

Prevalence of Obesity in Correlation with Physical Activity among School Students of Nepal

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Abstract

Background and Objective: Obesity is an emerging major public health problem throughout the world and its prevalence has largely increased over the last decade in both developed and developing countries. Only fewer studies have been done addressing obesity in Nepal. Moreover, while this global epidemic is well described in the adult population, not much data is available regarding the prevalence of overweight/obesity in children or adolescents amongst developing countries. Therefore, we aimed to investigate the prevalence of overweight/obesity in correlation with physical activity among school going students of Nepal.

Method: This cross sectional study included hundred students of either sex studying in different private and government school of Nepal. The students included in the study were from grade 7 to grade 10 with the age group of 11-18 years. Height and weight were measured on calibrated scales and the standard WHO criterion for BMI was used. Physical activities of the students were assessed with the help of a set of questionnaires. Independent sample t-test was used to identify whether there is any significant difference between anthropometric data of the study population, BMI of male and female students and BMI of students of government school and private school. Likewise, Chi square (χ^2) test was applied to determine any significant association between the parameters of physical activity with BMI.

Results: The results of this study showed that the obese and overweight subjects had a high BMI. Of the total population, 3% were obese while 19% were overweight. Similarly, 31% were found to be underweight and 47% of all the children were normal. The association of different types of physical activities (sports, domestic help, motor transportation) with BMI was found to be statistically significant. Of all the obese children, 66.66% belonged to the private schools, while of the underweight children, 58.06% were in the government school.

Conclusion: Obesity and under nutrition co-exist in Nepalese school-children. This study showed the higher rates of underweight children, even though Nepalese population is starting to have worrisome rates of overweight. There is a great need for information on nutritional status and physical activity in school-age children.

Keywords: Obesity; Physical activity; School children.

I. INTRODUCTION

Obesity is an emerging major public health problem throughout the world and its prevalence has largely increased over the last decade in both developed and developing countries. While this global epidemic is well described in the adult population, not much data is available regarding the prevalence of overweight/obesity in children or adolescents amongst developing countries [1]. The World Health Organization (WHO) has declared overweight as one of the top ten health risks in the world and one of the top five in developed nations [2]. Obesity in children and adolescents is a global concern. In developed countries, the prevalence of overweight and obesity in children increased by a magnitude of two to five times in the last quarter of the twentieth century. Not only developed countries but also developing countries are also adversely affected [3]. The age and sex specific body mass index (BMI) is the most common method for assessing weight status and health risk in children [4]. The prevalence of childhood obesity has been increasing dramatically worldwide, particularly in the last two decades. Estimates in several studies indicate that one in four children aged 6-14 years is presently overweight in developed and developing countries. It is unclear what cultural, lifestyle, genetic, or environmental factors may explain these differences [5]. Childhood and adolescence have

been proposed as critical periods for the development of obesity [6].

Among children, as well as adults, physical activity is a highly multidimensional construct, traditionally conceptualized as 'any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above the basal level. Subsequently, physical fitness is usually measured through maximal exercise tests, while physical activity is often assessed by self-report (typically through diaries and questionnaires), behavioral observations, motion sensors, heart rate monitors [7].

Thus, the purpose of the present study is to determine the prevalence of obesity in correlation of physical activity among the school students of Nepal.

II. MATERIALS AND METHODS

A. Subjects' selection

This cross sectional study was performed on hundred school going students: government school (n=50) and private school (n=50). Convenient sampling was the method adopted for subject selection. The students included in the study were from grade 7 to grade 10. Informed and written consent was taken from Principal of the schools before conducting the study. General information regarding their physical activity was obtained based on a questionnaire.

Inclusion criteria:

The subjects included were

- Both male and female students from grade 7 to 10.
- Students of age group 11-18 years.
- Interested to participate in the study.

Exclusion criteria:

The subjects excluded were

- Students with clinically diagnosed chronic illness, severe malnutrition, physical & mental defects.
- Students of lower grades.
- Students who were absent during the time of conduction of the study due to any reasons.

Sampling technique: convenient sampling method

B. Recorded parameters

The recorded parameters of the subjects were as follows:

- Height in centimeters
- Weight in kilograms
- Body mass index

C. Measurement of physical parameters

i) Height in centimeters

Each subject was instructed to stand straight, with the arms stretched at the sides and the ankles or feet together. The subjects head was positioned in the Frankfurt plane and the anthropometric rod was positioned behind the subject so that its lower ends stand between the heels and the rod passes vertically between the buttocks touching the back of the head and the measurement was taken.

ii) Weight in kilograms

The body weight was taken using a weighing machine where the subjects were without shoes and wearing minimum and light clothes.

iii) Body Mass Index [8]

$$\text{BMI} = \frac{\text{weight in kg}}{\text{height (m)}^2}$$

D. Questionnaire

General information regarding their physical activity was obtained based on a questionnaire. Assessment of physical activity (PA) of the children from Grade 7 to Grade 10 in both private and government schools was undertaken.

To estimate the physical activity (PA) habits, students were asked about the following:

- 1) The transport used by the students to and from school for various distances.
- 2) Number of hours spent in a week in home activities like cleaning the house, shopping groceries etc.
- 3) The frequency of after school PA, such as running, jumping, jogging, swimming, yoga, playing soccer, cricket, volley ball, basketball etc.

III. RESULTS

Hundred school students were included in the study. Among them, government school students (n=50) and private school students (n=50) were recruited for the study. In the study, we found that there is association between the frequency of floor exercises, frequency of playing football, frequency of playing cricket, number of hours each week for cleaning the house, means of transport used for journey to and from school for 1-5 mile and frequency of jogging with the BMI of the private and government school students [Table 1, 2, 3, 4, 5, 6].

Table 1: Association of floor exercises e.g. stretching, bending, yoga between the private and government school children

School	Floor exercises e.g. stretching, bending, yoga					Chi square value	Remarks
	None	2-3 times a month	Once a week	2-3 times a week	6 times a week or more		
Private	37	0	2	2	9	22.46 df=4	p=0.0001; Significant
Government	34	6	10	0	0		

Table 2: Association of playing football between the private and government school children

School	Football							Chi square value	Remarks
	None	Less than once a month	Once a month	2-3 times a month	Once a week	2-3 times a week	4-5 times a week	6 times a week or more	
Private	22	1	1	4	6	8	0	8	17.72 df=7
Government	28	5	0	0	2	3	5	7	

Table 3: Association of playing cricket between the private and government school children

School	Cricket							Chi square value	Remarks
	None	Less than once a month	Once a month	Once a week	2-3 times a week	4-5 times a week	6 times a week or more		
Private	29	0	11	3	1	4	2	24.75 df=6	p=0.0001; Significant
Government	28	10	3	0	7	2	0		

Table 4: Association of number of hours each week for cleaning the house between the private and government school children

School	Approximate number of hours each week for cleaning the house					Chi square value	Remarks
	None	Less than 1 hour a week	1-3 hours a week	3-6 hours a week	6-10 hours a week		
Private	10	26	10	2	2	46.02 df=4	p =0.0001; Significant
Government	1	3	18	10	18		

Table 5: Association of transport used for journey to and from school for 1-5 mile between the private and government school children

School	Transport used for journey to and from school for 1-5 mile				Chi square value	Remarks
	School Bus	Walk	Public transport	Cycle		
Private	5	5	4	0	13.48 df=3	p=0.004; Significant
Government	0	22	7	1		

Table 6: Association of jogging between the private and government school children

School	Jogging								Chi square value	Remarks
	None	Less than once a month	Once a month	2-3 times a month	Once a week	2-3 times a week	4-5 times a week	6 times a week or more		
Private	11	1	15	2	5	5	0	11	29.70 df=7	p=0.0001; Significant
Government	23	5	1	6	2	5	4	4		

Likewise, we looked for the anthropometric characteristics of the students of both the genders, obese/overweight and non-overweight. There were no differences in age and height between non-obese and obese children for either girls or boys. As expected, BMI was significantly higher ($p < 0.05$) in obese/overweight boys and girls compared with the non-overweight groups. Weight was significantly higher in obese/overweight girls compared with the non-overweight girls whereas there were no differences in weight between non-obese and obese/overweight boys [Table 7].

We even compared the mean BMI between the male and female students of private and government school. The mean BMI is not significant between male and female of private school whereas the mean BMI is significant between male and female of government school [Table 8].

Table 7: Anthropometric data of the study population

	Overweight		Non-overweight	
	Male (n=3)	Female (n=19)	Male (n=45)	Female (n=33)
Age (years)	15.33±1.15	14.68±1.73	14.42±1.73	14.15±1.52
Weight (kg)	65±9.17	66.05±6.59*	47.88±11.57	43.85±8.07
Height (cm)	156.66±8.08	153.68±6.22	154.74±10.60	150.21±5.62
BMI (kg/m ²)	26.36±1.09*	27.95±2.12*	19.69±2.83	19.33±2.86

Values are means ± standard deviation.

* $p < 0.05$.

Table 8: Mean BMI of students in private and government school

School	Male	Female	P value	Remarks
Private school	20.87±2.92	23.06±5.19	0.073	Not Significant
Government school	19.29±3.35	21.94±4.70	0.025	Significant $p < 0.05$

IV. DISCUSSION

The aim of the study was to find out the prevalence of obesity in the school children and also to explore the possible relationship of BMI with physical activity of the school children. The results of this study showed that the obese/overweight subjects had a greater BMI than the non-obese students which is similar to the study done by McGloin AF et al. (2002) [9]. In this study the prevalence of obesity was 3% while the prevalence of overweight children was 19%. The prevalence of underweight was found to be higher (31%) than the prevalence of obese and overweight students in both the schools whereas 47% of all the children were normal which is in accordance with the previous studies done by Shah C et al. (2008), Warraich HJ et al. (2009) and Chhatwal J et al. (2004) [9,10,11].

Out of the total population, 66.66% of all obese children belonged to the private school, while of the underweight children, 58.05% were in the government school. This finding is consistent with the view of previous studies that obesity in developing countries increases with socioeconomic class by Warraich HJ et al. (2009) and Chhatwal J et al. (2004) [11,12]. A statistically significant difference ($p < 0.05$) was observed between the mean BMI of the male (19.29 ± 3.35) and female (21.94 ± 4.70) students of the government school but not in private school students.

In Nepal, the students studying in the private schools are affluent and of high income group where they can afford the school fees which is more than that of the government schools. It is mostly observed that the parents of low socio-economic group admit their children in government schools and this fact explains the result of having more number of children falling in underweight group from the government school. Also, private schools have fine sporting facilities than that of government schools.

In this study, when the physical activity of the students of private and government schools were compared, it was found that the government school students mainly travel the journey from home to school and vice versa by walking for the distance of 1-5 miles whereas the private school students preferred school bus.

Private school children exhibit higher body weight and BMI compared to their government school counterparts, likely due to decreased energy expenditure that accompanies higher income, motor transportation, and domestic help. Three-fourth ($n=77$) of the children walked to school, and one-fourth were conveyed by other means like school bus and public transport ($n=23$). It is seen that the non-walkers are also involved less in the physical activities like swimming, jogging etc. This is in accordance with the study done by Wilkin TJ et al. (2006) [13].

Mirroring the trend already established by developed countries, the obesity epidemic in low- and middle-income countries now encompasses young children and adolescents. Recent data show that the prevalence among adolescent children was 29% in private schools and 11.3% in government funded schools in a study done by Bhardwaj S et al. (2008) [14].

V. CONCLUSION

Obesity and under nutrition co-exist in Nepalese school children. Under nutrition remains the nutrition problem here in Nepal, even though Nepalese population is starting to have worrisome rates of overweight. However, the rapid changes in dietary patterns and lifestyles occurring in many developing countries warrant close monitoring of overweight prevalence in children so that preventive measures can be taken in a timely manner. Nepal is also experiencing growing

urbanization and associated changes in lifestyle. City kids are quickly disappearing from playgrounds, rather to be found in front of their television screens for hours, or glued to their computer chairs. There is also a great need for information on nutritional status and physical activity in school-age children. Using schools to teach children better dietary practices and the benefits of physical activity would go a long way in helping developing countries such as Nepal overcome the burden of the problem. Sedentary life style should be discouraged. Physical activities like playing outdoor games, walking and cycling should be encouraged in children. Health education should be given to parents, teachers and children regarding dietary habits and sedentary life style (school based intervention).

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