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PERFIL DE SAÚDE, OBTIDO A PARTIR DE UMA AMOSTRA DE CONVENIÊNCIA, DE ESCOLARES DA REDE PRIVADA DA ZONA OESTE DO RIO DE JANEIRO

HEALTH PROFILE, OBTAINED FROM A CONVENIENCE SAMPLE, OF STUDENTS FROM PRIVATE NETWORK OF THE WEST OF RIO DE JANEIRO

[1,4,5]Luis Carlos Oliveira Gonçalves*; [1,5]Douglas Daniel Costa Santiago; [1,5]Márcio Vinícius de Abreu Verli; [5]Jonathas Silva Oliveira; [5]Marcelle Karyelle Montalvão Gomes; [5]Raphael Benassi; [5]Cayo Marcus Lames Silva; [3,4,5]Aníbal Monteiro Magalhães Neto; [2]Romeu Paulo Martins Silva

[1] Programa de Pós-Graduação em Ciências da Saúde - Universidade Federal de Mato Grosso;
[2] Programa de Pós-graduação em Ciências da Saúde na Amazônia Ocidental- Universidade Federal do Acre;
[3] Programa de Pós-Graduação em Imunologia e Parasitologia Básicas e Aplicadas - Universidade Federal de Mato Grosso;
[4]Laboratório de Bioquímica de Proteínas – Universidade Federal do Estado do Rio de Janeiro;
[5]Grupo de Pesquisa em Fisiologia e Metabolismo - Universidade Federal de Mato Grosso.
*Autor correspondente: e-mail: luisogoncalves@yahoo.com.br

RESUMO

Estudos sobre o estado de saúde fornecem subsídios para políticas públicas, com inclusão de conteúdos relacionados a hábitos de vida saudáveis nas escolas. Identificar o estado de saúde de escolares do ensino privado da zona oeste do Rio de Janeiro a partir de métodos não invasivos. A amostra foi composta por 84 indivíduos entre 06 e 11 anos. Os escolares foram submetidos à avaliação antropométrica, flexibilidade com Banco de Wells, HGS, teste de reação Ruler Drop Method. A flexibilidade apresentou redução com o passar dos anos, o que já é esperado tendo em vista o amadurecimento osteomioarticular. A HGS apresentou um crescimento, observado a partir dos nove anos de idade, o que pode ter influência da aproximação da puberdade. A reação motora diminuiu com o passar da idade induzido pelo amadurecimento cognitivo e motor. 86,9% dos indivíduos investigados estavam em baixo peso ou peso normal, diferente da tendência crescente de obesidade e sobrepeso, o que parece indicar que este ganho acontece após a faixa etária estudada. Os achados do presente estudo podem nortear políticas públicas de saúde nas escolas, onde os gestores de todas as esferas podem planejar melhor suas ações e investimentos a cada similaridade de desenvolvimento da população.

Palavras-chave: força muscular, dinamômetro de força muscular, amplitude de movimento articular, composição corporal.

ABSTRACT

Studies on health status provide subsidies for public policies, including content related to healthy living habits in schools. To identify the health status, through noninvasive methods, of private school students of Rio de Janeiro. The sample was composed of 84 individuals aged between 6 and 11 years. The students were submitted to anthropometric evaluation, the Wells bench flexibility test, Hand Grip Strength, and the Ruler Drop Method reaction test. Flexibility presented a decrease over the years, which was already expected in view of osteomioarticular maturation. HGS demonstrated increasing behavior, better observed from nine years of age, which may have been influenced by the approach of puberty. Motor reaction presented decreasing values with the passage of age, induced by cognitive and motor maturation. In total, 86.9% of the investigated individuals were underweight or normal weight, different from the increasing trend of obesity and overweight reported, which seems to indicate that this weight gain occurs after the age group studied. The findings of this study may guide public health policies in schools, where managers in all areas can better plan their actions and investments for each similarity of population development. Muscle strength, muscle strength dynamometer, joint range of motion, body composition.

Keywords: Muscle strength, hand grip strength, range of motion, body composition.

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1. INTRODUCTION

Obesity is a Chronic Non-transmissible Disease characterized by excessive accumulation of body fat, which causes detriments to the health of individuals and has a multifactorial etiology involving environmental and genetic aspects [1].

Knowing the prevalence and factors associated with chronic diseases and identifying risk behaviors among schoolchildren could subsidize interventions by Regional Education Offices in projects to improve nutrition, increase the offer of sports practices, such as extracurricular activities, and inclusion of these contents in classes, modifying the behavior of families and the community [2].

Analyzing the impact of variables such as environmental, socioeconomic, and other factors on the development of schoolchildren may provide support for the planning of public health and education policies [3].

Studies on nutritional status provide important subsidies for public health policies, which should promote an increase in physical activity in schools and inclusion of content related to healthy living habits from the first grades of elementary school [4].

Strategies to reduce daily time watching television and increase participation in physical education classes can be determining factors for the effectiveness of interventions [5].

The worldwide concern with childhood obesity and its consequences evidences the need for population studies to guide the adoption of a single criterion for health care and planning. This criterion, besides identifying individuals with excess body fat, should be correlated with risks of morbidity and mortality, as occurs with the BMI cut-off points 25 and 30 (body mass index) in adults [6].

The high rates of obesity, insufficient physical activity, and poor nutrition in Brazilian schoolchildren indicate the need for interventions that seek to promote health. The scarcity of publications involving the physical and alimentary state of this population makes it difficult to evaluate the effectiveness of these actions [7].

Sedentarianism is already seen as a risk factor for cardiovascular disease. Having identified its prevalence, identification of the determinants of physical activity becomes

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fundamental. To do so, describing the health condition of the population and outlining the determinants of the health situation is a public health issue [8].

Participation of health professionals, especially Physical Education teachers, in the diffusion of the importance of physical activity and in its planning and execution is fundamental to aid in the prevention of chronic diseases [9]. To this end, professionals should know the current reality of the physical, nutritional, and health status of this population in different regions, in public and private education, and different age groups, to guide policies with effective interventions.

The main objective of this study was, in a convenience sample, toshow the health profile sp that other authors can compare them with other similar populations, using noninvasive methods.

2 METHODS

The software *Sigma plot* 12.0 was used for statistical analysis.

The sample consisted of 84 children and pre-adolescents aged between 6 and 11 years (mean age 8.67 years), 45 boys (53.6%) and 39 girls (46.4%).

The inclusion criteria in this study were: children between the ages of 6 and 11, enrolled and attending elementary school regularly, between the 1st year and 5th year. Students who were not present at the school on the day of collection and those who refused to participate were excluded from the study.

The students were submitted to anthropometric evaluation of body mass measurement (kg). For the anthropometric data, a portable clinical stadiometer was used, with a maximum reading of 2.5m and accuracy of 0.1mm (Sanny®, Brazil) and for measurement of body mass, a digital clinical scale (Omron® HBF-400) was used, with an accuracy of 0.1 kg.

For measurements of weight and stature, each child was previously asked to take off their shoes. The students stood with their backs to the stadiometer and feet together, standing upright, arms stretched out along the body, and looking forward. Similarly, in order to measure weight, the individual stood in the center of the scale platform, standing erect, looking forward, with arms extended along the body.

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The weight in kilograms (kg) and stature in meters (m) were recorded. BMI was calculated by dividing the weight (in kilos) by the height squared (in meters). The children were classified as: Low Weight (<18.5), Normal Weight (18.5-24.9), Overweight (≥ 25), Pre-obese (25.0 to 29.9), Obese I, (30.0 to 34.9), Obese II (35.0 to 39.9), and Obese III (≥ 40.0).

The nutritional reference table of BMI recommended by the Brazilian Association for the Study of Obesity and Metabolic Syndrome was used as a base [10].

For flexibility, the Wells Bench test – WCS, brand Cardiomed, was used, through the Sit and Reach Test, which aims to evaluate the flexibility of the posterior muscles of the dorsum and lower limbs using the Wells Bench. Students were seated, with feet together, supported on the Wells Bench, legs and knees extended, elbows extended, and hands together flexed forward, pushing the measuring instrument forward as far as possible, without using swing movements. Each student was allowed three attempts and the arithmetic mean of the three attempts was considered.

For manual grip strength (HGS), a protocol suggested by the American Society of Hand Therapists was used (ASHT), where the individual is positioned in an orthostatic position or in a seated position, with the abducted shoulder at 5°, elbow flexed at 90°, and hand and wrist in neutral position. To perform the measurement, a JAMAR® hydraulic analog dynamometer was used (AsimowEngineering®, USA), with an accuracy of 0.5kg/f and a maximum capacity of 100kg/f, duly calibrated. The highest peak presented in three measurements was considered, with a 1 minute interval between attempts.

For the reaction test, the Ruler Drop Method was used, which consisted of positioning the seated child with the elbow of their dominant side flexed at 90º, with the forearm supported on the surface of a flat, horizontal table, and their hand open at the edge of the table. A ruler was suspended by the examiner so that the 0 cm mark was positioned aligned in the space between the thumb and index finger of the child's hand. The child was instructed to grasp the ruler as soon as it was released from the examiner's hand. The distance the ruler crossed from the 0 cm mark was noted. This distance was converted in time, using the following formula, $t = (2d/g)$ 1/2, where, t = RT; d = distance moved by the ruler, and $g = 9.81 m/s^2$ (gravitational constant). Three attempts were used and the mean of the RT was calculated.

The flexibility, manual grip strength, and motor reaction parameters were collected in triplicate.

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A free informed consent form (TCLE) was completed by those responsible for the students in the sample. This document included all information about the experiment, such as the objective, methods, and low risks (no invasive collection), as well as that there would be no financial benefit for the participants and their parents/guardians and the guarantee of non-disclosure of personal data which would allow identification of the sample.

The Research Ethics Committee of the Federal University of Mato Grosso has previously approved all procedures (Araguaia campus, under the number: 2.230.073).

3 RESULTS AND DISCUSSION

Health can improve considerably through increased physical activity and nutritional and lifestyle changes. Therefore, it is necessary to promote health in schools, mainly based on profile data and epidemiological studies that reveal the current reality [11]. In this context, the school is a propitious environment for the accomplishment of initiatives aimed at assisting in actions of control and prevention of excess weight in children, based on the strategy of health promotion. Health promotion aims at local diagnosis, disseminating information on health and nutrition that can promote reflection and training of more critical and conscious individuals to make healthier life choices [12].

In order to facilitate the planning of further studies and to guide public policies involving schoolchildren, which is where everything starts and where prevention of various public health problems can actually occur, the results of the present study are presented in five tables and two graphs.

Table 1. General and anthropometric data of the sample.

Parameters	**MEAN**	**MINIMUM**	**MÁXIMUM**	**MODE**	**SD**	**SE**
Age (years)	8.67	6	11	9	1.34	0.15
Weight (Kg)	37.86	19.40	81.10	25.6	12.2	1.33
Stature (cm)	136.88	119.0	160.5	143	9.48	1.03
BMI	22.49	12.52	31.48	21.84	4.55	0.50

SD = Standard deviation; SE = Standard error.

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Table 1 presents the mean age of the sample (8.67 years), mode of 9 years, and indicates a mean Body Mass Index of 22.49, which is considered as normal weight [10]. These BMI values are similar to those described by a previous study [12] with 40 students from Diamantina-MG, which reported a variation between 18.63 (minimum) and 32.08 (maximum), with a mean of 21.4.

Table 2. General and anthropometric data of the sample by age (means).

Age (years)	6 (n5)	7 (n14)	8 (n16)	9 (n23)	10 (n21)	11 (n5)
Weight (Kg)	25.16	29.65	32.68	43.85	41.06	49.22
Stature (cm)	123.10	129.57	134.34	142.57	143.12	148.90
BMI	16.62	17.56	18.04	21.39	19.98	21.61

When anthropometric parameters were observed for age, Table 2 indicates an increasing tendency for body mass and height, as expected with the evolution of chronological age, even without parameters of comparison with biological age. The body mass index also increased as bone and muscle mass increase over the years. The findings were similar to studies comparing the BMI profile in 1997 with the year 2009, which reveal no differences in the comparison years and the present day [13]. Thus, BMI remains a good tool for the diagnosis of nutritional status in the age group studied [14].

Table 3. Behavior of neuromotor parameters by age (means).

Age (years)	6 (n5)	7 (n14)	8 (n16)	9 (n23)	10 (n21)	11 (n5)
Flexibility (cm)	31.3	29.5	25.4	25.8	28.9	26.4
HGS (KgF)	9.8	8.0	8.2	10.9	10.6	11.5
M.R.	2.18	2.16	2.10	1.97	1.82	2.02

M.R. = Motor Reaction

Table 3 demonstrates a reduction in flexibility over the years, which is already expected in view of osteomioarticular maturation. Flexibility undergoes alterations according to the stages of human development, ranging from conception to adulthood [15]. Schoolchildren present greater flexibility in the pre-pubertal phase, which includes the years before the growth spurt. At this stage, flexibility levels tend to decline due to the rapid increase in body structures, causing the shortening of several muscle groups, such as the lumbar region, hip, and ischia-tibial muscles, corroborating results described by other studies found in the literature [15].

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Hand grip strength presents increasing behavior, better observed from nine years of age, which may be influenced by the approach of puberty, and this parameter (HGS) can still be used for nutritional and functional evaluation of several populations [16], and corroborates with findings described previously [17], where in a study with 1180 children and adolescents between 7 and 17 years of age in the city of Londrina-Paraná, the authors found progressively higher values over the course of age for manual hand grip.

Motor reaction presented decreasing values with the passing of age, which is normal due to cognitive and motor maturation. The motor reaction time is composed of neuropsychomotor aspects that contribute to the full development of children and facilitate their evaluation [18].

Table 4. General behavior of the parameters by gender (means).

Sex	**Weight (Kg)**	**Stature (cm)**	**BMI**	**HGS (KgF)**	**Flexibility (cm)**	**Motor Reaction**
Masculine	37.9	138.2	19.6	9.8	26.3	1.98
Feminine	37.8	138.2	19.3	9.8	28.8	2.03

Table 4 demonstrates that there were no differences in body mass, height, and hand grip strength of the sample, when divided by sex (male and female). These values usually become more distant between genders with the advent of puberty, at which time there is growth in hormonal synthesis, with development of sexual characteristics and changes in physical and behavioral characteristics. Guedes and Guedes [19], reported in their study with 1180 children and adolescents that, when comparing manual grip strength between sexes, the observed differences were not statistically significant until the age of 13, although there was a tendency for higher values among boys than girls. From this age up to the age of 17, the boys presented a steeper increase, so that although the girls also demonstrated significant evolution until the age of 15, at age 17 they produced, on average, no more than 65- 70% of the absolute strength of boys.

Flexibility was the parameter that presented differences between sexes as women were more flexible than men in all phases of life.

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These data corroborate with those found in the literature in similar studies [17][19][20][21][22], which report that women, at all ages, present higher mean flexibility values in relation to men.

Table 5. Sample division by BMI group, according to ABESO [10].

Classification	**BMI (Kg/m^2)**	**Risk of comorbidities**	**Sample subjects absolute and relative (%)**
LOW WEIGHT	<18.5	Low	40 (47.6%)
NORMAL WEIGHT	18.5 – 24.9	Medium	33 (39.3%)
OVERWEIGNT	≥25	-	-
PRE-OBESE	25.0 – 29.9	Increased	09 (10.7%)
OBESE I	30.0 – 34.9	Moderate	02 (2.4%)
OBESE II	35.0 – 39.9	Serious	0
OBESE III	≥40	Very serious	0

Table 5 shows that 40 subjects (47.6% of the sample) presented low weight and a low risk of comorbidities; 33 subjects (39.3% of the sample) normal weight and a medium risk of comorbidities; 9 subjects (10.7% of the sample) were considered pre-obese and had an increased risk of comorbidities; and only 02 subjects (2.4% of the sample) were included as grade 1 obese individuals, presenting a moderate risk of developing comorbidities.

When a sample from 11 years of age was observed in a municipality close to the present study, the number of individuals presenting low weight remained high, but with a growth in individuals of normal weight and a growth in the number of pre-obese individuals [11], this seems to indicate a change in perspective with the onset of puberty and increase in chronological age.

In an investigation with 3,430 students, identified a total of 17.7 and 14.1% for overweight in girls and boys, respectively, and approximately 5% for obesity in both sexes. For girls, there is a tendency to increase overweight with increasing age and, apparently, reduce obesity [23]. There is no clear pattern of association in the prevalence of overweight or obesity with the age of boys. The consolidation of overweight for adolescents (> 10 years of age) was 18.2 and 14.2% for girls and boys, respectively, and for obesity, values were 4.4 and 4.5%. For

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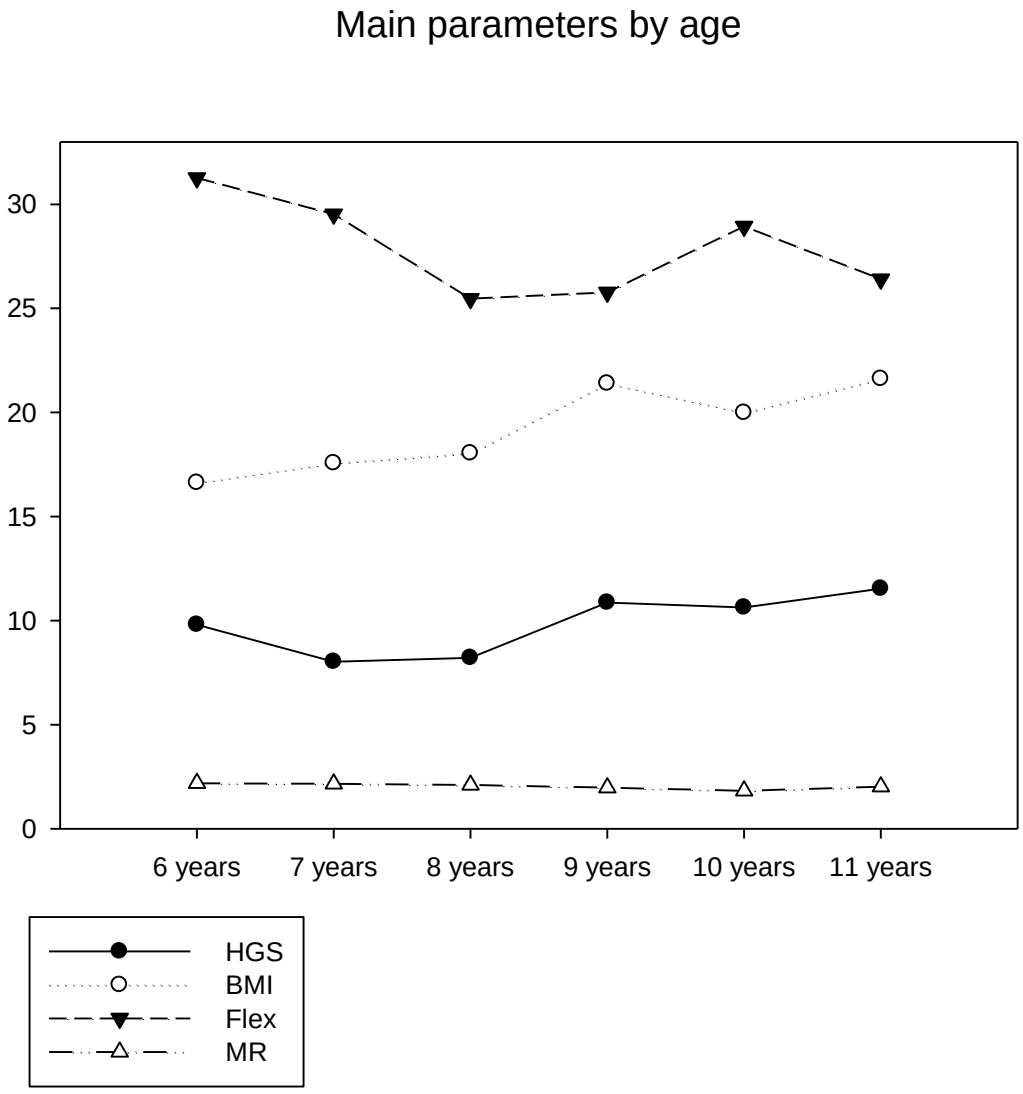
those under 10 years of age, the consolidated figure is 16.8 and 16.9% for overweight in girls and boys, and 5.7 and 5.1% for obesity.

Figure 1. Behavior of the main parameters by age.



Dimensional BMI and Motor Reaction, Flexibility in Centimeters, and Manual Grip Strength in KgF.

Figure 1 demonstrates the behavior of the parameters body mass index, flexibility, manual grip strength, and motor reaction by age in the six age groups presented by the sample in question.

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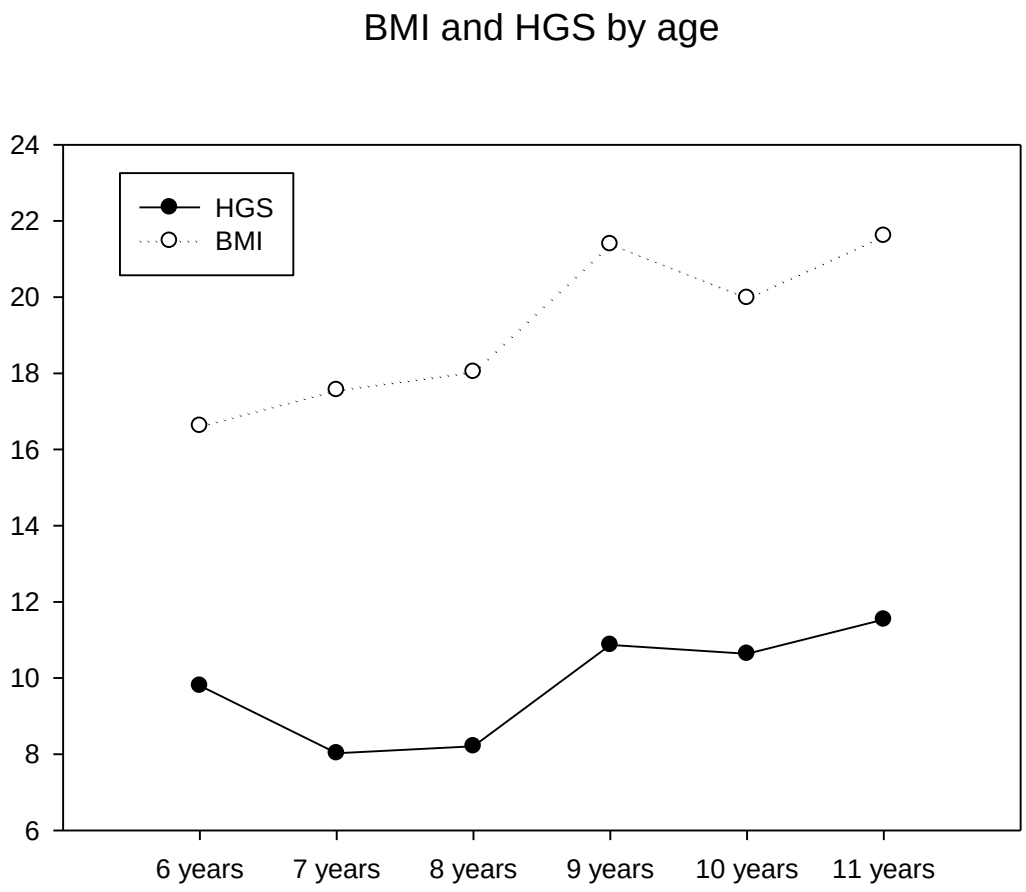
Figure 2. Behavior of Manual Grip Strength and BMI by age.



Dimensional BMI and Manual Grip Strength in KgF.

Figure 2 showed similar behavior between manual grip strength and body mass index, especially between 8 and 11 years of age, a fact previously observed with a sample from the same region as the present study [16]. The HGS scores found in different studies demonstrate the importance of this variable in different age groups, and can be used as reference values in functional evaluations, besides serving as a basis and control in the prescription and development of physical training applied to each population [24].

CONCLUSIONS

It was possible to observe that the body mass index (BMI) continues to be a good tool for evaluating the health of children and adolescents, while others, such as motor reaction and manual grip strength can be added to increase the possibilities of this evaluation.

Another important issue identified was the similarity in the results obtained with other studies in different regions of the country, which confirms the hypothesis that in this age group these tools can be used and the data compared with those of other populations.

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In the present study, similar behavior was observed between manual grip strength and the body mass index, mainly between eight and eleven years of age, with HGS indicating the general status of children or patients, not being only a hand strength indicator.

Regarding BMI, 86.9% of the individuals investigated were underweight or normal weight, different from the increasing tendency of obesity and overweight reported in the present day, which seems to indicate that this weight gain occurs after the age group studied.

The findings of this study may guide public health policies in schools, where managers from all areas can better plan their actions and investments for each similarity of population development.

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