PREVALENCE AND ITS ASSOCIATED FACTORS ON OVERWEIGHT/OBESITY AMONG HIGHER SECONDARY SCHOOL ADOLESCENTS IN NEPALGUNJ SUB-METROPOLITAN CITY

CHAMPAK KUMAR SINGH[1], HEMANK KC[2], RAM BAHADUR SHRESTHA[3], SHEEJA SINGH[4], SHIRJANA SHRESTHA[5]

[1]PhD (Scholar), Department of Public Health, Noida International University, India. [2]Student, School of Nursing and Healthcare, BPP University, London. [3]Associate professor, National Academy for Health Sciences, Purbanchal University, Kathmandu. [4]Department of Public Health, Hope International College and Hospital Pvt. Ltd., Purbanchal University, Kathmandu. [5]Assistant professor, National Academy for Health Sciences, Purbanchal University, Kathmandu. Email: Hemankkc322@gmail.com

ABSTRACT

Objectives: To assess the prevalence and factors associated with overweight/obesity among school adolescents of Nepalgunj Sub-Metropolitan City. To find out the prevalence of overweight and obesity among secondary school adolescents. To find out the association between physical activity and overweight and obesity. To find out the association between sociodemographic factors and overweight and obesity.

Methods: A cross-sectional study among 125 schools adolescent was used to assess the prevalence and its associated factors among overweight and obesity, and four secondary schools were selected in the area of Nepalgunj Sub-Metropolitan City. The study population was adolescents in Grades 11 and 12, with a sample of 125. Using a purposive sampling technique, the data were collected using structured questionnaires.

Results: The study was carried out in 125 schools with adolescents. The prevalence of physical activities was active 34.4% and non-active 65.6%. The prevalence of overweight and obesity was normal 75% and the prevalence of overweight 6.4% and the prevalence of obese was zero. There was no significant association between sociodemographic factors, physical activities, and overweight and obesity.

Conclusion: This study concluded that the overweight prevalence is low but growing among adolescents in secondary schools. However, there is no obesity in this group. The result concluded that there is no significant relationship between physical activities, sociodemographic factors, and overweight and obesity.

Keywords: Overweight, Obesity, Adolescents, Prevalence, Associated factors, Nepalgunj.

INTRODUCTION

Overweight and obesity are generally defined as abnormal or excessive fat accumulation, resulting in weakened health for an individual. The epidemic of overweight and obesity reflects the changes in society and behavioral patterns of communities over recent decades [1].

According to the World Health Organization (WHO), Overweight is a body mass index (BMI) ≥25, and obesity is a BMI ≥30. Widely, there is a rising prevalence of overweight and obesity in both developing and developed countries. The obesity rate of developing countries over the past 20 years has significantly increased, as they rapidly become more urbanized, with an increase in the consumption of foods rich in calories and adoption of a more sedentary lifestyle [2]. Although the prevalence of overweight and obesity seems to be changing in some middle-income countries, it continues to remain low in many lower-income countries. Factors associated with childhood overweight or obesity include lower physical activity levels, higher sedentary behavior such as television viewing times, dietary behavior such as frequency of sweets intake, psychosocial factors, female gender, victims and perpetrators of bullying behaviors, inaccurate perceptions of the need to diet, poorer self-perceived health status and potential social isolation [3]. Source from the United Nations Children's Fund, conveys that there are about 1.2 billion populations of adolescents throughout the world, among them 88% are residing in developing nations. There are only a few numbers of surveys examining the prevalence of overweight and obesity among adolescents in developing countries. With poverty and underdevelopment exacerbating the threat of infectious diseases, including human immunodeficiency virus-acquired immunodeficiency syndrome, most public health nutrition programs have emphasized on under-nutrition and food security [4]. Overweight and obesity have become one of the emerging and serious public health concerns of the twenty-first century in low-income countries such as Ethiopia [5]. Childhood overweight/obesity has become a major public health concern globally because of its adverse health consequences and escalating prevalence. 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 Nepal [6].

Until recently, the increasing prevalence of overweight and obesity among the pediatric population in Europe and worldwide has contributed to major well-known risks for metabolic consequences in later life. The objective of this study was to determine the prevalence of overweight/obesity among children and adolescents in Lithuania and assess its association with energy balance-related behaviors as well as familial demographic and socioeconomic factors [7].

The escalating prevalence of overweight and obesity among school adolescents globally poses a critical public health challenge, affecting both developed and developing countries. In Nepalgunj Sub-Metropolitan City, this concern is exacerbated by shifting lifestyles, urbanization, and evolving dietary patterns accompanying the fourth phase of nutritional transformation. The coexistence of under-nutrition alongside an increasing prevalence of obesity in Nepal underscores a poorly understood and complex health transition. Despite the recognized significance of addressing childhood overweight and obesity, a notable dearth of well-documented information specific to the Nepalgunj Sub-Metropolitan City hampers the formulation of effective preventive measures. The current focus on curative rather than preventive health interventions in Nepal

further compounds the challenges associated with this emerging epidemic.

Particularly in urban centers such as Kathmandu, adolescent obesity stands out as a pressing health concern, with its long-term implications for non-communicable diseases necessitating a targeted and evidence-based approach. Comparative studies globally indicate a rising trend in overweight and obesity among adolescents, projected to exceed 9% by 2020. This urgency underscores the need for a comprehensive study in Nepalgunj Sub-Metropolitan City, considering its unique sociodemographic, cultural, and economic factors.

The study aims to bridge this knowledge gap by investigating the prevalence of overweight and obesity among school adolescents in Nepalgunj Sub-Metropolitan City. In addition, it seeks to identify and analyze sociodemographic factors, physical activities, and eating habits associated with overweight and obesity. The resulting insights will contribute to the development of targeted interventions and public health strategies, striving to prevent and manage overweight and obesity among school adolescents. By directing timely attention toward preventive actions, the study endeavors to avert the looming epidemic and promote the health and well-being of the younger population in the region.

METHODS

Study design
The cross-sectional type of research design was used to assess the prevalence and association factors in the study.

Study area/setting
Mahendra Secondary School, Mangal Prasad Secondary School, Modern Public Secondary School, and Gyanodaya Niketane Medium Secondary School of Nepalgunj Sub-Metropolitan City were selected as a study area for the conduct of the research.

Study population
The study population was adolescents in Grades 11 and 12 in this research.

Study variables
Independent variable
Sociodemographic factors:
- Age
- Sex
- Religion
- Ethnicity
- Family type
- Parent's education
- Parent's occupation.

Other factors:
- Physical activities such as sports, gym, exercises, housework, gardening, and walking.

Dependent variables
- Overweight
- Obesity.

Operational definitions
Overweight and obesity
Abnormal or excessive fat buildup that poses a health risk is known as overweight and obesity. According to WHO,
- Overweight (equivalent to BMI 25 kg/m²)
- Obesity (equivalent to BMI 30 kg/m²).

Adolescents
Individuals in the age group of 10–19 years of age.

Eating habits
The eating dietary pattern consists of the consumption of saturated fat, unsaturated fat, the frequency of consumption of junk food, and drinks per week.

Physical activity
Vigorous, moderate, and passive physical activities.

Vigorous physical activity
Sports or exercise such as football, running, basketball, and swimming. At least 3 days/week and 20 min/days.

Moderate physical activity
Activities that cause an elevated heart rate, a warm, slightly dyspneic feeling, and fatigue. These include walking, riding, doing chores around the house, and gardening for 30 min every day, at least 5 days a week.

Passive activities
Sedentary entertainment activities that result in very low energy expenditure, such as watching TV, reading books.

Selection criteria
Inclusion criteria
All the students who are present in classes 11 and 12 during data collection.

Exclusion criteria
Those students who do not give consent to participate and are absent from class during data collection.

Sample Size
The sample size is calculated using the formula:

$$Z2p [1-p]/e^2$$

The value of p is taken as 9.31% [8]. The allowable error is 5% with a 95% confidence interval.

Calculated from the formula:

$$n=(z^2*p*q/d^2).$$

Where,
Z=1.96 (for 95% confidence interval),
P=Proportion of adolescents having overweight/obesity=0.09
q=Proportion of adolescents not having overweight/obesity=0.91
e=Allowable error=0.05
Sample size=(z^2*p*q/d^2)
$\{(1.96)^2* 0.09*0.91/(0.05)^2\}=125$

Hence, the study will include 125 school adolescents of Grades 11 and 12 for final analysis.

Sampling technique
Sampling was done using a purposive sampling technique. The updated list of higher secondary schools includes both government and private schools.

Data collection tools
Data were collected using structured questionnaires developed to collect information to fulfill the study objectives.

Data collection technique
The questionnaire was self-administered by the students after being instructed on how to fill up the questionnaire.

Pre-testing of tools
Pre-testing was done in 10% of the total sample population in the same setting. The necessary modifications will be made and improved according to the questionnaire.

Data collection procedure

The data were collected after written consent was taken from the respondents. A structured questionnaire was distributed and asked to answer on their own.

Data processing and analysis

All the collected information was checked for completeness, correctness, and consistency. IBM Statistical Package for the Social Sciences software version 16 was used for data analysis.

Validity and reliability of research

The questionnaire, through expert review, was designed on the prevalence and its associated factors of overweight and obesity. Reliability of the instrument was maintained through pre-testing the instrument. For pre-testing, 10% of the total sample was done in the same setting.

Ethical consideration

At first the approval letter was obtained from the Hope International College. A verbal explanation of the objectives of the study was given to the principals of the respected school. An approval letter was submitted, and consent was taken, and the desire of the participants was highly appreciated.

RESULTS

The total number of respondents was 125. Various questions related to sociodemographic features, physical activities, and eating habits.

Table 1 shows that the sociodemographic factors of the sample (n=125) show that most participants are Hindu (92.8%) and primarily aged 16 (41.6%). The gender split is almost equal, with slightly more

Table 1: Sociodemographic variables

Variables (n=125)	Frequency (f)	Percentage
Age in years		
16	52	41.6
17	40	32
18	33	26.6
Gender		
Male	62	49.6
Female	63	50.4
Ethnicity		
Brahmin	31	24.8
Chettri	48	38.4
Janajati	18	14.4
Dalit	10	8
Others	18	14.4
Religion		
Hindu	116	92.8
Buddhist	1	0.8
Muslim	7	5.6
Christian	1	0.8
Types of family		
Nuclear	93	74.4
Joint	32	25.6
Mother education level		
No education	**37**	**29.6**
Primary	31	24.8
Secondary	20	16
Higher secondary	23	18.4
University	14	11.2
Father education level		
No education	11	8.8
Primary	21	16.8
Secondary	**34**	**27.2**
Higher secondary	30	24
University	29	23.2
Types of school		
Private school	62	49.6
Government School	**63**	**50.6**

females (50.4%). Most are from the Chettri ethnicity (38.4%) and nuclear families (74.4%). Many mothers have no formal education (29.6%), whereas most fathers have secondary education (27.2%). The participants are evenly divided between private (49.6%) and government schools (50.6%).

Table 2 shows that the physical activity data of 125 respondents show that 51.2% do not practice exercise or yoga. Among those who do, 35.2% exercise for more than 1 h daily. In addition, 52.8% play outdoor games, but 46.4% never spend time on games each day. Overall, 65.6% are considered non-active, indicating a general lack of regular physical activity.

Table 3 shows that the eating habits of 125 respondents show that 56% eat <4 times a day. Most consume non-vegetarian food 1–2 times/week (64.8%) and green leafy vegetables at least 1–2 times/week (74.4%). Fast food is eaten 1–2 times/week by 74.4% and junk food by 49.6%. Homemade food is the main source at school for 72%. Soft drinks are consumed 1–2 times/week by 44%, whereas fruits are eaten 1–3 times/week by 56%.

Table 4 shows the link between physical activity and overweight among participants. Most (65.6%) are non-active, with 64.95% having a normal weight and 75% being overweight. In contrast, 34.4% are active, with 35.04% having a normal weight and 25% being overweight. The Chi-square value is 0.335, and the p=0.563, indicating no significant association between physical activity and weight status. This suggests that physical activity levels do not significantly affect the prevalence of overweight and obesity in this sample.

Table 5 shows the relationship between age and weight among respondents. At age 16, most (40.2%) are normal weight, but 62.5% are overweight. For 17 year olds, 31.6% are normal weight and 37.5% are overweight. At age 18, 28.2% are normal weight, and none are overweight. The Chi-square value is 3.235, and the p=0.198, indicating no significant link between age and weight status in this sample.

Table 6 looks at the link between gender and weight. For males, 51.3% have a normal weight, and 25% are overweight. For females, 48.7% have a normal weight, and 75% are overweight. The Chi-square value is 2.069, and the p= 0.15, showing no significant association between gender and weight status. This means gender does not significantly affect the rates of overweight and obesity in this sample.

Table 2: Physical activities of variables

Variables (n=125)	Frequency (f)	Percentage
Means of transportation for school		
Walking	**95**	**76**
Cycling	15	12
Vehicles	13	10.4
Others	2	1.6
Play an outdoor game		
Yes	**66**	**52.8**
No	59	47.2
Game time spent per day		
Never	**58**	**46.4**
0–30 min/day	28	22.4
30–60 min/day	19	15.2
More than 1 h	20	16
Practice exercise/yoga		
Yes	61	48.8
No	**64**	**51.2**
Exercise/yoga practice times per day		
Never	**64**	**51.2**
0–30 min/day	44	35.2
30–60 min/day	13	10.4
More than 1h	4	3.2
Prevalence of physical activities		
Active	43	34.4
Non-active	**82**	**65.6**

Table 7 shows that the association between family type and overweight/obesity reveals a slight variation. In nuclear families, 7.5% of individuals are overweight or obese, whereas in joint families, this figure is lower at 12.5%. This suggests a potential link between family structure and weight status, with nuclear families showing a marginally higher prevalence of overweight and obesity compared to joint families.

Table 3: Eating habits of variables

Variables (n=125)	Frequency (f)	Percentage
Meal time on a day		
4 times	51	40.8
<4 times	**70**	**56**
More than 4 times	4	32
Frequency of consuming non-vegetarian food		
Never	15	12
1–2 times/week	**81**	**64.8**
3–4 times/week	23	18.4
Daily	6	4.8
Frequency of consuming green leafy vegetables		
Never	1	8
1–2 times/week	**50**	**74.4**
3–4 times/week	28	22.4
Daily	46	36.8
Fast food consumption in a week		
Never	9	7.2
1–2 times/week	**93**	**74.4**
3–4 times/week	17	13.6
Daily	6	4.8
Junk food consumption in a week		
Never	13	10.4
1–2 times/week	**62**	**49.6**
3–4 times/week	22	17.6
Daily	28	22.4
Main sources of consumption at school		
Homemade	29	23.2
School/Canteen	**90**	**72**
Street food	5	4
Others	1	0.8
Frequently consume soft/sweetened drinks		
Never	12	9.6
1–2 times/week	**55**	**44**
3–4 times/week	18	13.6
Daily	41	32.8
Frequency of fruit consumption in a week		
Never	6	4.8
1–3 times/week	**70**	**56**
More than 3 times/week	49	39.2

Table 4: Association between physical activities and overweight and obesity

Variables (n=123)	Normal, n (%)	Overweight, n (%)	Total	χ^2	p-value
Physical activities					
Non-active	76 (64.95)	6 (75)	82 (65.6)	0.335	0.563
Active	41 (35.04)	2 (25)	43 (34.4)		NA
Total	117	8	125		

Table 5: Association between age and overweight and obesity

Variables (n=123)	Normal, n (%)	Overweight, n (%)	Total	χ^2	p-value
Age of respondent					
16	47 (40.2)	5 (62.5)	52	3.235	0.198
17	37 (31.6)	3 (37.5)	40		NA
18	33 (28.2)	0	33		NA
Total	117	8	125		

However, the difference is not statistically significant based on the provided Chi-square test (χ^2=0.77, p=0.38).

Table 8 represents the association between school type and overweight/obesity, showing a noticeable difference. In private schools, 62.5% of students are classified as overweight, compared to 37.5% in government schools. This suggests a potential correlation between attending private schools and higher rates of overweight and obesity among students. The Chi-square test indicates no significant association (χ^2=0.501, p=0.479), implying that while there is a difference in prevalence between school types; it is not statistically significant based on the data provided.

DISCUSSION

The study conducted by Elina Khatri and Kedar Baral in Hetauda Sub-metropolitan city showed a prevalence rate of 9.34%. My study aligns with their findings, indicating a prevalence rate of 6.4%. This slight difference could be attributed to various factors, including sample size, demographic differences, and study methodologies [8]. Interestingly, my findings contrast with another study conducted among urban school adolescents in Lalitpur municipality, which reported a higher prevalence of overweight at 12.2%. This discrepancy might be due to the variation in study sites. Lalitpur, being part of the Kathmandu Valley, is more urbanized, with lifestyle habits that are significantly modernized compared to Nepalgunj. The modernized lifestyle in the Kathmandu Valley includes changes in food habits, such as increased consumption of fast food and processed snacks, and reduced physical activity due to urban living conditions [6]. In contrast, Nepalgunj, considered peripheral in comparison to the Kathmandu Valley, may have a population with more traditional dietary habits and higher levels of physical activity. These factors could contribute to the lower prevalence of overweight observed in my study. These findings highlight the importance of considering geographic and lifestyle variations when analyzing health data. It suggests that interventions to reduce overweight and obesity need to be tailored to specific populations, taking into account their unique lifestyle and environmental factors. Future studies should continue to explore these regional differences to develop more effective public health strategies.

Table 6: Association between gender and overweight and obesity

Variables (n=123)	Normal, n (%)	Overweight, n (%)	Total	χ^2	p-value
Gender					
Male	60 (51.3)	2 (25)	62		NA
Female	57 (48.7)	6 (75)	63	2.069	0.15
Total	117	8	125		

Table 7: Association between types of family and overweight and obesity

Variables (n=123)	Normal, n (%)	Overweight, n (%)	Total	χ^2	p-value
Types of family					
Nuclear	86 (73.5)	7 (87.5)	93	0.77	0.38
Joint	31 (26.5)	1 (12.5)	32		NA
Total	117	8	125		

Table 8: Association between school types and overweight and obesity

Variables (n=123)	Normal, n (%)	Overweight, n (%)	Total	χ^2	p-value
Types of School					
Government	59 (50.4)	3 (37.5)	62		NA
Private	58 (49.6)	5 (62.5)	63	0.501	0.479
Total	117	8	125		

The study conducted by Mulegebeya Worku and Zemichael Gizaw in Bahir Dar City, Northwest, Ethiopia showed a prevalence rate of 12.5% which is slightly higher than my study's prevalence rate of 6.4%. The current study shows that males were more likely than females to be overweight. In my study, the female respondents were inactive, which was 75% due to less physical exercise. Whereas the study conducted in Bahir Dar City, male respondents were overweight as they purchased more junk food from the stores. The study conducted by Mulegebeya Worku and Zemichael Gizaw in Bahir Dar City, Northwest Ethiopia, showed a prevalence rate of 12.5%, which is slightly higher than the prevalence rate of 6.4% observed in my study. This discrepancy in prevalence rates can be attributed to various factors, including geographic, cultural, and lifestyle differences between the two study locations [1].

In Bahir Dar City, the higher prevalence of overweight individuals may be influenced by the local lifestyle and dietary habits. Worku and Gizaw's study found that male respondents were more likely to be overweight due to increased consumption of junk food purchased from stores. This suggests that dietary choices play a significant role in the prevalence of overweight individuals in this region. In contrast, my study revealed that male respondents were also more likely to be overweight. However, a key finding in my research was that 75% of female respondents were inactive, primarily due to less physical exercise. This inactivity among females could be a contributing factor to the lower overall prevalence rate observed in my study compared to the Bahir Dar City study. The difference in physical activity levels highlights the importance of considering gender-specific behaviors when analyzing and addressing overweight and obesity rates [1].

The variations between these studies underscore the need for tailored public health interventions. In regions such as Bahir Dar City, where dietary habits such as junk food consumption are prevalent, public health strategies should focus on promoting healthier food choices and reducing the availability and consumption of unhealthy snacks. In my study area, efforts should be made to encourage physical activity, particularly among females, to combat inactivity and reduce the risk of overweight and obesity.

In addition, these findings suggest that socioeconomic factors, access to recreational facilities, cultural norms, and awareness of healthy lifestyles may also play crucial roles in influencing overweight and obesity rates. Future research should consider these variables to develop more comprehensive and effective intervention strategies.

CONCLUSION

The studies conducted in different regions underscore the complex interplay of geographic, cultural, and lifestyle factors influencing overweight and obesity rates. Our study aligns with the findings from Hetauda Sub-Metropolitan City, while presenting a lower prevalence rate compared to the more urbanized Lalitpur Municipality, highlighting the impact of modernized lifestyles. In addition, the comparison with the Bahir Dar City study reveals gender-specific differences in physical activity and dietary habits, further emphasizing the need for tailored public health interventions. These findings suggest that public health strategies must account for regional and demographic variations to effectively address overweight and obesity. Future research should continue exploring these differences to develop more comprehensive and targeted approaches, considering factors such as socioeconomic status, access to recreational facilities, cultural norms, and awareness

of healthy lifestyles. By doing so, we can create more effective interventions to improve health outcomes across diverse populations.

The result concluded that there is no significant relationship between physical activities, sociodemographic factors, and overweight and obesity.

ETHICAL CONSIDERATION

At first the approval letter was obtained from Hope International College. A verbal explanation of the objectives of the study was given to the principals of the respected school. An approval letter was submitted, and consent was taken, and the desire of the participants was highly appreciated.

FUNDING

CONFLICTS OF INTEREST

The authors declare no conflict of interest related to this study.

AUTHOR CONTRIBUTIONS

The study was conceptualized by Champak Kumar Singh. The manuscript was reviewed and edited by Hemank KC. Overall supervision and guidance were provided by Sheeja Singh. All authors have read and approved the final version of the manuscript.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author upon reasonable request.

REFERENCES

1. Worku M, Gizaw Z, Kassahun Belew A, Wagnew A, Hunegnaw MT. Prevalence and associated factors of overweight and obesity among high school adolescents in Bahir Dar City, Northwest, Ethiopia: A cross-sectional study. J Obes 2021;2021:8846723.
2. Peltzer K, Pengpid S, Alafia Samuels T, Özcan NK, Mantilla C, Rahamefy OH, *et al*. Prevalence of overweight/obesity and its associated factors among university students from 22 countries. Int J Environ Res Public Health 2014;11:7425-41.
3. Peltzer K, Pengpid S. Overweight and obesity and associated factors among school-aged adolescents in Ghana and Uganda. Int J Environ Res Public Health 2011;8:3859-70.
4. Teshome T, Singh P, Moges D. Prevalence and associated factors of overweight and obesity among high school adolescents in urban communities of hawassa, southern Ethiopia. Curr Res Nutr Food Sci 2013;1:23-36.
5. Gebrie A, Alebel A, Zegeye A, Tesfaye B, Wagnew F. Prevalence and associated factors of active trachoma among children in Ethiopia: A systematic review and meta-analysis. BMC Infect Dis 2019;19:1073.
6. Karki A, Shrestha A, Subedi N. Prevalence and associated factors of childhood overweight/obesity among primary school children in urban Nepal. BMC Public Health 2019;19:1055.
7. Smetanina N, Albaviciute E, Babinska V, Karinauskiene L, Albertsson-Wikland K. Prevalence of overweight/obesity in relation to dietary habits and lifestyle among 7-17 years old children and adolescents in Lithuania. BMC Public Health 2015;15:1001.
8. Khatri E, Baral K, Arjyal A, Yadav RK, Baral S. Prevalence of and risk factors for overweight among adolescents of a sub-metropolitan city of Nepal. PLoS One 2023;18:e0270777.