European Journal of Physical Education and Sport Science
ISSN: 2501 - 1235
ISSN-L: 2501 - 1235
Available on-line at: www.oapub.org/edu

doi: 10.5281/zenodo.1069683 Volume 3 | Issue 12 | 2017

PHYSICAL ACTIVITY LEVELS, OVERWEIGHT AND OBESITY AMONG SCHOOL GOING ADOLESCENTS AND THEIR ASSOCIATIONS WITH LIFESTYLE HABITS

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Abstract:

Background: Despite well documented and widely acknowledged health benefits of physical activity (PA), no study has examined the PA levels among the Jammu & Kashmir youth. The decreasing levels of PA and increasing prevalence rates of overweight and obesity among adolescents is a major public health concern.

Objectives: The purpose of the study was to assess the activity levels, prevalence rates of overweight and obesity and to investigate the association between leisure-time activities and dietary habits among adolescents.

Methods: A school- based cross-sectional study was conducted among 405 adolescents (14-18 years) from 16 randomly selected schools of Anantnag, Jammu and Kashmir. Height, weight, physical activity and other lifestyle habits were determined from self-report. Gender- specific prevalence rates of overweight and obesity were calculated based on Indian Paediatrics Association (IAP) standards. Logistic regression was used to identify association between lifestyle habits and measures of overweight and obesity.

Results: Of the total adolescents, 28.1% met the recommended levels of PA of 60 minutes daily, with boys meeting more than girls (41.5% vs 19.5%, $p < 0.001$). Prevalence rates of overweight and obesity was 11.4% and 2.7%, respectively. Logistic regression unadjusted for gender, age and location of participants shows that the odds of being overweight/obese was more among adolescents who are more involved in

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sedentary pursuits and consumes higher amounts of junk food and carbonated soft drinks.

Conclusion: Low PA levels and substantial prevalence rates of overweight and obesity among the participants were observed. The results also suggest that sedentary behaviours, physical inactivity and erratic food habits are strongly associated with the obesity epidemic.

Keywords: physical activity, overweight, obesity, adolescents, Jammu and Kashmir

1. Introduction

Children and adolescents regular participation in physical activity (PA) has several physical and psychological benefits. [1,2] It is well established that regular moderate to vigorous physical activity (MVPA is associated with many health benefits, including reduced risk of obesity, increased cardiovascular and metabolic functions, bone and muscle tissues development and above all improves mental health. [3–5] Despite the scientific evidence that physically active lifestyle has vast health benefits. Physical inactivity has become major threat to public health; an estimated 5.3 million deaths per year worldwide are attributed to physical inactivity [6,7]. Reports from India's 2016 report card and Global Matrix 2.0 on PA showed that 50% of youth did not meet the existing WHO recommendations of MVPA for 60 minutes daily and spend most of their time in sedentary pursuits [8,9]. Overweight and obesity is also a growing concern globally and India is not exempted from it. The prevalence of overweight and obesity among adolescents in India has grown significantly over last few decades. [10,11] Given that the prevalence of overweight and obesity is substantial and is mainly attributed to erratic lifestyle behaviours. The objective of the present study is to estimate the PA levels, prevalence of overweight, obesity and their association with different lifestyle behaviours among school going adolescents in Anantnag district of Jammu and Kashmir, India. The study is important because there is an emerging evidence on PA levels, overweight and obesity among adolescents from various Indian states, but little is known about school going adolescents of Jammu & Kashmir.

2. Methods

A cross sectional study design and multistage random sampling procedure were adopted and the study was conducted among school going adolescents (14-18 years) in Anantnag district of Jammu and Kashmir. Anantnag has 9 educational zones from

which four zones were selected and from each zone 4 schools were selected through random procedure. The selected 16 schools comprised of 10 high schools and 6 higher secondary schools out of which 9 were privately managed and another 7 were government managed schools.

The calculation of sample size required was carried out by using Open epi version 3.01. [12] Based on the reports from India's 2016 report card on PA, more than 50 % children and adolescents did not met the recommended guidelines of PA. Taking prevalence (P) as 50%, Precision (d) as 6% and a design effect of 1.5, the required sample came to 401. Expecting a refusal of 10% to participate, the sample size taken was 441 and was rounded to 450. The randomly selected participants from each school were provided with informed consent forms to be signed by the parents/ guardians. A separate consent form was also provided to the head of the institution. Out of the total (450) participants, 440 responded (97.7%). The study was approved by Research and Ethics Review Committee, Department of Physical Education, Aligarh Muslim University, Aligarh, India.

2.1 Measurement of Physical Activity

PA levels were assessed by using Physical Activity Questionnaire for Adolescents (PAQ-A, [13] a 7 day self-administered recall questionnaire. PAQ-A is designed for adolescents studying in 9th to 12th grades (14- 20 years).The PAQ-A has acceptable validity and reliability and has been widely used in research and field settings. [13–15] In brief, PAQ-A consists of eight questions and an additional item for identifying unusual activities of participants and is not used in final scoring. Each item of the PAQ-A has five response options and is scored between 1 and 5 to get the value for 8 items of the instrument. Once, a value is obtained for all items, the mean of the 8 items results in the final PAQ-A score. A score of 1 and 5 denotes low PA and high PA, respectively. While the PAQ-A is cost- effective to assess general PA levels, it has its own limitations. The final outcome as the mean of all individual items is not readily interpretable. [15] This makes it difficult to relate the final PAQ score to the established PA guidelines. To overcome this limitation, to relate the final score to established guidelines; a literature based criterion cut-off score of 2.75 proposed by Javier Benítez-Porres,et al.,2016[15] was used to categorize the participants as "active" (meeting 60 mins. of MVPA daily) and "inactive (< 60 mins. MVPA daily)

2.2 Other Measures

Students completed a self–administered Performa which included questions to assess information regarding lifestyle related behaviours. Dietary variables were assessed by

using Global School Based Health Survey (GSHS) dietary module modified for India. [16] The module collects information on fruit and vegetable intake, carbonated drinks pertaining to past 30 days, except the junk food item which collects information for past 7 days. The possible responses for these items were "I did not eat/drink", "Less than one time per day", "1 time per day"……, and "5 or more times per day". The responses for junk food item were "0 days", "1 day", "2 days", …….., and "7 days". The subjects for fruit and vegetable intake were categorized into "*low*" (≤ 1 time per day), "*moderate*" (2- 3 times per day), and "*high*" (4 or more times per day) categories. For carbonated soft drinks, subjects who drink less than 1 time /day constitute "*low group*", 1 – 2 times /day were in "*moderate group*" and 3 or more times/day make "*high Group*". The same way junk food item was categorized into "*low*" (0 days/week), "*moderate*" (1-3 days/week) and "*high*" (4 or more days/week) categories.TV watching and Computer/ Internet use were assessed by adopting two questions from Youth Risk Behaviour Survey (YRBS). [17] Based on the information provided, subjects were categorized into "*low*", "*moderate*", and "*high*" groups.

Weight and height were measured by the standardised procedure. The Indian Academy of Pediatrics (IAP) growth charts were used to determine corresponding BMI for age and sex percentile. [18] Obesity was defined as a BMI of above 27 adult equivalent line, Overweight was a BMI value > 23rd adult equivalent line. Normal weight was a BMI value less than 23rd adult equivalent line but at or above 3rd percentile and underweight was a BMI value less than 3rd percentile.

2.3 Statistical Analysis

Statistical analysis was performed by using SPSS version 20. Proportion of participants meeting the PA guidelines and prevalence of overweight and obesity were computed. These statistics were further analysed by using Chi-square to see for age and gender differences. Logistic regression (Multivariate) was used to examine the relation between lifestyle behaviours and BMI classification. Odds ratio (OR) and 95% confidence intervals along with p values are provided for each group of leisure- time and dietary variable in contrast to reference group.

3. Results

The study was carried out among 440 participants, of the 440 participants who take part in the survey, 405 (92%) completed the PAQ-A, and thus formed the final analytical sample of the study. The average age of participants was 15.4 (SD= 1.5). Out of the 405

participant 39.3% are boys and 60.7% were girls. About 59% are from the government schools and the rest 41% from private schools.

3.1 Proportion of Students meeting recommended levels of PA

Among the adolescents surveyed only 114 (28.1%) met the recommended PA levels, with boys more likely to meet the 60 minutes recommendation than girls (41.5% vs 19.5%, $p < 0.001$). However, no statistically significant difference was found in meeting the guidelines by age, type of school, and location Table 1.

As illustrated in Figure 1 the overweight and obesity prevalence rates in the total subject pool were 11.4% and 2.7%, respectively. Girls have high prevalence rates of overweight and obesity 13.8% vs 3.3% than boys 7.5% vs 1.9%, respectively but the differences were not found to be statistically significant .However, no study participant was found to be underweight.

Table 1: Recommended levels of PA among adolescents surveyed

Characteristics	**Total**	**60 Minutes MVPA per day**		**p-value**
		n	**%**	
Gender				
Male	159	66	41.5%	< 0.001
Female	246	48	19.5%	
Age		73	26.0%	0.144
14-16 years	277	41	33.0%	
17-18 years	128			
Type of School				0.625
Govt	238	69	29.0%	
Private	167	45	26.9%	
Location				0.104
Rural	323	85	26.3%	
Urban	82	29	35.4%	
Total	405		**28.1%**	

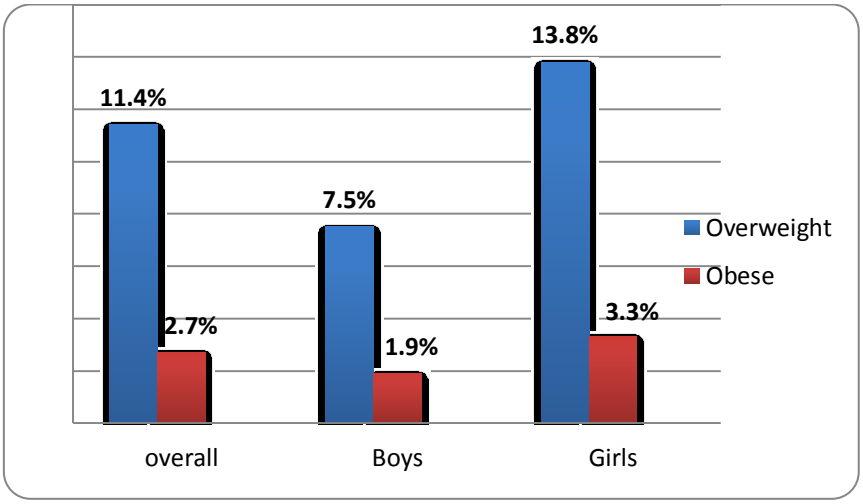

Figure 1: Prevalence of overweight and obesity

Lifestyle behaviours were used as explanatory variables to foresee the odds of combined overweight/obesity (the term "Overweight" will be used after this for combined overweight and obese status). The results of the multivariate logistic regression investigating the association between leisure time activities and overweight are presented in Table 2. A statistically significant association was seen among TV viewing, computer/ internet use, physical activity and overweight. A positive relationship ($p = 0.006$, $p = 0.025$) between high TV viewing, high computer/ internet use and overweight was seen, such that with an increase in time spent in these sedentary pursuits the odds of being overweight increases.. PA shows a negative relationship ($p = 0.011$) such that with increasing PA the odds of being at risk decreases.

Table 2: Leisure-time Activities and their Association with Overweight

Leisure-time Activities	Normal weight %	Overweight/ Obese %	OR (95% CI)[b]	P value
TV Viewing				
Low (RG)[a]	94.8	5.2		
Moderate	93.5	6.5	1.056 (.316-3.525)	0.929
High**	71.4	28.6	4.808 (1.57-14.66)	0.006
Computer/Internet use				
Low (RG)	93.2	6.8		
Moderate	88.6	11.4	1.648 (.569-4.77)	0.375
High**	70.7	29.3	4.439 (1.40-14.06)	0.025
Physical Activity				
High (RG)	93.9	6.1		
Low*	83.2	16.8	3.485 (1.335 -9.096)	0.011

a RG = reference group

b OR (95% CI) = odds ratio (95% confidence Intervals). Given for each group of leisure- time activities in

contrast to the reference group.

*Significant negative association ($p \leq 0.05$)

**Significant positive association ($p \leq 0.05$)

Table 3: Associations between Dietary Habits and Overweight

Dietary Variables	Normal	Overweight		p value
	%	%	OR (90% CI)	
Fruits NS				
Low	84.1	15.9	2.846 (.638- 12.686)	.170
Moderate	87.7	12.3	1.198 (.279- 5.140)	.808
High (RG)	88.9	11.1		
Vegetables NS				
Low	81.8	18 .2	4.964 (.457- 53.912)	.188
Moderate	86.2	13.8	2.533 (.246- 26.468)	.432
High (RG)	97.2	2.8		
Carbonated drinks				
Low (RG)	98.9	1.1		
Moderate	96.4	3.6	2.903 (.275- 30.602)	.375
High**	70.8	29.2	15.739 (1.825- 135.755)	.012
Junk Foods				
Low (RG)	98.6	1.4		
Moderate	96.0	4.0	3.878 (.375- 40.086)	.255
High **	70.2	29.8	11.392 (1.350- 96.157)	.025

a Odds ratio and 95 % confidence intervals are show for each group of dietary variable in contrast to reference group

**Significant positive association ($p \leq 0.05$)

NS = no significant association

Table 3 presents the association between dietary practices and overweight. The results show that high carbonated soft drink and junk food categories has a positive relationship ($p = 0.012$, $p = 0.025$),respectively with overweight, that is with increased intake of soft drinks and junk food the odds of being overweight increases. However, surprisingly, associations of fruit and vegetable intake with BMI were not found to be significant.

4. Discussion

The purpose of the present study was to report the prevalence of PA levels, overweight, obesity; and the association of behavioural factors with overweight among adolescents.

Our findings indicate that only 28% of adolescents meet the PA guidelines. The results are in agreement with studies conducted across India, [19,20] reporting that only small proportion of adolescents meet the guidelines of PA. Overall, girls meeting the guidelines was 22% lower than boys, the findings are similar with previous studies, stating that girls are more inactive compared to that of boys [20–22]. Low PA levels among girls in the study may be due to the norms, values and culture of society, where girls are mostly involved in domestic chores and less likely to be involved in outdoor sports as compared to boys.

The overall prevalence of overweight and obesity was 11.4% and 2.7%, respectively. The results are similar to the largest study conducted in India in this age group, which reported 10.8 ± 2.1 and 2.1 ± 0.6 percent, respectively. [19] The prevalence rates of overweight and obesity among girls and boys in this study was 13.8%, 3.3% and 7.5%, 1.9%, respectively which are to some extent consistent with previous studies. [23–25] The overall prevalence rates, when compared with studies conducted in Kashmir [26,27] revealed that overweight rates were considerably less than the present study but obesity prevalence rate in one study [26] was more than that of present study. Part of these differences with studies conducted in Kashmir and other states of India may be attributed to different criteria used to define BMI and sample size taken can't be ruled out as well.

The results show that overweight was significantly associated with low levels of PA, high TV watching and high computer/ internet use Table 2. Our findings are similar to several previous studies, [25,28–31] affirming a relationship between leisure-time activities and overweight in adolescents. The model predicts that adolescents, who are highly active, have low odds of being overweight by 3.485 times than their less active counterparts. The results also indicate that odds of being at risk in high TV watching group are 4.808 times higher than the low TV viewing group, similarly the odds are 4.44 times higher for more time spent on computer/ internet than the reference group. A significant association was found between carbonated soft drink and junk food consumption among the study sample Table 3. These findings are in agreement with several previously conducted studies.[25,28–30,32] The results of logistic regression indicates that odds of being overweight for high soft drink and junk food categories are 15.739 and 11.392 times higher as compared to that of reference group. The study results do found that fruits and vegetables have negative relationship trend with overweight, such that with increase in fruit and vegetable intake the odds of being overweight decreases, but the association was not found to be significant.

It was observed that nearly 35% and 20.2% of the adolescents are watching TV and using computer/ internet for more than two hours, respectively. An alarmingly

high physical inactivity levels were found among the study population, less than 30% of the adolescents met the guidelines. These findings highlight the impact of physical inactivity and other sedentary behaviours on adolescent overweight and obesity epidemic. Thereby, support the scientific evidence implicating screen viewing as the major risk factor of overweight and obesity. It thus becomes important that health promotion interventions seek to increase PA levels and accordingly prioritized.

4.1 Limitations

Our chosen tool for measuring PA levels has normal limitations associated with recall based self-report scales such as over/under reporting, recall bias, and social desirability bias. A literature based cut-off score used to distinguish the participants as active or inactive is a limitation. Finally, the study was conducted in one district of Kashmir and is unlikely to represent other regions and as such, generalization is limited.

5. Conclusion

The study found that a considerable proportion of adolescents were at increased health risk owing to low PA, overweight and obesity. There is strong evidence that obesity begins in childhood and the obese children are likely to become obese adults. Our findings indicate that increased TV viewing, computer/ internet use and low PA along with increased soft drinks, junk foods and low intake of fruits and vegetables are correlated with overweight and obesity. Hence, if the burden of the obesity is to be decreased, most effective interventions aimed at increasing PA, decreasing use of sedentary pursuits and health eating habits have a fundamental role to play. While physical activity and dietary behaviours of the population are much influenced by some important sectors of society, such as families, communities, schools, health care providers, governmental entities, the media and the food, beverage and entertainment industry. Each of these sectors has a fundamental and independent part to play in improving the dietary and physical activity behaviours of the population. The whole of school and whole of society approach is a necessity for all of us to be able to tackle this ever growing problem of Physical inactivity, overweight, obesity, and other metabolic risk factors of non-communicable diseases which are affecting the whole of our population at all ages.

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