Physical Inactivity, TV-Watching Hours and Body Composition in Children and Adolescents

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Abstract

Background: Physical inactivity is a predisposing factor to the onset/worsening of other cardiovascular risk factors, particularly obesity.

Objective: To determine physical activity level (PAL) and daily number of hours of TV (HTV) and the association and/or correlation of these variables with age, gender, economic class, public/private school, overweight and obesity in children and adolescents.

Methods: Cross sectional study, school-based population, public and private education, primary and secondary education. The sample was calculated based on the minimum expected prevalence of several variables, including physical inactivity. Cluster sampling. Protocol: structured questionnaire, including Physical Activity for Older Children Questionnaire (PAQ-C) measurements of weight, height, body mass index (BMI) and triceps skinfold (TSF). Statistical analysis: Chi-square, linear correlation.

Results: Among the 1,253 students, averaging 12.4 ± 2.9 years old, of which 549 were male, there was a prevalence of inactivity in 93.5%, more commonly found in female adolescents and there was no association between PAL and excess weight or body fat, soccer and dance were the most frequent activities in boys and girls, respectively; 60% of students did not have physical education classes. Average and median HTV were respectively 3.6 and 3 hours; there was a significant association between HTV and obesity and significant correlation between PAL and age (negative) and between BMI and TSF (positive).

Conclusion: Physical inactivity is present in 93.5% of children and adolescents from Maceió. It is more commonly found among teenagers and females, with no association or correlation of this variable with excess weight or body fat; obesity was associated with ≥ 3 HTV. (Arq Bras Cardiol 2010; 95(2): 159-165)

Key words: Sedentary lifestyle; obesity; body composition; children; adolescents; television/utilization.

Introduction

There is evidence that atherosclerosis, the most frequent cause of death in Brazil[1], starts in childhood[2], and that the speed of progression and the severity of injuries that constitute it are proportional to the presence and aggregation of cardiovascular risk factors (CRF), as reported in adults[3], which have been present since childhood[4-6].

Among these factors, physical inactivity or a sedentary lifestyle appears as predisposing to the onset or worsening of other CVRF[3,7,8], particularly obesity[9] (due to an imbalance between energy intake and energy expenditure), which, even in young people, is associated with a number of comorbidities, such as metabolic syndrome, diabetes mellitus type II, dyslipidemia and hypertension[8-15]. Moreover, there is evidence that active or sedentary behaviors in childhood and adolescence tends to persist into adulthood[16,17]. Hence, the acquisition and maintenance of an active lifestyle since childhood are present in all recommendations for a long and healthy survival[18-24].

In the absence of a gold standard, different instruments have been used to measure daily physical activity, which can do it in a physiological (oxygen consumption, heart rate) or behavioral point of view (questionnaires, interviews, diaries)[25]. It is also important to investigate the daily time used in sedentary activities (television, electronic games, computers), which, by reducing the time spent in activities with greater energy expenditure, may contribute to increased weight and body fat, blood pressure and serum lipids[26-28].

In population studies, it is necessary to choose user-

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Manuscript received April 08, 2009; revised manuscript received October 30, 2009; accepted December 28, 2009.

friendly and low-cost precision instruments[25], as with validated questionnaires with other precision instruments[29] and properly tested[30].

This study aims to establish the physical activity level (PAL) and daily number of hours watching TV (HTV) and the association and correlation of these variables with overweight and obesity in children and adolescents.

Methods

In the school year of 2001, we conducted a cross-sectional epidemiological, observational study to identify the prevalence of cardiovascular risk factors (overweight, obesity, smoking, hypertension and sedentary lifestyle), in a representative sample of children (aged 7 to 9 years) and adolescents (10 to 17 years) from both genders, enrolled in public (municipal, state and federal) and private elementary and high schools from the city of Maceió.

Some of the results of this study, the criteria used for the calculation and selection of the sample to define the variables investigated and the informed consent for participation have been previously published[31,32].

Overweight was defined as body mass index (BMI) in the percentile greater than or equal to 85, identified in a population-specific table, according to age[33]. BMI in the percentile equal to or above 95, from the same table, was used to define obesity[33].

Diagnosis of obesity was also performed by measuring the triceps skinfold (TSF) using the parameters of Must, Dallal & Dietz[33], which establish that TSF in the percentile equal to or greater than 85, identified in tables deriving from the National Health and Nutrition Examination Survey I (NHANES I), identifies obese individuals and TSF in the percentile equal to or above 95 identifies super obese individuals.

The physical inactivity research was done by investigating physical activities performed by students, using the Physical Activity Questionnaire for Older Children (PAQ-C), which had been validated for the age group under investigation[25,29] and adjusted to exclude non-physical activities practiced in Brazil[30].

The PAQ-C investigates moderate and intense physical activities 7 days before filling it up (therefore including the weekend). This questionnaire consists of 9 questions about sports and games, physical activities in school and leisure. Each is worth 1 (did not practice any activity) to 5 (practiced activities on all week days) and the final score is the average of the questions. In the end, the score provides a range from very sedentary to very active (from 1 to 5): 1 - very sedentary, 2 - sedentary, 3 - moderately active; 4 - active; and 5 - very active.

The PAQ-C also includes one question on the average number of hours watching TV, two on the compared level of physical activity with individuals of same gender and age on the existence of a disease that prevented the respondent from having practiced physical activities in the week assessed. The answers to the last 4 questions are not used to build up the score.

For association analyses, the sample was divided into groups: Sedentary Individuals (with scores between 1 and 2 in the PAQ-C) and Active Individuals (with scores 3, 4 and 5 in the PAQ-C); with HTV greater than or equal to the median and smaller than the median). The independent variables analyzed were: age, gender, economic class, school type, BMI and TSF. The analysis was performed using the chi-square test or Fisher exact test on association tables, establishing a level of 5.0% to reject the null hypothesis.

The linear correlation was used in the study of the relationships between age, BMI percentiles, TSF percentiles with PAL and HTV.

The research project was approved by the Ethics Committee of the University Hospital of the Federal University of Alagoas.

Results

We evaluated 1,253 students (7 beyond the expected, due to a greater number of students enrolled in some schools), including 547 males (43.7%) and 706 females (56.3%). The mean age (± standard deviation) was 12.4 ± 2.9 years. The general characteristics of the sample are shown in Table 1. The average values, standard deviation, median, minimum and maximum for continuous variables are shown in Table 2.

For BMI, we identified 116 children and adolescents (9.3%) in the percentile ≥ 85 (overweight) and 56 (4.5%) children and adolescents in the percentile ≥ 95 (obese). Excess weight, as measured by BMI, is present, therefore, in 13.8% of the sample.

For the TSF, we identified 110 (8.8%) children and adolescents in the percentile ≥ 85 (obese) and 75 (6%) children and adolescents in the percentile ≥ 95 (super obese). Therefore, there is excess of body fat in 14.8% of the sample.

PCT in the ≥ 95 percentile identified 43 children and adolescents with BMI in the ≥ 95 percentile (57.0%), 28 in the ≥ 85 percentile (37.0%) and 4 (6.0%) with normal BMI (percentile between 50 and 85). In ≥ 85 percentile, the TSF identified 11 children and adolescents (10.0%) with BMI in the ≥ 95 percentile, 47 (43.0%) in the ≥ 85 percentile and 52 (47.0%) with normal BMI, percentile between 50 and 85. When analyzed together, the TSF and BMI in the ≥ 85 percentile identified excess of central adiposity and overweight in 129/228 (57.0%) children and adolescents; overweight, no excess of central adiposity in 43 (19.0%) and excess of central adiposity without overweight in 56 (24.0%) individuals.

The analysis of answers to the questionnaire on physical activity (PAQ) identified 671 students with scores 1 (very sedentary) and 501 with score 2 (sedentary), resulting in 1,172 (93.5%) sedentary individuals; 79 students had a score 3 (moderately active), 2 with score 4 (active) and none of them had score 5 (very active).

The activities most frequently performed (three or more days in a week) by male students were soccer (40.0%) and cycling (37.0%) and for female students, dancing (22.0%) and cycling (21.0%); 62.0% of female students and 57.0% of male students reported they did not take physical education classes in school.

For TV-watching, 38 (3.0%) students said they did not watch it, of which 26 do have TV at home (from 129, around 10.0% of the sample do not have a TV set) and 12 have TV sets.

The other 103 who do not have a TV set reported that they watch TV for 1 to 10 hours a day, averaging 3.6 ± 2.0

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Table 1 - Absolute and relative frequency of the variables studied

Variable	N	Frequency (%)	Variable	N	Frequency (%)
Age group			BMI		
Children	249	19.9	Normal	1.081	86.2
Pre-Adolescents	665	53.1	≥ % 85	116	9.3
Adolescents	339	27	≥ % 95	56	4.5
Sex			TV-watching hours		
Male	547	43.7	≥ 3 hours	808	
Female	706	56.3	< 3 hours	445	
Economic class			PA level		
A	70	5.6	1	671	53.4
B	155	12.3	2	501	40.1
C	341	27.2	3	79	6.3
D	567	45.3	4	2	0.2
E	120	9.6	5	0	0
School			TSF		
State school	741	59.1	Normal	1.068	85.2
Municipal school	52	4.2	≥ % 85	110	8.8
Federal school	193	15.4	≥ % 95	75	6
Private school	267	21.3			

Table 2 - Association analyses among the variables of the study

	N	Sedentary individuals (PAQ-c 1.2)	≥ 3 TV-watching hours/day	BMI % ≥ 85	TSF % ≥ 85
Age group					
Children	249	225	159	39	40
Adolescents	1004	947*	649	133	145
Sex					
Male	547	494	347	80	98**
Female	706	678***	461	92	87
Economic class					
A +B	225	208	145	54***	66***
C+D+E	1,028	964	663	118	119
School					
Public school	986	921	626	107	104
Private school	267	251	182	65***	81***
TSF					
% ≥ 85	185	177	132*	129***	
% < 85	1,068	995	676	43	
BMI					
% ≥ 85	172	161	115		
% < 85	1,081	1,011	693		

*Chi-square test: * p = 0.03; ** p = 0.006; *** p < 0.0001.*

hours. In the group of 1,112 students who have TV at home, the number of daily hours of TV-watching also varied from 1-10 hours, averaging 3.7 ± 2.2 hours. Considering those who watch TV, regardless of having it at home or not, the median hours of TV-watching are 3 hours; 407 (32.0%) watch TV for 1-2 hours and 808 (65.0%) watch it for 3 or more hours.

Table 3 shows the association analysis of PAL, median of HTV, overweight (according to BMI) and obesity (according to TSF) of the sample in relation to the variables of the study. There is significant association between a sedentary lifestyle, adolescence and women and between watching TV for three or more hours and obesity. Overweight and obesity were significantly more frequent in individuals from higher income classes studying in private schools; in addition, obesity was associated significantly with male sex and overweight.

We observed weak negative correlation between age and PAL ($r = -0.27$; $p < 0.05$); no correlation was observed between PAL and HTV, BMI percentiles and TSF percentiles. There was no significant correlation between HTV and age, BMI percentiles and TSF percentiles. We found a strong correlation between BMI and PCT ($r = 71$; $p < 0.01$). The correlation analysis is shown in Table 4.

Discussion

The increasing growth of prevalence of obesity and physical inactivity and lower levels of daily physical activity in all age groups and in different populations around the world justify the importance of studies analyzing the distribution of these variables and how they associate with each other, indicating the need and enabling the adoption of population-specific public health strategies to control them[9,18,19] in order to reduce cardiovascular morbidity and mortality[1].

This school-based study found that 93.5% of young students do not perform moderate to heavy physical activities throughout the week and this sedentary behavior, as already shown in other studies[27,30,34], is more common in adolescents than in children and in females. Using the same investigation tool, Silva and Malina[30] identified 89.5% of sedentary individuals in a sample of 325 adolescents of both sexes, in Niterói, RJ, also predominantly female. Other studies in Brazil showed a prevalence of inactivity ranging from 10 to 94.0% in young people from different ages and using different research instruments[18,30,34], making it impossible to compare results, but pointing out to the urgent need for public health strategies intended to reduce its impact as a risk factor for atherosclerosis[18].

This study found no association of physical inactivity with a lower purchasing power (economic class C, D or E; public school students) as found in other studies[28,34].

As for body composition, this work found no significant association of sedentary behavior with overweight determined by BMI, nor with the triceps skinfold in percentiles at or above 85 and at or above 95, when analyzed separately or together as observed in other studies[6,9,10,15,21,26,28]. Considering that the causes of obesity are multiple and complex, involving genetic and environmental components, probably in individuals with overweight and/or excess body fat in this sample, other factors, in addition to physical inactivity, should play a more important role in the onset of this characteristic[9,10,11]. Furthermore, the low prevalence of these variables in this sample may also explain the result found.

This study also found a high proportion of young individuals (62.0% of female students and 57.0% of students) who do not have physical education classes in school, considering that the Law of Guidelines and Bases[35] sets forth that it is mandatory for schools to offer physical education classes in primary and secondary education (Basic Education), from which we selected the individuals from our sample.

Trudeau et al[17], in a longitudinal study that monitored adolescents aging 10-12 years old up to the age of 35 years old, noted a positive impact of regular, orderly and early

Tabela 3 - The average, standard deviation, median, minimum and maximum of the numeric variables studied

	Average	Standard deviation	Median	Maximum	Minimum
Age (years)	12.4	2.9	13	7	17
BMI (kg/m²)	18.8	3.7	18.2	41.6	12.8
TSF (mm)	13.6	6.3	12.2	38.2	4.0
PAQ-c Score	1.9	0.6	1.9	4.2	1
TV-watching hours/day	3.6	2.3	3.0	10	0

Table 4 - Correlation coefficients between the numeric variables of the study

	Physical activity level	TV-watching hours	BMI Percentiles	TSF Percentiles
Age	*r = - 0.27; p< 0.05	r = 0.01; p > 0.05	r = - 0.04; p > 0.05	r = 0.05; p > 0.05
TV-watching hours	r = - 0.04; p > 0.05	r = 1.0	r = 0.04; p > 0.05	r = 0.06; p > 0.05
BMI percentiles	r = 0.02; p > 0.05	r = 0.04; p > 0.05	R = 1.0	*r = 0.71; p < 0.01
TSF percentiles	r = - 0.02; p > 0.05	r = 0.06; p > 0.05	*r = 0.71; p < 0.01	r = 1.0

*$p < 0.05$.

exercising in school on the persistence of this characteristic in adulthood. This evidence has assigned to schools a critically important role in fighting sedentary lifestyles in childhood and adolescence[14-18], considering that both activity and physical inactivity in childhood, especially in adolescence, tend to persist into adulthood[16,17].

Sedentary behavior has many components, among which the time spent watching TV contributes with 81.0%[27] for such behavior. Worthy of note is that this habit does not require energy expenditure above basal metabolic rate and reduces the daily time spent in activities with greater energy expenditure. Besides this, TV advertisings promote increased consumption of foods with high energy contents, often shown in TV commercials and programs screened at times of increased TV-watching rates[16,26-28].

Dietz et al[26], studying 6,965 young people aged from 6 and 11 and 6,671 aged from 12 to 17 found that the prevalence of obesity increases by 2.0% for each additional hour of TV-watching.

In a longitudinal study that monitored 1,000 young people aged from 5 to 15 up to the age of 26, Hancox et al[28] showed that the greater the number of hours watching TV, the higher the body mass index, cholesterol level, prevalence of smoking and worse fitness in childhood and adolescence. They also reported that these variables remained into adulthood.

Myers et al[27], studying individuals aged from 9 and 15, found greater triceps skinfold in males with a more sedentary male and lower HDL-cholesterol in more sedentary girls; in both sexes, diastolic blood pressure was higher in more sedentary individuals. These findings corroborate recommendations that children and adolescents should spend no more than two daily hours watching TV[18-24].

In this study, we observed that the average daily hours watching TV was 3.6 hours, of which 3.7 were among girls and 3.5 among boys; the median for the group and in both sexes was 3 hours. In the study by Silva and Malina[30], the average found was 4.4 and 4.9 hours for males and females, respectively; the fact that the sample consisted of adolescents explains these higher values when compared to our study, which included children and preadolescents, who are naturally more active.

No association was found between 3 or more hours watching TV and age group, gender, economic class and school type, demonstrating that such behavior is frequent and ubiquitous in young people from Maceió. As for body composition, there is a significant association only in individuals with excess body fat (TSF in percentiles above or equal to 85 and 95), as previously shown by Myers et al[27]. The impact of other factors in the development of obesity and the low prevalence of abnormalities related to excess weight and body fat in this sample, as previously mentioned, justify the absence of such associations.

The conclusion of this investigation is that most (93.5%) young individuals from the city of Maceió do not practice moderate to intense physical activities, spending more than the recommended daily time for sedentary activities (65.0%) and do not practice physical activities at school (60.0%). Hence, this data provide reasons for us to believe that, although these behaviors do not appear to be involved in the genesis of obesity presented by them, they may contribute to the emergence of obesity and other CVRF in adulthood[16,17,28], who will contribute to worsen the current profile of cardiovascular morbidity and mortality[1].

The possible use of the data presented in the construction of strategies to raise the level of physical activity and reduce children and adolescents' time in sedentary activities, aiming at the prevention of cardiovascular diseases, justifies studies like this.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Sources of Funding

This study was funded by FAPEAL.

Study Association

This study is not associated with any post-graduation program.

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