Original Research Article

Assessment of nutritional and physical activity status of children in a selected school of district Dehradun

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ABSTRACT

Background: Adequate levels of physical activity combined with a balanced diet are two essential components of healthy lifestyle. Healthy eating and physical activity habits formed during childhood can persist into adulthood and prevent or delay premature onset of a number of chronic diseases.
Methods: Present cross-sectional study was carried out using a questionnaire-based interview. It was conducted among school going children of age 8 years to 18 years. A total of 318 students were included in the study by means of total enumeration from class 2nd to class 12th of a selected school of field practice area conducted from July 2019 to September 2019.
Results: The total of 318 students participated in the study. Majority of the respondents were involved in Moderate to vigorous physical activity (40.3%). Moreover, majority were found to be normal on the basis of stunting, wasting and body mass index for age 80.2%, 79.2%, 64.4% respectively.
Conclusions: Physical activity level was found to be low as the age of children advanced. In female students the level of physical activity was low to moderate as compared to male students. Solutions to improve physical activity and nutritional status in children need to be incorporated for Indian schools' curricula.

Keywords: Body mass index, Physical activity, Stunting, Wasting

INTRODUCTION

Today's children are the citizens of tomorrow's world. Their survival, protection, and development are the prerequisite for the future development of humanity.[1] Physical activity is an integral component of a healthy lifestyle in today's modern world.[2] WHO defined Physical activity as any bodily movements produced by skeletal muscles that require energy expenditure.

Further WHO classified energy expenditure in terms of: light physical activity when heart beats slightly faster than normal and person can talk and sing, moderate activities are when heart beats faster than normal and person can talk but not sing and vigorous activities are when heart rate increases a lot and person can't talk or talking is broken up by large breaths.

WHO recommends that children of all ages requires vigorous physical activity 3 times a week for 60 minutes.[3] Asia has the highest numbers of overweight children.[4] Promoting physical activity in childhood may increase physical activity in adulthood and help reduce the burden of chronic disease? Evidence from the Cardiovascular Risk in Young Finns study indicates that decreased physical activity levels in childhood and persistent inactivity are linked to obesity in adulthood.[5]

At present a potential public health issue is emerging is the increasing incidence of childhood obesity in

developing countries, and the resulting socioeconomic and public health burden that have to be faced by these countries in the near future.[6]

Developing countries like India have a unique problem of 'double burden' wherein at one end of the spectrum we have obesity in children and adolescents while at the other end we have malnutrition and underweight.[7]

Under nutrition is ordinarily established in public health and clinical contexts with the use of anthropometry, specifically weight and height. Undernutrition during infancy and early childhood receives most emphasis because of its association with morbidity and mortality early in life and its long-term consequences; however, undernutrition can occur at any time during the life cycle. Furthermore, the terms overweight and obesity, on the other hand, are often used interchangeably, but they are not synonymous. Overweight is characterized by a moderate degree of excess weight-for-height, whereas obesity is a more severe state.[8]

Hence present study has been undertaken to identify physical activity patterns in school going children, to find out the nutritional status in school going children and to identify the association between nutritional status and physical activity among the school children.

METHODS

A school based cross-sectional study was carried out in the field practice area of Rural health training Centre, Dehradun. The study was conducted from July 2019 to September 2019, after taking approval from the Institutional Ethical Committee.

It was conducted among children of age 8 years to 18 years. A total of 318 students were included in the study by means of total enumeration from class 2nd to class 12th of a selected school. Students absent on the day of study were excluded.

Physical activity of the children was assessed by the physical activity questionnaire for older children (PAQ-C) by Crocker et al, Kowalski et al. The PAQ-C is appropriate for elementary school-aged children (grades 4-8; approximately ages 8-14 yrs who are currently in the school system and have recess as a regular part of their school week and the physical activity questionnaire for adolescents (PAQ-A) by Kowalski et al. The PAQ-A is appropriate for high school students (grades 9-12; approximately ages 14-20) who are currently in the school system. The PAQ-C and PAQ-A are self-administered, 7-day recall instrument. It was developed to assess general levels of physical activity throughout the elementary school year for students in grades 4 to 8 and approximately 8 to 14 years of age. The PAQ-C can be administered in a classroom setting and provides a summary physical activity score derived from nine items, The nine items includes the questions regarding

physical activity (sports, games, dance etc.) in spare time in the past 7 days, activity during physical education classes, activity during recess time, during lunch time, activity right after school, activities during evening time, for how many times did the child were involved in physical activity on the last weekend, How the children describe themselves about being physically active. All items were scored on a 5-point scale. Scoring 1-1.9 was taken as LPA, 2-2.9 is MPA, 3-3.9 as MVPA, 4-4.9 as VPA and 5 as HPA.[9-12]

Nutritional status was assessed through weight for age (underweight), height for age (stunting) and BMI for age (thinning) according to WHO criteria.[13]

Each child's height and weight were measured in the metric system, using standardized technique. A stadiometer capable of measuring to an accuracy of 0.1 cm was used to assess height of the subjects. The subject was made to stand without footwear with the feet parallel and with heels and occiput touching the scale. A portable balance with an accuracy of 100 g was used to record the weight of the subjects. Children were instructed to stand on the balance with light clothing and without footwear and with feet apart and looking straight. All the proceedings were undertaken after taking clearance from the institutional ethical committee and informed consent from the study participants.

Statistical analysis

The data collected was refined, compiled and tabulated using Microsoft Excel. The data was further analyzed using Epi info software and SPSS 20.0 version. Descriptive statistics, Chi-Square tests were performed to interpret the data and finding any association and significance between the study variables. The level of significance taken for our analysis is 95%.

RESULTS

The total of 318 students were participated in the study. Out of them 181 (56.9%) were boys and 137 (43.1%) were girls, between the age of 8-18 years excluding absenteeism. Majority of the students 157 (49.3%) belonged to early adolescence (10-13 years) age group followed by 109 (34.2%) mid adolescence (14-17 years), 42 (13.2%) pre adolescence (8-9 years) and least 10(3.14%) to late adolescence (>17 years) (Table 1).

Overall 255 (80.2%) of the students were found to be normal and 63 (19.8%) were stunted as per their height for age below 3rd percentile. The mean height of the students was 140.3 (Table 2).

Overall 196 (61.6%) of the students were found to be normal, 89 (27.9%) underweight below 5th percentile and 33 (10.3%) overweight as per the BMI for age above 95th percentile (Table 3).

Table 1: Distribution of study participants on the basis of sex and age.

Variable	No. of study participants (N)	%
Sex		
Female	137	43.1
Male	181	56.9
Total	318	100
Age (yrs)		
8-9	42	13.2
10-13	157	49.4
14-17	109	34.3
> 17	10	3.1
Total	318	100

Table 2: Distribution of study participants on the basis of stunting (height for age).

Stunting	No. of study participants (N)	%
Normal	255	80.2
Stunted	63	19.8
Total	318	100

Out of the total students, 252 (79.2%) were found to be normal and 66 (20.8%) underweight as per weight for age below 3rd percentile. The mean weight of the students was 40.5 (Table 4).

Table 3: Distribution of study participants on the basis of their BMI (BMI for age).

BMI	No. of study participants (N)	%
Normal	205	64.5
Underweight	82	25.8
Overweight	31	9.7
Total	318	100

Table 4: Distribution of study participants on the basis of wasting (weight for age).

Wasting	No. of study participants (N)	%
Yes	66	20.8
No	252	79.2
Total	318	100

Table 5: Distribution of study participants on the basis of physical activity.

Physical activity	No. of study participants (N)	%
LPA	28	8.8
MPA	93	29.2
MVPA	128	40.3
VPA	66	20.8
HPA	3	0.9
Total	318	100

Table 6: Association between sex and physical activity.

Sex	LPA	MPA	MVPA	VPA	HPA	Total
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Female	21 (75)	51 (54.8)	44 (34.4)	21 (31.9)	00	137 (43.1)
Male	07 (25)	42 (45.2)	84 (65.6)	45 (68.1)	03 (100)	181 (56.9)
Total	28	93	128	66	03	318

Chi sq=23.4 df= 4, p<0.05.

Table 5 shows the distribution of the study participants according to the physical activity performed, the highest number 128 (40.3%) were involved in moderate to vigorous physical activity, followed by 93 (29.2%) in moderate physical activity and least 3 (0.9%) in high physical activity. The mean physical activity score of the students was 2.31.

Table 6 shows the association between sex of the students and physical activity performed; low physical activity was found more in female students 21(75%) as compared to male students 7 (25%). High physical activity was found only among male students 3 (100%). This association was found to be statistically significant.

Table 7 shows the association between age of the students and physical activity performed. Low physical activity was found more among students of age group 14-17 years i.e., 15 (53.5%). As the age advances physical activity

among children decreases i.e., This association was found to be statistically significant.

Table 8 shows the association between stunting, wasting and BMI of the students and physical activity performed, Majority of the students who were involved in moderate to vigorous physical activity were found to be normal i.e., 97 (75.7%) and undernourished 31 (24.2%). Table also shows that majority of the students who were involved in moderate to vigorous physical activity were found to be normal according to weight for age i.e., 104 (81.25%).we found association between BMI of the students and physical activity performed, Majority i.e., 80 (62.5%) of the students who are involved in Moderate to vigorous physical activity are found to be normal, followed by underweight 33 (25.7%) and overweight 15 (11.7%) Although this association between stunting, wasting and BMI of the students and physical activity performed was not found to be statistically significant.

Table 7: Association between age and physical activity.

Age (yrs)	LPA	MPA	MVPA	VPA	HPA	Total
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
8-9	0 (0)	9 (9.6)	22 (17.2)	10 (15.1)	1 (33.3)	42 (13.3)
10-13	12 (42.8)	45 (48.4)	65 (50.7)	34 (51.5)	1 (33.3)	157 (49.3)
14-17	15 (53.6)	36 (38.7)	36 (28.2)	21 (31.8)	1 (33.3)	109 (34.2)
>17	1 (3.6)	3 (3.3)	5 (3.9)	1 (1.6)	0 (0)	10 (3.2)
Total	28	93	128	66	3	318

χ^2=15.6 df=12, p<0.05.

Table 8: Association between stunting, wasting, BMI and physical activity among school students.

Variable	LPA	MPA	MVPA	VPA	HPA	Chi-square, df, P value
	N (%)	N (%)	N (%)	N (%)	N (%)	
Stunting						
Normal	23 (82.1)	75 (80.6)	97 (75.7)	58 (87.8)	02 (66.6)	χ^2=3.8, df=4, p>0.05
Stunted	05 (17.9)	18 (19.4)	31 (24.3)	08 (12.2)	01 (33.4)	
Wasting						
Normal	19 (67.8)	75 (80.7)	104 (81.3)	52 (78.7)	02 (66.6)	χ^2=3.67, df=4, p>0.05
Undernourished	09 (32.2)	18 (19.3)	24 (18.7)	14 (21.2)	01 (33.4)	
BMI						
Normal	20 (71.4)	50 (53.7)	80 (62.6)	44 (66.6)	02 (66.6)	χ^2=10.5, df=8, p>0.05
Underweight	06 (21.4)	34 (36.6)	33 (25.7)	15 (22.7)	01 (33.4)	
Overweight	02 (7.2)	09 (9.7)	15 (11.7)	07 (10.7)	00	
Total	28	93	128	66	03	

DISCUSSION

Inappropriate dietary intakes and inadequate physical activity during adolescence can have several consequences such as: potentially retarded physical growth, reduced intellectual capacity and delayed sexual maturation, it also affects young people's risk for a number of immediate health problems such as nutrients deficiencies, under-nutrition, and stunting. A deficient growth may also affect concentration on studies, learning and school performance in school-going children.[14]

It is observed that the findings of the present study were acceptable and consistent with the research findings of the previous studies.

In our study it has been observed that females were more involved in moderate physical activity while males were more involved in moderate to vigorous physical activity. In a similar study done in Malaysia it was reported that female adolescents were less active when compared to their male counterparts.[15]

In the present study it was observed that moderate and moderate to vigorous physical activity was performed by the children of age group 10-13 years (48.3% and 50.7%), 14-17 years (38.7% and 28.1%), 8-9 years (9.6% and 17.1%), >17 years (13.9% and 10.9%). In the other study conducted by Hemaldave et al, it was observed that younger children (12-14 years) have higher physical activity than older ones (15-18 years).[16]

In this study the prevalence of stunting, wasting, thinness, overweight was 19.8%, 20.7%, 25.7%, 9.74% respectively. In a study done by Singh JP et al there is a high prevalence of malnutrition among rural adolescents as the prevalence of underweight, stunting and thinness was found to be 32.8%, 19.5% and 26.7% respectively.[16]

In the present study it was observed that the mean physical activity score was 2.31. Similarly, in the other study conducted by Dave et al the mean physical activity level was 2.62.[16]

In the present study it was observed that there was a non-significant relationship between physical activity performed and BMI of the adolescents i.e., p>0.05. In the other study conducted by Cruz et al there was no relationship between the practice of PA and BMI for boys (p=0.883) and girls (p=1.49).[17]

CONCLUSION

Overall physical activity level and nutritional status was satisfactory, but physical activity level was found to be low as the age of the children advanced. In female students the level of physical activity was low to moderate as compared to male students. Solutions to improve physical activity in children need to be incorporated for Indian schools. The study suggests that all children should be engaged in physical activity which will help in reducing the risks of developing non-

communicable diseases in future and inculcate healthy behaviour in them.

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