily were also found to be statistically significant with *p*-value 0.039 (OR=2.198; CI=1.04 to 4.638); twice a week *p*-value 0.242 (OR=1.396; CI=0.798 to 2.443); once a week *p*-value 0.353(OR=1.434; CI=(0.670 to 3.070) while holding constant for occasionally.

Table 4. Association between Overweight and Fast-food Consumption

Fast Food Consumption	Overweight		p-value	COR (95% CI)
	Yes (%)	No (%)		
Frequency of Junk food Consumption				
Daily	35 (28.9)	86 (71.1)	0.001*	3.112 (1.641-5.904)
Twice a week	31 (27.9)	80 (72.1)	0.001*	2.963 (1.541-5.698)
Once a week	6 (17.1)	29 (82.9)	0.375	1.582 (0.574-4.361)
Occasionally (Ref)	17 (11.6)	130 (88.4)		1
Frequency of Aerated drinks and beverage consumption				
Daily	13 (32.5)	27 (67.5)	0.039*	2.198 (1.04-4.638)
Twice a week	26 (23.4)	85 (76.6)	0.242	1.396 (0.798-2.443)
Once a week	11 (23.9)	35 (76.1)	0.353	1.434 (0.670-3.070)
Occasionally (Ref)	39 (18.0)	178 (82.0)		1

Note: * in *p*-value denotes significance

DISCUSSION

This study finds the prevalence of overweight and factors associated with it among the school going adolescent students of Butwal Sub-Metropolitan City.

The findings from this study revealed that the prevalence of overweight among adolescent students was 21.5% which is similar to the study conducted in schools of Kathmandu Metropolitan City, Nepal which shows 23.7% of prevalence of overweight among them.⁴ Similarly, another study reported a slightly lower prevalence than our finding (i.e. 17.9%) which was done in Gokarneshwor Municipality in the northeast of Kathmandu.⁵ However, this finding is higher in comparison to the study conducted in Hetauda Sub-metropolitan City, Makwanpur District revealing the prevalence of overweight among adolescents from secondary schools to be 9.31%.⁶ This might be due to

variations in study sites.

The male students were more likely to be overweight than female students by 1.173 times. This finding aligns with the study conducted in Lalitpur, Nepal,^{7,8} India⁹⁻¹¹, and Pakistan.¹² But in contrast to this, a study conducted in Bhutan revealed that female adolescents were significantly associated with being overweight.¹³ The reason can be due to differences in body fat composition or maybe that females care more about their appearance and pay higher attention to their body image than males.

Findings from this study showed that middle-aged adolescents (14-16 years) tend to have higher odds of being overweight as compared to early and late-age adolescents which was consistent with the findings of the study conducted in the peri-urban area of Nepal.⁶

In this study, being overweight was significantly associated with the school type of students. The study

showed that adolescents studying in government schools were four times more likely to be overweight than those studying in private schools. And contrary to the findings, a study in India found a higher prevalence in private schools than that in government schools.^{10,14,15} This might be due to the careless and weak responsibility of government schools on the dietary habits of students in Nepal. Also, a study conducted in Pokhara, Kaski district, Nepal reveals the prevalence of junk food consumption is higher in government schools than in private schools.¹⁶

This study has found no significant association of overweight with grade, family type, family size, and birth order of students. However, adolescents belonging to joint families were more likely to get overweight as compared to those who belong to nuclear families.

In our study, being overweight among adolescents was found to be highly significant with socioeconomic status which was in accordance with a study conducted in Nepal,^{7,17} India^{9-11,18,19} and Botswana.²⁰ This might be due to students from the upper economic class having high purchasing power for fatty foods, luxurious lifestyles, and more pocket money.

The study revealed that there is a significant association between fast food consumption and overweight. This shows daily consumption of junk food and aerated beverage drinks increases the likelihood of being overweight. Similarly, the study shows, there was a significant association between overweight and consumption of junk food twice a week. This finding aligns with the past study conducted in Rupandehi district, Nepal,³ Kathmandu district, Nepal,⁴ and Lalitpur district, Nepal.⁸ Also, these findings are similar to the study which was conducted in Asian Countries.²¹ The reason behind this could be the widespread availability of fast-food shops and restaurants all around that increase in consumption of junk foods which contributes to unhealthy diets with low nutritious and high-calorie dense food that ultimately results in fat deposition which is even more when there is minimum or no physical activity.

There were a few limitations in the study. First, the study was conducted at a small level so this might not be able to generalize the population. Second, the study was not able to address other variables such as physical activity, sedentary behavior, etc due to limited time factors.

CONCLUSIONS

In conclusion, this study revealed a concerning prevalence of overweight among school-going adolescents in Butwal Sub-Metropolitan City, Nepal. The findings indicate significant associations between overweight and factors such as attending government schools, belonging to a higher socioeconomic class, and regular consumption of junk food and aerated beverages. The potential long-term implications of being overweight

during adolescence, increasing the risk of non-communicable diseases (NCDs) in later life, underscore the importance of addressing this issue proactively. To combat overweight among school adolescents, it is essential to implement necessary actions, including organizing health awareness programs and educative initiatives within schools. By promoting healthy habits and fostering a supportive environment, we can work towards mitigating the problem of overweight and improving the overall well-being of adolescents in the community.

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CONFLICT OF INTEREST

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