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Original Research Article

Intensity of physical activity among school going adolescents in Chennai, South India

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ABSTRACT

Background: Insufficient physical activity is one of the leading risk factors for global mortality and is on the rise in many countries, adding to the burden of NCDs and affecting general health worldwide. People who are insufficiently active have a 20% to 30% increased risk of death compared to people who are sufficiently active. Objective of the study was to assess the intensity of physical activity among school going adolescents aged 13–17 years.
Methods: A cross sectional study was done among school going adolescents aged 13 – 17 years in 2 semi urban schools. About 235 subjects were selected and administered with a modified GPAQ questionnaire which measured the physical activity of the students in METs (metabolic equivalent).
Results: The median intensity of physical activity among the study population was 500 METs (IQR 360 – 800). Among the study population, 148 (63%) adolescents were insufficiently physically active (< 600 METs) out of which females were 84 (57%). Among the adolescents, insufficient physical activity was significantly higher among females and among 16-17 years than 13-15 years age group.Academic stress and no space near their home for playing were found to be associated with insufficient physical activity.
Conclusions: The prevalence of insufficient physical activity is very high among adolescents especially more among females. Reducing the academic burden and inclusion of physical activity classes in regular academic schedule and proper motivation from parents are required to improve physical activity among adolescents.

Keywords: Physical activity, MET, Adolescent

INTRODUCTION

Insufficient physical activity is the fourth leading risk factor for global mortality.[1] Insufficient physical activity is a key risk factor for non-communicable diseases (NCDs) such as cardiovascular diseases, cancer and diabetes. Physical activity has significant health benefits and contributes to preventing NCDs. It's estimated that more than 80% of the world's adolescent population is not sufficiently physically active.[2] Several studies have shown that increased physical activity decreases the incidence of cardiovascular diseases, stroke, and improves psychological well-being.[3-5]

World Health Organization (WHO) defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure – including activities undertaken while working, playing, carrying out household chores, travelling, and engaging in recreational pursuits. Globally, 81% of adolescents aged 11-17 years

were insufficiently physically active in 2010. Adolescent girls were less active than adolescent boys, with 84% vs. 78% not meeting WHO recommendations.[2]

WHO recommends that children and adolescents aged 5-17 years should do at least 60 minutes of moderate to vigorous-intensity physical activity daily. Physical activity of amounts greater than 60 minutes daily will provide them additional health benefits. Most of the daily physical activity should be aerobic. Vigorous-intensity activities should be incorporated, including those that strengthen muscle and bone, at least 3 times per week.[2]

Physical activity can lead to improvements in both long- and short-term physical and mental health and there is increasing evidence that it is also associated with academic and cognitive performance.[6-8]

Several studies have shown that regular physical activity in children and adolescents improves body composition, cardiorespiratory and muscular fitness, bone health, and levels of metabolic health biomarkers.[9]

Objectives

- To assess the intensity of physical activity among school going adolescents aged 13-17 years.
- To elucidate the factors associated with the insufficient physical activity among school going adolescents aged 13-17 years.

METHODS

Study design and setting

Two schools in Chennai, one at Thiruvottiyur (urban) and one at Chrompet (semi-urban) were chosen for conducting a cross sectional survey among school going adolescents during the period of Nov–Dec 2016. The adolescents aged between 13–17 years of both sex were included in the study. Physically challenged subjects having deformities in hands or legs were excluded from the study.

Sampling and sample size

With a prevalence of 81% of insufficient physical activity among adolescents, with 5% precision at 95% confidence limits accounting for a non-response of 5%, the sample size was calculated to be 250.[2] 125 subjects were selected from each school by systematic random sampling with 25 subjects from each age group.

Study tool

A questionnaire was designed based on the global physical activity questionnaire (GPAQ) modified to suit the school students. GPAQ was developed by WHO for physical activity surveillance.[10] The questionnaire collected information regarding physical activities which include vigorous activity, moderate activity, travel (walking/cycling) and sedentary activities. The intensity of physical activity is calculated according to GPAQ guidelines.

Data collection and analysis

Informed consent was obtained and the questionnaire was administered to the selected subjects and each question was explained in detail. The data collected were entered in MS Excel Office and analysed using SPSS v21 software. After checking for errors and non-response, 13 subjects' data were removed and the total data accounted to 235 subjects.

Operational definitions

METs (metabolic equivalents): One MET is defined as the energy cost of sitting quietly, and is equivalent to a caloric consumption of 1 kcal/kg/hour.[10]

Measurement of intensity of physical activity: 4 METs get assigned to the time spent in moderate activities and 8 METs for vigorous activities and 1 MET for sedentary activities. Total physical activity MET minutes per week <600 is classified as insufficient physical activity.[10]

RESULTS

The study population had almost an equal sex distribution with 118 males and 117 females with almost equal distribution of subjects in each age group.

Table 2 shows that among the study population, 148 (63%) adolescents were insufficiently physically active (<600 METs) out of which females were 84 (56.75%). The insufficient physical activity was more among 16–17 years age group (70.8%) compared to 13–15 years age group (57.5%) and the difference was statistically significant (p=0.038). The level of insufficient physical activity was significantly higher in females (70%) compared to males (56%) and the difference was statistically significant (p=0.041).

Around 52% (124 out of 235) of the subjects had been academically stressed which hinders them from doing physical activities and nearly three fourths (71%) of themwere insufficiently physically active (p=0.003). Around 35% (84 out of 235) of the parents of the subjects encourage them to do physical activity and out of them almost 51% had sufficient physical activity compared to those subjects whose parents who didn't encourage were only 29% physically active (p=0.001). About 60% (140 out of 235) of the study population were found to be sedentary for more than 6 hours per day. Nearly three-fourths of the study subjects (75%) who don't have playing space near their homes were insufficiently physically active compared to others (46%) those who had space near their homes (p<0.001).

Table 1: Distribution of physical activity (METs per week) among various age and sex of the study population.

Age (years)	Physical activity (mets per week)					
	Male		Female		Overall	
	N	Median (IQR)	N	Median (IQR)	N	Median (IQR)
13	25	640 (350-900)	25	440 (350-760)	50	490 (355-880)
14	24	680 (520-955)	21	400 (300-590)	45	520 (380-800)
15	21	500 (360-720)	23	560 (440-860)	44	550 (375-750)
16	23	540 (400-960)	23	460 (280-800)	46	510 (350-855)
17	25	480 (400-610)	25	440 (310-520)	50	480 (360-560)
Total	118	560 (400-855)	117	460 (320-700)	235	500 (360-800)

Table 2: Distribution of prevalence of insufficient physical activity among various demographic characteristics.

Variable	Category	Physical activity		Total N=235 (100%)	Chi square p value
		Insufficient N=148 (63%)	Sufficient N=87 (37%)		
Age categories	13-15 years	80 (57.5)	59 (42.5)	139	0.038
	16-17 years	68 (70.8)	28 (29.2)	96	
Sex	Male	64 (54.2)	54 (45.8)	118	0.005
	Female	84 (71.8)	33 (28.2)	117	
Academic stress limiting activity	Yes	89 (71.7)	35 (28.2)	124	0.003
	No	59 (53.2)	52 (46.8)	111	
Encouragement by Parents for playing	Yes	41 (48.8)	43 (51.2)	84	0.001
	No	107 (70.9)	44 (29.2)	151	
Space near home for play	Yes	46 (46.9)	52 (53.1)	98	<0.001
	No	102 (74.4)	35 (25.5)	137	
Sedentary Activity	>6 hours / day	85 (60.7)	55 (39.3)	140	0.383
	<6 hours / day	63 (66.3)	32 (33.7)	95	

Table 3: Multivariate analysis (Binomial logistic regression) to predict the insufficient physical activity among the study population.

Variable	Category	Unadjusted Odds ratio	Adjusted Odds ratio	P value
Sex	Female	2.15 (1.25 – 3.69)	2.46 (1.35-4.49)	0.003
	Male (ref)	1	1	
Academic stress limiting physical activity	Yes	2.24 (1.31-3.85)	2.39 (1.32-4.34)	0.004
	No (ref)	1	1	
Encouragement by parents for playing	Yes	0.39 (0.22-0.68)	0.33 (0.18-0.61)	0.001
	No (ref)	1	1	
Space near home for play	Yes	0.31 (0.18-0.53)	0.28 (0.15-0.5)	0.001
	No (ref)	1	1	

McFadden R^2=0.139; Goodness of fit: Pearson's chi square p=0.736. Model fitting: Likelihood ratio chi square p<0.001

A binomial logistic regression was carried out to predict the insufficient physical activity among the adolescents aged 13-17 years. The gender of the participant, their academic stress, encouragement by parents for playing, playing space near home were significantly associated predictor variables.

Female adolescents have 2.46 odds of becoming insufficiently physically active compared to male adolescents. Those adolescents who have academic stress are 2.39 times at risk of becoming insufficiently physically active compared to others. Those adolescents who have encouragement from their parents for playing are 67% protected and those who had space near their homes are 72% protected from becoming insufficiently physically inactive.

DISCUSSION

The overall prevalence of insufficient physical activity among the study population is 63%. The systematic review by Jurakic et al listed out various studies which determined the prevalence of insufficient physical activity among adolescents.[11] Out of which, a study by WHO stated that the prevalence of physical activity among 13 year old adolescents is 58-88%.[12] In a similar

study done in Tamil Nadu, the prevalence of insufficient physical activity among adolescents was found to be 59%.[13]

Among the study population, the physical activity measured in METs was more in the 13–15 years age group compared to 16–17 years and showed a decline with increasing age. In a study by Anmol et al, the pattern of the physical activity among the school going adolescents were studied which showed a significant decrease in the duration of physical activity between 10-12 years adolescents and 16-18 years adolescents.[14]

In our study, insufficient physical activity was significantly higher in females (70%) compared to males (56%). Similar results were seen in a study done in Chennai.[13] In a similar study done in Malaysia it was reported that female adolescents were less active when compared to their male counterparts.[15]

The present study showed a significant association between adolescents being physically active and encouragement by their parents for playing. In a systemic review of studies published between 1998 and 2013 it was suggested that parental encouragement and support may influence child's physical activity.[16] Similar association was also seen in a study done in Alberta, Canada where it was found that increased parental encouragement was positively associated with boys' and girls' physical activity on schooldays and girls' physical activity on weekends.[17]

Academic stress was found to be a significant predictor for insufficient physical activity in our study. Several studies have shown similar association between insufficient physical activity and academic stress.[18-20]

A statistically significant association was found between insufficient physical activity and unavailability of playing space near home or residence in the present study. Similar findings were reported in a study in Kalaburagi city, India.[21] A study done in Coimbatore among 11-15 year school children also revealed that access to playground was an important factor for physical activity.[22]

Studies have proven that physical activities in school environment have short term as well as long term benefits over health. Encouraging physical activity from school days should be promoted in India, which will prevent the children from many risk factors including childhood obesity.[7,23]

Limitations

The intensity of physical activity measurement was based on subjective responses and there is a slight lack in credibility.

Recommendations

- Parents of the school going children should be counselled for motivating their wards to engage in sufficient physical activity atleast 5 days a week.
- Those adolescent children who do not have adequate space or playground near their homes for physical activity should be encouraged to spend more time in school playground after academic hours.
- The physical activity of the school children and adolescents must be monitored in the school health activities.

CONCLUSION

The prevalence of insufficient physical activity is very high among school going adolescents especially more among females. Reducing the academic burden and inclusion of physical activity classes in regular academic schedule and proper motivation from teachers and parents are required to improve physical activity among adolescents.

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