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Analysis of physical activity level, the body mass index and skill in global motor teens

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Abstract

Introduction: Adolescence is the stage between childhood and adulthood, marked by a process of growth and biopsychosocial development, which adopted habits and behaviors tend to stabilize in adult.

Objective: To analyze the level of physical activity, body mass index and the motor age teens in school.

Method: Data were collected using the International Physical Activity Questionnaire, body mass index for age range of the Center for Disease Control and Prevention, and gross motor function tests based Development Motor Scale.

Results: Physical activity analysis showed that there was no physical inactivity due to physical education, but 44% was classified as insufficiently active, and 24% very active; BMI for age rated normal for 64%, with 32% of obese; 92% of the sample was within the normal range of motor age, even with 11:16 months of delay in gross motor age compared to chronological age.

Conclusion: Each tool has been used independently, without establishing a relationship between the level of activity, BMI and motor age. Should join health professionals and family members to detect deviations growth and help in the development, intervening in the present and future life of the population.

Introduction

Adolescence is characterised by various biological, social and behavioural changes that significantly affect health habits, including social, family and cultural [1]. According to the World Health Organization (WHO) adolescence is the stage of life between childhood and adulthood, marked by a complex process of growth and biopsychosocial development that is present in people between 10 and 19 years of age. However, in Brazil, the Statute of Children and Adolescents uses the age range 12 to 18 to define the stage of adolescence.

During the motor development process there is a series of physical and mechanical changes [2], where gravitational mechanical forces (impact) and muscle contractions inherent to physical and sporting activity contribute to a healthy development of the skeletal system, providing greater bone mineral density without influencing longitudinal growth [3]. According to Dartagnan & Grondin (2002) and Parmenter & Wardle (2000) [4,5], the acquisition and maintenance of healthy habits, such as proper nutrition and physical activity, are directly linked to improving quality of life and health, contributing to a reduction in various diseases.

There is evidence in the literature showing that habits and health-related behaviours adopted during childhood and adolescence tend to stabilise in adulthood [6]. Thus, stimulating physical activity at a young age should be a priority in public health, since engaging in daily physical activity has a significant role in health promotion and the prevention of hypokinetic diseases [7,8].

According to Troiano *et al.* (2008) [9], less than 8% of adolescents and 5% of American young adults follow the recommendations of a healthy diet and regular physical activity. A survey developed by the WHO (2010) points out that two thirds of adolescents under the age of 15 do not meet the recommendations for physical activity, i.e., at least 150 minutes per week of moderate physical activity or 75 minutes a week of vigorous physical activity with sessions of at least 10 minutes' duration without determining weekly frequency.

Physical activity is considered an important indicator of health, therefore, from an epidemiological point of view, it is essential to identify the amount of physical activity that a population performs at a given time, in order to establish the need to implement promotional strategies [10,11].

Despite the recognised importance of physical activity for health and well-being, a large proportion of adolescents do not achieve

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satisfactory levels [12]. According to Souza & Duarte (2005) [13], 62.1% of adolescents are inactive or insufficiently active, boys being physically more active than girls. Young people tend to reduce physical activity levels along with their advancement in school grades, and this decline is also evident when analysing the data for chronological age.

Because of this significant reduction in levels of physical activity, researchers in the United States found that schools would be the most appropriate place for implementation of public policies to promote physical activity in children and adolescents [13]. As Harris *et al*. (2009) [14] suggest, school-based interventions are theoretically attractive because of adherence to interventions by teachers. There are a number of advantages to the strategy of promoting physical activity in school, such as ensuring full attendance of students due to the school curriculum and further guidance on the importance of practice and explanations about the consequence of inactivity due to established risk factors for chronic diseases [15].

There is good evidence that physical activity interventions in school are effective in increasing the duration of physical activity, reducing blood cholesterol and time spent watching television [15]. However, according to Fromel *et al*. (2016) [16], extracurricular physical activity, such as leisure with family and/or friends or playing sports, is also critical to health and especially to the physical, mental and social development of young people.

According to Lammle *et al*. [17] physical activity has positive effects on children's development, which plays an important role in motor skills. Observing motor development in teenagers leads to the possibility of detecting inadequate progress, allowing the development of interventions to reverse this situation. Therefore, this study is justified due to the current lifestyle of adolescents, as they are increasingly inactive and may not have motor development typical for their age group, as well as possible changes in the rates of weight and height. This study aims to analyse the level of physical activity, body mass index (BMI) by age, and motor age of teenagers, accomplished during school hours.

Method

All adolescents of 10 and 11 years old at a public school in the municipality of Presidente Prudente in Sao Paulo were recruited for this study. Effective participation in all stages of the study was carried out by 25 adolescents of both sexes, nine boys and 16 girls, with a mean chronological age of 133.1 months. Adolescents with any medical condition were excluded. The data collection started after approval of the research by the Ethics and Research Committee of Unoeste, and all parents and/or guardians signed the Informed Consent Form, CAEE Number: 411.

For the collection of data we used the International Physical Activity Questionnaire (IPAQ) [18], the BMI for age scale of the Centre for Disease Control and Prevention (CDC), and the global motor skills (GM) tests based on the Motor Development Scale (MDS) [19].

The level of physical activity of volunteers was evaluated by means of the IPAQ [18] and the Baecke Habitual Physical Activity Questionnaire [20].

The IPAQ is composed of questions that assess physical activity in an average week, which is subdivided into activity as a means of transport, activity at work, exercise and sport. According to the classification of the level of physical activity by IPAQ, individuals fall into:

- Sedentary - does not perform any physical activity for at least 10 continuous minutes during the week.
- Insufficiently active - individuals who practice physical activities for at least 10 minutes, but insufficiently to classify them as active.
- Active - individuals who do vigorous physical activity ≥ three days per week and ≥ 20 minutes per session, moderate physical activity or walking ≥ five days per week and ≥ 30 minutes per session, or any activity added up to reach ≥ five days per week and ≥ 150 minutes per session.
- Very active - vigorous activity ≥ five days per week and ≥ 30 minutes per session, vigorous activity ≥ three days per week and ≥ 20 minutes per session, and more moderate activity ≥ five days per week and ≥ 30 minutes per session [21].

The Baecke Habitual Physical Activity Questionnaire is a reminder tool for the last 12 months, consisting of 16 questions which cover three scores of habitual physical activity, i.e., occupational physical activity, physical exercise in leisure, and recreational physical activity and locomotion [22].

The collection of height and weight data was held followed by the analysis of these through the BMI by age scale of the CDC.

Then there was the assessment of the GM through the MDS, either according to the chronological age of the adolescent, or via the adolescent performing the tasks starting from their chronological age until they cannot complete the task and then the General Motor Age (GMA) is defined based on the results.

When failure occurs in the task corresponding to chronological age, the previous task It is performed and, if successful, the child performs next task, if it fails again, performs previous. You can observe a suppleness with regarding successes and failures, however, since that a test can not be overcome is not offered the opportunity to conduct further testing there was the failure. In this context, children were able to perform the following tasks that failed, this result would not be considered [23]. The results were calculated for the highest score described in months. The development of motor quotient (QM = MG/IC x 100) was ranked as much higher, superior, normal high, average normal, low normal, bottom, or much lower. Adolescents who had impairments were instructed to seek health services which have the power to prescribe appropriate treatment.

The descriptive statistical method was used for the analysis of the results, which were presented as mean values.

Results

During the IPAQ a precise explanation was given to adolescents so they could properly answer the questions. The data are shown in Figure 1. The level of physical activity assessed by the IPAQ showed no inactivity due to physical education, but 44% of the sample were ranked as insufficiently active, and only 24% as very active.

The analysis score of occupational physical activities in the application of the Baecke questionnaire was excluded because no subject of the sample was working. The teenagers evaluated by the Baecke questionnaire obtained a mean score of 6.18 ± 0.86. There is an additional classification to this finding to analyse the spectrum of scores, with a minimum of 3.45 to a maximum of 12.27. This suggests that if the sample in the last 12 months performed little physical activity, scoring below average would be 7.86.

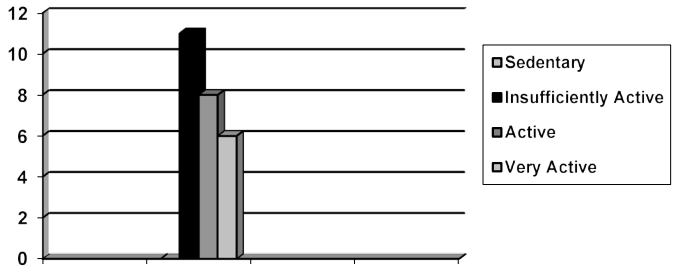

Figure 1. Sample classification according to IPAQ

The results obtained with respect to the mean BMI/age were 19.18 kg/m2, this figure being classified as normal or eutrophic. The other values can be seen in Figure 2. The BMI for age rated 64% of adolescents as normal and 32% as obese.

When comparing the average GMA with the mean chronological age there was a slight advantage that can be seen in Figure 3. The motor age is presented within normal range in 92% of the sample, even with 11.16 months of delay in gross motor age in relation to chronological age. To sort the MDS for GM need to realise Quotient General Motor with an average of 91.53, this means average normal. We can observe the overall rating of the GM according to MDS in Figure 4.

Discussion

This study showed that we can independently analyse the index of physical activity, body weight and motor function in adolescents through different tests. For the analysis of physical activity during the period of a week, the IPAQ [18] found that there was no physical inactivity in adolescents due to practical exercises during the school period. It is known that school physical education is a favourable environment to promote behaviour change [24], because it is believed that it contributes to an increase in physical activity [25,26]

It is important to note that school physical education does not determine the optimal level of activity, it contributes only a small portion to the desired degree of physical activity. This because it is usually carried out at low intensity and low frequency during the school schedule [27]. This is observed in a study by Rivera *et al.* [28], where 93.5% of the assessed young people did not exercise at moderate to intense levels throughout the week. These data corroborate the results found in this study where 44% of students were classified as insufficiently active, even when performing regular activities at school.

Following this reasoning, physical education teachers should encourage and motivate students to conduct activities during leisure time [29-31]. School breaks and the practice of extracurricular sports present opportunities to engage students in physical activities [32]. To quantify leisure activities and time for individual travel, the Baecke questionnaire [32] can be used, where the selected statistical data in a study Dartagnan *et al.* [33] indicate that it can be defined as a valid instrument directed to follow the usual practice of physical activity, particularly among older adolescents. Thus, according to the results found in the last 12 months, the participants performed physical activity below average during their daily activities.

One of the factors contributing to the inactivity of young people is the reduction in the physical effort of travelling to school and hobbies, and an increase in time in passive activities, such as electronic games and computer games or television [34] In a longitudinal study that followed 1,000 young people from five to 15 years old and then until the age of 26 [35], it was demonstrated that the higher the number of hours watching television, the higher the BMI, the cholesterol level, and the smoking prevalence, and the worse the physical fitness in childhood and adolescence, and these variables remained in adulthood.

According to Silva *et al.* [36], good relationships with colleagues during the school year also negatively influences adolescents to present sedentary behaviours, due to the large amount of time needed for static and online activities. Areas where the activity is carried out (at home, at work, on transport, and leisure time) and the age, sex, ethnic origin, and socioeconomic status also directly influence the level and frequency of activities [37]. These results confirm the importance of the social environment to active lifestyles [38], and suggest that a specific approach to the context should be taken to develop effective interventions [36].

Studies involving anthropometric assessment, especially body mass, have been the most widely used form for the assessment of nutritional status and regulation of growth in children and adolescents, and cases of malnutrition or obesity can be detected early through this method [39]. The increasing prevalence of being overweight and obese at increasingly early ages has aroused the concern of researchers and health professionals, because of health problems, such as hypertension, heart disease, diabetes, and being hyperlipidemic [40,41]

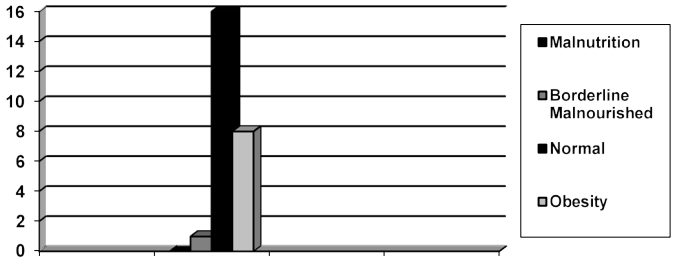

Figure 2. Sample classification according to BMI/Age

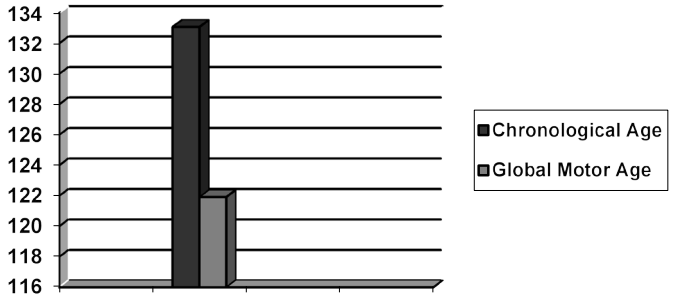

Figure 3. Comparison of the performance of the global motor age according to MDS and chronological age.

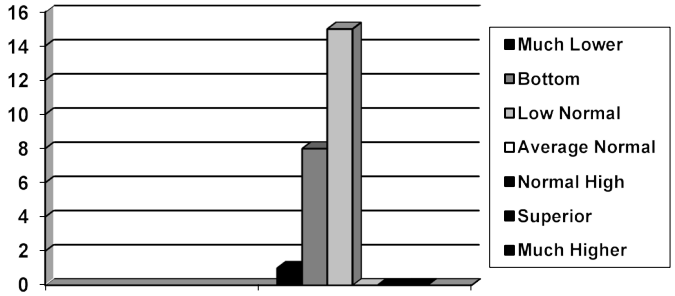

Figure 4. GM Classification according to MDS

The ability to measure or quantify body fat reserves is key to preventing and treating obesity-related diseases [42]. The degree of obesity has been defined in most epidemiological studies by BMI [43], establishing itself as a reference for the classification of weight status to normal, overweight and obese [44].

In the last three decades, the prevalence of being overweight among young people has increased significantly in several countries, including Brazil [45]. According to a study Sulemana *et al.* [46], girls who were overweight and obese had, respectively, 10% and 6% less physical activity compared to those of normal weight. This association was not found in our study, where 64% of adolescents had BMI classified as eutrophic or normal even with activity below the recommended average. However, eight teenagers had obesity which could negatively impact future life due to degenerative, cardiovascular and musculoskeletal diseases from the excess weight. According to a longitudinal study of more than 2,500 participants, 77% of children who were overweight became obese adults, as classified by BMI [47]. These data reinforce the need to increase physical activity by teenagers.

The evidence suggests that the acquisition of motor skills in early childhood may be an important prerequisite for the participation of children in activities and engagement in physical activity later in life [48] thereby reducing the risk of developing cardiovascular diseases [49]. Among the predisposing factors are vascular changes, early family history, obesity, sedentary lifestyle, ethnicity, and psychosocial factors [50]. In this study, we only assessed obesity and physical activity, where both pose risks for these individuals.

Another factor analysed in the study was overall motor skills through the MDS, which is generally conducted in order to assess, analyse and study the development of children at different developmental stages [19]. Our results showed that the global motor age of the adolescents showed a relatively late development in relation to chronological age but was classified as normal average.

According to Caetano *et al.* [51], the process of development of each traction component has both dynamic aspects and features of non-linearity. These variations among children of the same age are evidenced by the differences in the speed of the biological maturation process, in which young people with early development outperform others [52]. In a study by Bojikian *et al.*, [53] of motor performance tests, significant differences were not found in most comparisons between groups of different maturational stages within the same age group, indicating that the different maturational stages were not decisive for better performance, especially in indicators testing agility, abdominal strength and flexibility.

Physical activity in childhood and adolescence associated with physical growth, sexual maturation, and behavioural development are frequent discussions in the context of the future health of the individual. This scenario shows that the evidence is strong for the beneficial effects of physical activity for musculoskeletal health, cardiovascular health, and the presence of adiposity in young overweight people [8] . Thus, an increased level in physical activity of moderate to vigorous intensity in adolescence is promoting health and a strategy for disease prevention, where sedentary young people should progress to the recommended level of physical activity gradually.

Conclusion

In this study each assessment tool proved to be independent and it was not possible to establish a relationship between the level of physical activity, BMI and the motor age, except that adolescents classified as normal in the CDC scale tended to have normal rating for the MDS, unrelated to the level of physical activity. Therefore, we should unite education and health professionals, such as physiotherapists, with families to detect growth deviations and assist the most rapid development possible, contributing to a more appropriate interaction with teenagers, positively intervening in the present life and their future.

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