

## Cardiovascular risk factors in adolescents: a study with high school students

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ORIGINAL ARTICLE

### ABSTRACT

The purpose of the study was to investigate cardiovascular risk factors (CRF) found in adolescents from a public school in Fortaleza / Ceará / Brazil. The sample consisted of 180 students from the State High School Justiniano de Serpa, which is covered by sub-project of the course of Physical Education of the Institutional Program Initiation Grant for Teaching from the State University of Ceará. For data collection, it was used a questionnaire which included objective questions related to gender, age, alcohol consumption, smoking, physical activity level, and family history. Besides that, a physical evaluation was conducted in which it was collected height, weight, and waist circumference. For data analysis, it was used the absolute and relative frequency to characterize the participants as well as chi-square test for the variables gender and level of physical activity. Results showed the percentage of overweight and obesity was 22.2% and 12.2%, respectively. Furthermore, 16.7% of adolescents had abdominal obesity, 6% reported alcohol consumption, and 1% smoking. In family history, highlighted the presence of diabetes, hypertension, and high cholesterol levels, which together amounted to 65.4%. The results also showed 79.4% of adolescents had insufficient levels of physical activity. It is concluded that the main CRF found were family history, physical activity, and overweight.

*Keywords:* cardiovascular diseases, school health, physical education and training.

### INTRODUCTION

The sedentary lifestyle is a huge damage for society, becoming a determining factor for the great increase of cardiovascular diseases (CVD), as well as other chronic non-communicable diseases. Therefore, there is an incessant search for the population to become, more and more, physically active. Physical activity (PA), as well as physical exercise, is today considered synonym of quality of life (Mendonça, 2012).

Nowadays, a study showed that not only adults are affected by CVD, but also children and adolescents (Burgos et al, 2013). There has been a recent increase in the diagnosis of systemic arterial hypertension in young population. In addition, childhood obesity has been identified as an important risk factor in the development of CVD (Burgos et al, 2013).

This phenomenon is undoubtedly due to a significant decrease in PA, sedentary lifestyle, combined with poor diet and the new behavioural routine of the human being, which

has led to an increase in the incidence of various diseases related to this lifestyle, such as stress, anxiety, cancer, hypertension, diabetes, dyslipidaemias, obesity and, consequently, CVD (Mendes, Alves, Alves, Siqueira, & Freire, 2006).

In contrast, the practice of AF provides several benefits, such as increased self-esteem and well-being, stress relief, full functioning of the immune system, and others (World Health Organization [WHO], 2015). Moreover, it is a relevant protection factor against obesity, diabetes and CVD, some cancers and mental disorders, in other words, being impactful in health promotion and disease prevention (WHO, 2015).

In this context, the present study is justified by the need to investigate the presence of Cardiovascular Risk Factors (CRF) in high school students in the city of Fortaleza. The results of this study can be subsidies for the physical education professional's view within the

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school context. Besides of contributing for the development of more attentive professionals, who assess the health status of the students as well as orienting / stimulating the changes of lifestyle, seeking in fact the adoption of a healthy lifestyle by the students.

The relevance of this study is to contribute for the teaching practice of the physical education professional through health education: alerting him about the social and epidemiological reality of high school students, aiming to improve the quality of life and health promotion, as well as providing clinical data of high school students and their relationship with a major Public Health problem, which are CVD.

Thus, it was intended to answer in the study the question: what are the CRF found in adolescents from a high school institution of the capital city of the state of Ceará? Therefore, the objective of this study was to investigate and analyse the CRF found in adolescents, from a public school in the city of Fortaleza/Ceará.

## METHOD

The study was characterized by quantitative and qualitative field research, through a data collection under an objective character, in a closed questionnaire of opinion research and physical evaluation, both of which were cross-sectional.

### Participants

This study was based on the database of a survey conducted in 2015 at the State Public High School Justiniano de Serpa, Fortaleza, Ceará, Brazil, which is covered by the subproject of the course of Physical Education of the Institutional Program Initiation Grant for Teaching (PIGT) of the State University of Ceará. The sample of the present research was constituted by 180 students, of both genders and who were present in the classes of physical education of the mentioned school. Only those students who were voluntarily interested in participating of the program and who were regularly enrolled in the school were included.

### Instruments and Procedures

The physical evaluation collected data regarding to height and weight (Petroski protocol, 2011), and waist circumference (WC) (protocol of Callaway et al., 1991). The WC values allowed characterizing the amount of body fat located in the abdominal region (according to the critical values proposed by Taylor, Jones, Williams, & Goulding, 2000). For the identification of the nutritional profile of the sample, the body mass index (BMI) was calculated, given by the formula weight (kg) divided by the square of the height (m). The diagnosis of different nutritional status was investigated by BMI for age. The cut point used was provided by the World Health Organization (World Health Organization [WHO], 2006). The questionnaire had objective questions related to gender, age, alcohol consumption, smoking, physical activity level, and family history for CRF.

The participants were formally invited and during the study the objectives of the research and the ethical aspects involving human beings were explained. Data collection techniques and procedures were consultations to the physical evaluations and the questionnaires applied in the school, which occurred in the period from March to June of 2015. The physical evaluations happened in a classroom of the school. They were conducted by the scholarship holders of the program who were trained by one of the researcher professors. The questionnaires were completed by the participants at the same location as the physical assessment data collection.

For the use of the documentary data, the authorization of the coordination of the PIGT was requested through a declaration of faithful depositary, which allowed the use of data already collected.

The research is in accordance with the Resolution No. 466/12 of the Brazilian National Health Council, which establishes guidelines and norms regulating research involving human beings (Brasil, 2012).

### Statistical analysis

The questionnaire and the data collected were numbered and quantified. The data were analysed through descriptive statistics using SPSS software version 22.0, and presented in tables and graphs. The absolute and relative frequency was used to characterize the participants and Chi-Square test to observe the possible associations between the variables gender and level of physical activity, adopting as criterion of statistical significance  $p < 0.05$ .

### RESULTS

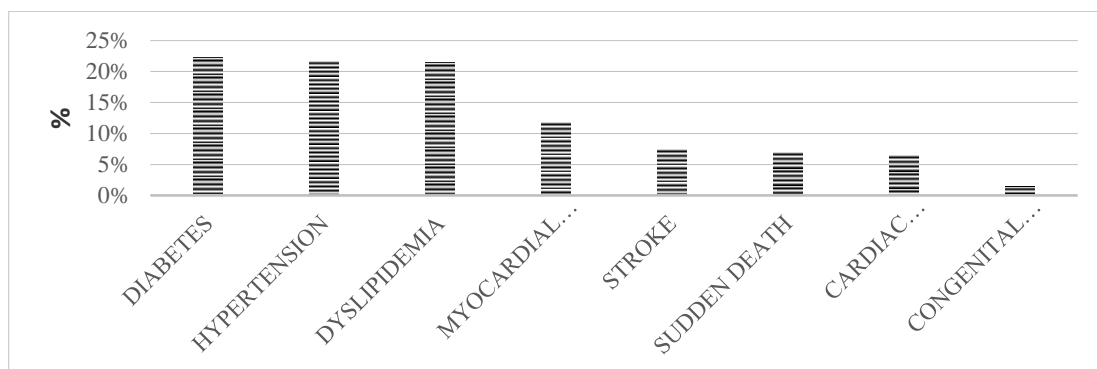
The sample was composed in its totality by adolescents, with age between 13 and 17 years and average age of  $15.1 \pm 0.73$ . In the Table 1, there is their sociodemographic and clinical-epidemiological characterization. The hereditary factor exerts a strong influence on the onset of CVD and other diseases (Walter et al., 2004). After analysing the data, the presence of some diseases that represent a risk to the cardiovascular system can be verified through the family history of adolescents (Graph 1). Only 12.2% of the students reported having no disease in the family history. O Graph II shows the distribution of the sample by gender, obtaining a high prevalence of adolescents with insufficient levels of physical activity (79.4%). Likewise, it is worth mentioning that the levels of physical activity below the recommended level are higher in female adolescents (53.3%) than in the male (16.1%). However, levels above the

recommended are higher in male adolescents (13.3%) than in female (7.2%).

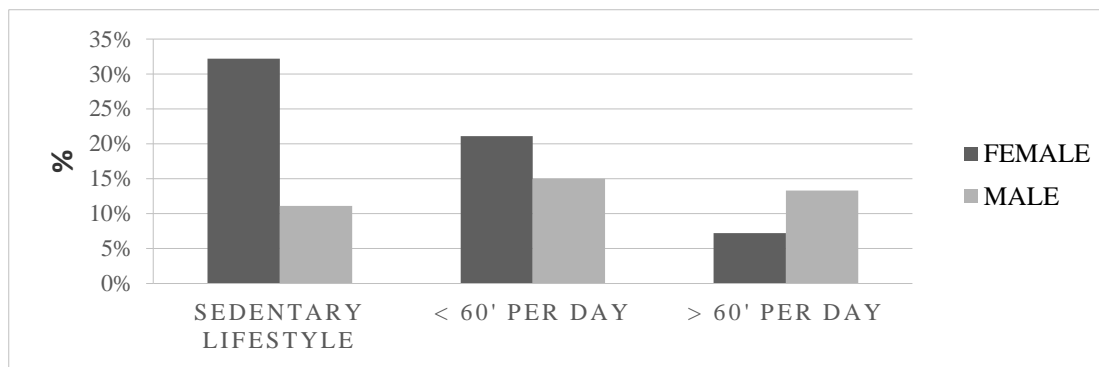
By the chi-square test, we can report the difference between male and female adolescents is statistically significant ( $p < 0.001$ ). This shows that there is a relationship between gender and the level of physical activity. In other words, male adolescents have a more active lifestyle compared to females. By checking and analysing the different variables of the study, it was possible to generate a graph (Graph 3) with the prevalence of CRF. The variables described consider behavioural health habits and the possible inherited genetic load.

Table 1  
*Sociodemographic and clinical characterization of high school adolescents*

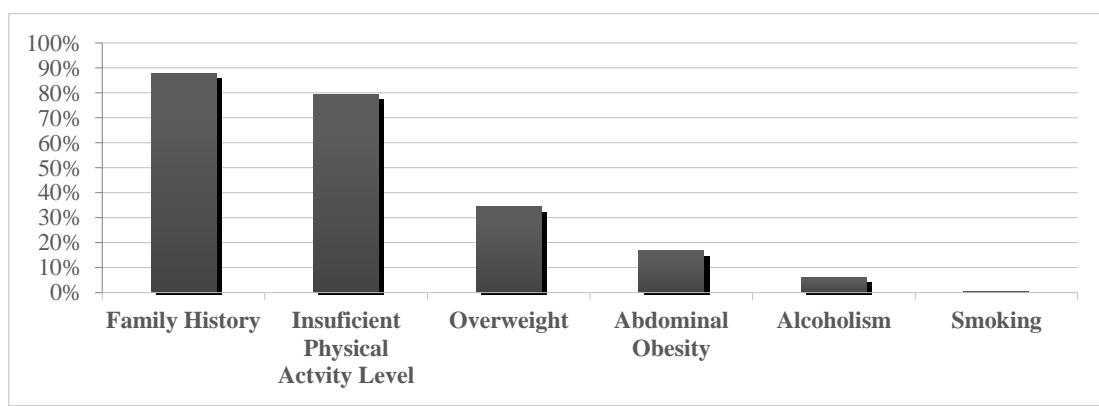
Variables	n	%
Gender (n)		
Male	71	39.4%
Female	109	60.6%
BMI		
Eutrophic	118	65.6%
Overweight	40	22.2%
Obesity	22	12.2%
WC		
Normal	150	83.3%
Risk	30	16.7%
Alcoholism		
No	169	93.9%
Yes	11	6.1%
Smoking		
Yes	1	0.6%
Have smoked	10	5.6%
No	169	93.9%



Graphic 1. Percentage distribution of the sample group by the prevalence of cardiovascular risk diseases in the family history



Graphic 2. Percentage distribution of the sample group by the prevalence of cardiovascular risk diseases in the family history



Graphic 3. Prevalence of CRF in high school adolescents

### DISCUSSION

The sample group of adolescents was evaluated to investigate the presence of CRF in these individuals, since there is a strong correlation between the existence and severity of CVD and the presence of their factors in the early stages of life (Quadros, Gordia, Silva, Silva, & Mota, 2016). In conjunction with other studies (Brito et al., 2016, Quadros et al., 2016), we also obtained a higher participation of female adolescents (60.6%). We believe that this fact is related to demographic issues that according to the Brazilian Institute of Geography and Statistics - IBGE (2010a) the female population is more numerous.

By characterized the adolescents through BMI, it was verified that the percentage of overweight and obesity is of 22.2% and 12.2%, respectively. This data corroborates with the findings of Ribas and Silva (2014), in which the number of adolescents with BMI classified as normal is prevalent when compared to the number with excess weight. However, this number of overweight adolescents is a concern,

since BMI in young population is considered a risk for possible coronary diseases in adult life.

It was also verified the WC, since it is known that the fat accumulated and located in the central region has contributed to the development of diseases (Pereira et al., 2010). Table 1 shows that 16.7% of adolescents in the sample had abdominal obesity. This value generates concern since several studies in children and adolescents have observed a significant association between WC and CRF (Bitsori, Linardakis, Tabakaki, & Kafatos, 2009; Pereira et al., 2010;). Other investigated risk factors, such as alcoholism (6%) and smoking (1%) presented a small number of cases, and similar results were found by Farias Júnior, Mendes, Barbosa, and Lopes (2011). Through these results it is possible to suggest that the populations studied seem to be aware of the harm that these habits cause to health and may be a result of health education campaigns and actions carried out in the last decades in Brazil.

It is possible to verify through the graph II, some DCVs related to the family history of the

sample group. Diabetes, hypertension, and dyslipidaemia, which together account for 65.4%, representing a high risk to cardiovascular health. Against this genetic tendency, verified through family history, adherence to and maintenance of healthy lifestyle is recommended - with adequacy of physical exercise; rich diet in fruits and vegetables; access to active leisure; no ingestion of alcoholic beverages; among other protective situations for cardiovascular risk (Gomes et al, 2012).

The results of the study showed a high presence of adolescents with insufficient levels of physical activity (79.4%), with a significantly higher prevalence in female adolescents (53.3% vs 16.1%), so the boys in the present study may be considered more active than the girls (Chart 2). However, their level of physical activity is still considered low, considering that only 13% reached the level of physical activity recommended by the WHO (2015). Insufficient practice of physical activity was also observed as a prevalent CRF in studies such as that of Quadros, Gordia, Silva, Silva, and Mota. (2016) and Farias Junior et al. (2011), being the insufficient practice present in 64.3% and 59.5% of the samples, respectively.

Thus, even physical activity is considered one of the most important actions to prevent the development of obesity and chronic diseases (Brito et al., 2016), it is a practice still little experienced in school life, especially in the female gender (Fermino et al. 2010). Among the main barriers reported for involvement in physical activity during childhood, there is a rise of passive leisure (television and video game) and decline of active leisure (jumping rope, elastic and cycling); in the period of adolescence, the environmental and socio-cultural factors are mentioned (Fermino et al., 2010; Santos, Hino, Reis, & Rodriguez-Añez, 2010).

It has been observed strong associations between the physical activity variables and cardiac risk, indicating an increase in risk as the level of physical activity reduces (Ekelund et al., 2012). The study of Gopinath, Hardy, Kifley, Baur and Mitchell (2014) reports that it is possible that the higher prevalence of high blood pressure among adolescents is related to longer

exposure to unhealthy behaviours, such as inadequate eating habits and insufficient activity practice physical. Accordingly, it is considered relevant to develop actions to promote physical activity in school to confront this CRF in the researched population (Quadros et al., 2016).

It was emphasized that the insufficient level of physical activity was the second most prevalent risk factor among all the factors studied in the present study, behind only the family history (Graph 3). This highlights the importance of interventions on the level of physical activity of children and adolescents.

Related to the presence of overweight, the present study found a higher prevalence (34%) than other national studies, such as Ribas and Silva (2014) (20.4%), Farias Junior et al. (2011) (10%) and 29.4% of Gomes et al. (2012). Despite the consequences, obesity is considered the fastest growing problem in the world. In Brazil, between 1974 and 2009, excess weight among adults almost tripled, culminating in 49% of overweight and 14.6% with obesity. The prevalence of overweight in children (47.8%) and adolescents (21.5%) was highlighted, which presented increases of three and four times, respectively, over the referred time frame (IBGE, 2010b).

Central obesity, due to WC measurement, was present in 17% of the analysed sample. This result is superior to the finding by Romanzini, Pelegrini, and Petroski (7%) and resembles that found by Gomes et al. 2012 (14.8%). In relation to gender, a higher proportion of girls (6.7%) with abdominal obesity were found in a sample of adolescents from the Northeast region when compared to boys (4.9%) (Cavalcanti et al., 2010). These evidences indicate an increase in abdominal obesity in adolescents, and knowing the factors associated with abdominal obesity are important to subsidize intervention programs in adolescents.

## CONCLUSION

The presence of several cardiovascular diseases in the family history of the students analysed demonstrated a strong genetic tendency for CVD. Against this genetic tendency it is necessary to adhere to a healthy lifestyle.

However, it was verified through the study a prevalence of young students with insufficient levels of physical activity and with a relevant number of them with overweight and obesity. Therefore, it is important that public policies aimed at young population should orient and stimulate healthy habits of life, such as the importance of physical activity and healthy eating choices, contributing to the adhesion of a healthy lifestyle in this population.

It is suggested that studies be carried out to provide longitudinal follow-up with the young students, verifying and monitoring not only genetic and behavioural factors, but also environmental and psychological factors, so as make it possible to direct public intervention policies in the school environment.

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**Conflict of interests:**

Nothing to declare.

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