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Sedentarism levels of an educational institution in Popayan, Colombia

Niveles de sedentarismo de una institución educativa en Popayán, Colombia

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Resumen

Introducción: La niñez y la adolescencia son etapas de desarrollo del ser humano susceptibles a cambios en los estilos de vida donde se pueden intensificar comportamientos sedentarios durante las actividades de la vida diaria. **Objetivo:** Determinar los niveles de sedentarismo de los estudiantes de una Institución Educativa de Popayán-Colombia. **Materiales y métodos:** Estudio cuantitativo de tipo no experimental, con diseño descriptivo de corte transversal. La muestra fue estratificada simple obtenida bajo fórmula probabilística compuesta por 92 estudiantes, 51,1% del sexo masculino, con edad promedio de 12,5 años ± 3,21 años. Se evaluó el nivel de sedentarismo mediante el test del cajón de Pérez-Rojas-García. **Resultados:** El 79,3% de la población practica deporte o actividad física, respecto al índice de masa corporal el 72,83% están en normopeso y de acuerdo al test de sedentarismo el 41,3% son sedentarios severos y el 43,5% son sedentarios moderados. **Conclusiones:** La población escolar presenta un factor de riesgo para la salud asociado a comportamientos sedentarios.

Palabras clave: Salud; estilo de vida; actividad física; estudiantes. (Fuente: DeCS, Bireme).

Abstract

Introduction: Childhood and adolescence are stages of development of the human being susceptible to changes in lifestyles where sedentary behaviors can be intensified during activities of daily living. **Objective:** To determine the sedentarism levels of the students of an Educational Institution of Popayán-Colombia. **Materials and methods:** A quantitative study of non-experimental type, with descriptive cross-sectional design. The simple stratified sample was obtained under the probabilistic formula composed of 92 students, 51.1% of which were male, with an average age of 12.5 ± 3.21 years. The level of sedentary lifestyle was assessed by the Pérez-Rojas-García drawer test. **Results:** 79.3% of the population practice sports or physical activity, the body mass index was 72.83% that represents normal weight and according to the sedentary lifestyle test 41.3% are severe sedentary and 43.5 % are moderate sedentary. **Conclusions:** The school population presents a risk factor for health associated with sedentary behavior.

Key words: Health; life style; physical activity; students. (Source: DeCS, Bireme).

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Introduction

Childhood and adolescence are human developmental stages that are affected by changes in lifestyle caused by fashion as well as social and family environments[1]. These changes have an impact on the "quality of life associated with the health of children and young people"[2], which is influenced mainly by their nutrition and low physical activity (PA). At least 60% of the world population does not perform any physical activity (PA)[3], and this inactivity is intensified by sedentary behaviors practiced during daily life activities (DLAs).

Carson, *et al.*[4] define a sedentary behavior as the performance of low energy expenditure activities in a sitting or reclining position. Likewise, the World Health Organization (WHO) states that "sedentary lifestyle affects more than 60% of the world population"[5,6], which is associated with current social dynamics, use of technological devices, unsafe conditions that limit the performance of outdoor activities, and DLAs executed in sitting position. These behaviors facilitates the appearance and development of a sedentary lifestyle with direct consequences to people's health[7].

Some of the most commonly affected groups are children and adolescents because they are more likely to acquire sedentary behaviors[8] due to the long school days in which they must remain seated most of the time. Cardenas, *et al.*[9] indicate that "children and young people invest an average of 360 hours a year in their education, basically, 8 hours/day". These long hours force children to adopt a sedentary behavior that is aggravated by the use of motorized means of transportation, the absence of an adequate infrastructure for the practice of PAs[10], and unsafe conditions. These child behaviors also develop due to job commitments of the parents. According to the International Labour Organization (ILO), 47.3% of whom have entered into the job market, which has forced the early entry of children to the educational system, thus spending large part of their days in kindergartens and schools[5].

The nutritional aspect of sedentarism is also important to consider as children are induced to ingest "goodies" and sweets"[11] of doubtful nutritional value since their school years. Thus, consumption of foods with high-fat and high-carbohydrate contents has become a vicious circle that aggravates the risk factors for child populations[12].

Determining sedentarism levels in the child population will be useful to generate and strengthen PA programs in schools to positively influence the health of future adults. In fact, sedentarism is generating high costs to the Colombian public health system as reported by Guerrero *et al.*[13]. They have shown that sedentarism is a predictor of chronic non-communicable diseases (NCDs) such as obesity, high blood pressure and diabetes. Likewise, a study by Hernández[14] demonstrated the association between physical inactivity and the presence of NCDs, which is disturbing since sedentarism can lead to hypertension and high blood pressure.

Ferreira, *et al.*[15] clearly state that child hypertension is associated to both risk factors that affect adults (genetic predisposition, intrauterine development, socioeconomic situation, smoking, and abdominal obesity) as well as extrinsic factors such as PA and sedentary lifestyles. Altogether, these elements are increasing the levels of cardiovascular risk in children. Therefore, the objective of this study was to determine the sedentarism levels of students from an elementary and secondary school in the city of Popayan (Colombia).

Materials and methods

A quantitative non-experimental study was conducted with a descriptive and cross-sectional design.

Participants

The study population included 189 students. The stratified probabilistic sample included 124 students and was defined with a 95% confidence interval and a 5% margin of error. 92 students completed the study, of which 47 (51.1%) were men. The average age and the age range were 12.5 ± 3.21 years 7-18 years, respectively. They met the following inclusion criteria: being officially enrolled in the educational institution, signing the informed consent form, and having an authorization signed by their legal representative. Students were excluded if they had a physical disability, did not show up for the assessment or voluntarily decided to quit the study.

Instrument

The sedentarism test by Pérez-Rojas Garcia was applied, which was validated by previous

studies[13,16,17]. The test consists in going up and down an 25 cm high step for 3 minutes, applying three loads with progressive rhythms (17, 26 and 34 steps per minute). Each load is applied during 3 minutes, with 1-minute resting periods between loads. Before performing this test, blood pressure and resting pulse of participants are measured, and the 65% of their Maximum Heart Rate (MHR) is defined within one minute. This result is divided by 4 to take it to the 15-second frequency and this final value becomes the assimilation limit to apply the three possible physical loads (17, 26 and 34 steps per minute). Based on the results and the application of the formula, individuals are classified as severe sedentary if they do not complete the first load. Moderate sedentary are those who pass the first load without completing the second one, whereas those participants that complete the second load but do not pass the third one are classified as active sedentary. Finally, very active sedentary individuals are those that pass the third load[13].

The anthropometric parameter used was the body mass index (BMI), which is calculated by dividing the weight of a person in kilos by the square of the height in meters (kg/m^2)[18]. The BMI tables for children and adolescents aged between 5 to 18 years old were used to classify malnutrition of participants as follows: severe (< -3 SD), moderate (≥ -3 SD to < -2 SD), normal (≥ -2 SD to ≤ + 1 SD), overweight (> +1 SD to ≤ + 2 SD) and obesity (> +2 SD)[18,19].

Procedure

Data collection was achieved during the first semester of 2016 through a survey to identify sociodemographic aspects, anthropometric aspects, and health indicators. The informed consent formed signed by their parents or legal guardians was requested to authorize Children's participation in the study. The Pérez-Rojas Garcia test was performed during Physical Education classes and participants were given the chance to drop their participation in the study.

Data analysis

The SPSS version 24.0 program (SPSS Inc., Chicago, EE.UU.) was used. An univariate analysis was carried out applying central tendency and dispersion measurements. The Kolmogorov-Smirnov test was used to demonstrate group uniformity. For the bivariate analysis, a statistical significance level value of $p \leq 0.05$ was taken into account and the Pearson's Chi square test was applied.

Ethical considerations

This study was approved by the Ethics Committee of the Research System of the Autonomous University Corporation of Cauca, which reviewed that research procedures followed the ethical considerations of the Helsinki declaration and Resolution 8430 of 1993. The study classified as minimum risk and participants signed the informed consent form.

Results

Most participants were students from fifth and seventh school grades and 60.9% of them belonged to middle socioeconomic stratum. In terms of lifestyles, 79.3% of students indicated that they practice PA, the majority of them (54.8%) belonging to first school grades. Weekly PA of 2 days (19.6%) and 3 days (28.3%) were reported, with a duration of 30-60 minutes (37%), and more than 60 minutes (31.5%) per session. The majority of participants that practice PA were men (40; 43.47%) compared to women (33; 35.86%). Regarding the use of technological devices during their free time, 77.2% of students used cell phones and 62% watched television. It was observed that students spent more that 2 hours a day using tablets (Table 1).

The anthropometric parameters recorded were average weight (43.2 ± 12.4 Kg), height (1.49 ± 0.14 m) and BMI (18.9 ± 12. 9 kg/m^2) (Table 2). The BMI classification showed a tendency towards a normal weight (72.83%), followed by overweight (23.9%). Severe and moderate malnutrition as well as obesity each displayed a distribution of 1.09%. A comparison between BMI and gender revealed a similar normal weight distribution for both boys and girls. On the contrary, a comparison of BMI to the level of schooling showed no differences between students of higher and lower grades.

In reference to sedentarism levels, it was found that 84.77% of the students were sedentary, whereas the population of active and very active students was 15.23% (Table 3).

Variable crossing of sedentarism with sociodemographic, healthy lifestyle and anthropometric variables did not show a statistically significant association ($p \leq 0.05$) (Table 4). However, there were numeric differences that showed that men tended to be more sedentary [42 men (45.65%) compared to 36 women (39.1%)]. In addition, there was a larger sedentary population within secondary

school students (46=50%) compared to primary school students (32=34.78%).

Table 1. Sociodemographic and lifestyle characterization of students from an academic institution in Popayán (Colombia)

Variable	N=92	%
School grade		
Third	17	18.5
Fifth	21	22.8
Seventh	20	21.7
Ninth	16	17.4
Tenth	18	19.6
Socioeconomic stratum		
Low	2	2.2
Medium-low	33	35.9
Medium	56	60.9
Medium-high	1	1.1
Physical activity or sport practice		
Yes	73	79.3
No	19	20.7
No. of practice days per week		
1	15	16.3
2	18	19.6
3	26	28.3
4	6	6.5
5	8	8.7
Not applicable	19	20.7
Hours of practice per day		
< 30 minutes	9	9.8
Between 30 and 60 minutes	34	37.0
> 60 minutes	29	31.5
Not applicable	20	21.8
Watch TV during free time		
Yes	57	62.0
No	35	38.0
Use PC during free time		
Yes	48	52.2
No	44	47.8
Use cell phone during free time		
Yes	71	77.2
No	21	22.8

TV= television, PC= computer

Table 2. Anthropometric characterization of students

Variable	Average	Median	Mode	SD	Minimum	Maximum
Weight (kg)	43.2	44.3	48.9	12.4	19.0	74.4
Height (m)	1.49	1.50	1.35	0.146	1.17	1.84
BMI	18.9	18.6	23.3	12.9	12.2	27.4

BMI: body mass index; SD: Standard Deviation

Table 3. Classification of sedentarism levels of students

Sedentarism level	N=92	%
Severe sedentarism	38	41.30
Moderate sedentarism	40	43.47
Active	13	14.13
Very active	1	1.1

Table 4. Results of the variable crossing of the sedentarism with sociodemographic, lifestyles and anthropometric variables of the students

Crossed variables	X^2 value	Asymptotic sign.
Sedentarism level*gender	6.513	0.089
Sedentarism level*school grade	6.312	0.900
Sedentarism level*socioeconomic stratum	6.371	0.702
Sedentarism level*BMI classification	8.571	0.739
Sedentarism level*PA or sport practice	9.519	0.391
Sedentarism level*practice days of PA or sport	10.482	0.574
Sedentarism level*practice hours per day	4.243	0.643
Sedentarism level*free time on TV	2.180	0.526
Sedentarism level*free time on PC	2.930	0.403
Sedentarism level*free time on cell phone	8.320	0.842

X^2 = Pearson's Chi square, BMI=body mass index

Discussion

Our results show that gender does not determine sedentary behaviors, a fact that differs from recent studies revealing a higher degree of sedentarism in women[20,21]. Regarding school grade, it was observed that secondary school students are more sedentary than primary school students, which is similar to what was found by other researchers such as Abarca, *et al*. and Buhring, *et al*.,[8,22]. This result highlights a higher percentage of sedentarism among adolescent students attending secondary school, which indicate that sedentary lifestyles increase as children get older.

Unlike previous studies conducted with similar populations, it was found that participating school students are within normal BMI levels. This is an important factor to maintain healthy lifestyles since an increase in BMI is related to both a poor PA practice and an increase in overweight and obesity[23]. On the other hand, Siquier, *et al.* reported similar results to those revealed in this study with respect to the BMI of the population[24].

Most school students belong to the medium socioeconomic stratum and this classification is not related to sedentarism, which is similar to the results reported by Alcibíades, *et al.*[25]. They suggest that it is important to focus on the association between a sedentary lifestyle and socioeconomic stratum since this relationship is based on the most inactive lifestyles and changes in habits in some socioeconomic strata.

Although most schoolchildren say that they practice PA, which is considered a healthy habit, they display notorious sedentary behaviors[26] including the lack of an appropriate practice of physical activity and the long time spent using technological devices. A tendency towards greater activity in boys has been reported. Indeed, various studies have demonstrated that schoolchildren exhibit a low level of PA and shown that boys practice more PA than girls[5,26,27]. This observation could be due to the fact that mothers teach still and reserved behaviors in girls, whereas boys are encouraged to go out and play with friends[28-30].

It has been demonstrated that schoolchildren in beginning grades are those who more practice PA. Trejo, *et al*.[31] reported that PA practice decline with age mostly due to the development of secondary sexual characteristics that leads to children and adolescents to consider games and PA as not important.

In reference to weekly and hourly frequencies of PA, schoolchildren fulfilled the recommendations of the WHO[3,31-34]: a minimum of 60 minutes of PA per day and three times per week. Ramos, *et al.*[35] reported similar findings and suggested the possibility that schoolchildren do not have health issues due to NCDs. On the contrary, Simons, *et al.*[36] identified that children do not perform PA for periods that are longer than 30 minutes a week, which coincides with the time of physical education classes. In this regard, the National Survey of the Nutritional Situation (ENSIN in Spanish) found that only 31.1% of the population aged between 5 to 12 years and 13.4% of the population between 13 to 17 years comply with the recommendations for PA[37].

The present research suggests that some limitations for PA practice are the hours that children spend watching television, using computers and cell phones, which reduces the time to perform healthy activities. Similarly, Prieto, *et al.*[29] indicated that the longer the exposure time to technological devices, the shorter the time for PA. In addition, Martínez, *et al.*[38] reported that advertisements on television encourage individuals to consume unhealthy food with high energy content and sugary drinks. According to ENSIN[37] 67.6% of the population aged between 5 to 12 years and 76.6% of the population aged between 13 to 17 years spend excessive time in front of technological devices. Del Águila[39] described that the prevalence of overweight and obesity in children and adolescents constitutes an emerging public health problem in Perú. This study highlighted the need to prevent the development of chronic diseases, ensuring this way the quality of life during adulthood.

Most of the young population who participated in this study is sedentary. This is an important finding since the age at which this problem starts is crucial for the establishment of healthy practices. In addition, based on these results one can infer the possibility of developing of risk factors for the appearance of NCD[37,38]. It is important to note that no research has been carried out in local children and adolescent populations, but studies with university students showed that 97% of this population is sedentary[13]. Vidarte, *et al.*[16] has reported similar findings showing that 70% of the population aged between 18 to 60 years are sedentary.

Unlike previous reports[13,40], this study did not find a statistically significant relationship between PA and the level of sedentarism. Those studies state that the variable crossing analysis of levels of PA and sedentary behaviors shows an inversely proportional relationship, concluding that people who do not perform PA represent the majority of the sedentary population.

Conclusions

The majority of schoolchildren analyzed in this study are sedentary, which demonstrates the presence risk factors for children's health that could lead to the appearance of chronic noncommunicable diseases such as obesity and diabetes.

A relationship between the sedentarism level and sociodemographic, anthropometric, and lifestyle variables was not found. The fact that most schoolchildren belong to a medium socioeconomic stratum does not permit to show the differences in PA that could exist in different economic levels,

according to the possibilities of acquiring habits or lifestyles that favor sedentary behaviors.

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Conflict of interests

The authors do not report conflicts of interest of any nature.

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