

## ORIGINAL ARTICLE

## Association between dyslipidemia, sociodemographic data, sedentary behavior and improper feeding in schoolchildren from southern of Brazil

*Associação entre dislipidemia, dados sociodemográficos, hábitos sedentários e alimentação inadequada em escolares do sul do Brasil*

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## ABSTRACT

*Dyslipidemia is an important risk factor for cardiovascular diseases and is increasingly present in childhood and adolescence. Identifying the associated factors is fundamental for the elaboration of public health strategies. **Objective:** to verify the possible association between dyslipidemia with sociodemographic variables, sedentary behavior and eating habits in schoolchildren from a municipality in Southern Brazil. **Method:** 1,243 children and adolescents were evaluated of which 563 were male, of public and private schools from the urban and rural areas of Santa Cruz do Sul, Brazil. Dyslipidemia was evaluated through the presence of alteration in at least one parameter of the lipid profile (triglycerides, total cholesterol and HDL and LDL fractions). Sociodemographic variables, sedentary activities and eating habits were assessed by questionnaire. The 9-minute run/walk test was used to assess cardiorespiratory fitness. **Results:** dyslipidemia was associated only with sociodemographic variables. Thus, the prevalence of dyslipidemia is 9% higher in the central region ( $p = 0.030$ ) and in municipal schools (RP: 1.18,  $p = 0.002$ ) and state schools (RP: 1.11;  $p = 0.023$ ). No relation was observed with sedentary habits and the low intake of fruits/vegetables. **Closing remarks:** the identification of the variables associated with dyslipidemia can help in the elaboration of public health strategies.*

**Keywords:** Dyslipidemia; Risk Factors; Lifestyle; Children; Adolescents.

## RESUMO

A dislipidemia, importante fator de risco para doenças cardiovasculares, está cada vez mais presente na infância e adolescência. Identificar os fatores associados é fundamental para elaboração de estratégias de saúde pública. **Objetivo:** verificar possível associação entre dislipidemia com variáveis sociodemográficas, atividades sedentárias e hábitos alimentares em escolares de um município do Sul do Brasil. **Método:** foram avaliados 1.243 crianças e adolescentes, sendo 563 do sexo masculino, da rede pública e privada, da zona urbana e rural do município de Santa Cruz do Sul, RS. Para avaliação de dislipidemia, considerou-se a presença de alteração em pelo menos um parâmetro do perfil lipídico (triglicerídeos, colesterol total e frações HDL e LDL). As variáveis sociodemográficas, as atividades sedentárias e os hábitos alimentares foram avaliados por questionário. O teste de corrida/caminhada de 9 minutos foi utilizado para avaliar a aptidão cardiorrespiratória. **Resultados:** a dislipidemia associa-se somente com variáveis sociodemográficas. Assim, a prevalência de dislipidemia é 9% maior na região centro ( $p=0,030$ ) e em escolas da rede municipal (RP: 1,18;  $p=0,002$ ) e estadual (RP: 1,11;  $p=0,023$ ). Não foi observada relação com hábitos sedentários e ao pouco consumo de frutas/verduras. **Considerações finais:** a identificação das variáveis associadas com a dislipidemia pode auxiliar na elaboração de estratégias de saúde pública.

**Palavras-chave:** Dislipidemias; Fatores de Risco; Estilo de Vida; Criança; Adolescente.

## INTRODUCTION

The development of new surveys can help health care professionals on prevention of childhood dyslipidemia.<sup>1</sup> Therefore the job of the physical educator consist in guide and provide answers aiming an improvement in health conditions. A healthy behavior implicate good food and physical and mental development, focusing in human care; thus, we must work with body and mind searching for good habits. This is a constant walk of new alternatives for problems resolution.

The search for new knowledges increases the number of surveys with children and adolescents to investigate the prevalence of dyslipidemia, which has become an epidemic in last three decades.<sup>3-6</sup> A proper food with decrease in consume of soft drinks and candies, as well as the stimulation for physical activity practice, decreases sedentary lifestyle, providing children's healthy development and avoiding diseases.<sup>7</sup> The children and youth obesity is related to adulthood cardiovascular diseases.<sup>8</sup>

Controlling routines in order to have a diet rich in fruits and vegetables and a decrease in fat foods and soft drinks, beside the daily physical activity practice, are important strategies in decrease of health risks in future.<sup>4</sup> According to Lachtermacher<sup>7</sup> we can prevent several diseases through the attention to diet avoiding foods with saturated fat, sausages, sodium excess and candies. Zheng et al.<sup>9</sup> advocate physical activity as an important preventive factor which helps in the control of dyslipidemia in children and adolescents.

We must prevent childhood obesity with appropriate measures, as well as the diet prescription in newborns, besides the adoption of education programs which can be applied in primary health and in schools. Is consensus that childhood obesity has increasing significantly and causing several problems in childhood and adulthood.<sup>1</sup> Among this problems are dyslipidemia and metabolic syndrome, each time more common in children and adolescents with overweight and obesity.<sup>10</sup>

Knowing that dyslipidemia are an important risk factor for cardiovascular diseases<sup>11</sup> and its prevalence tends to increase with overweight and age increasing risks of injuries and its complications.<sup>12</sup> The impact of dyslipidemia on cardiovascular structures is reversible in childhood, being an important and strategic phase for acquiring healthy habits. The maintenance of this lifestyle can avoid cardiovascular diseases, one of the leading causes of death in adulthood.<sup>13,14</sup> Thus, the present study aims to verify a possible association of dyslipidemia with sociodemographic data, sedentary behavior and eating habits in schoolchildren of a municipality from Southern Brazil.

## METHOD

Subjects of this cross-sectional study are 1,243 children and adolescents aged 7 to 17 years of public (state and municipal) and private schools of urban and rural area of Santa Cruz do Sul in the state of Rio Grande do Sul (Brazil). The present study is part of a larger survey developed at Universidade de Santa Cruz do Sul (Unisc) denominated "Evaluation of biochemi-

cal markers of health of schoolchildren using infrared spectroscopy, polymorphisms, oral health and factors related to lifestyle: a study in Santa Cruz do Sul - Fase II". Before data collection the study was submitted to the ethics and research committee of Unisc (protocol n° 2959-11). Parents or guardians signed free and informed consent authorizing the participation of children.

For evaluation of lipid profile (triglycerides, totaland HDL cholesterol) was performed blood sample at the laboratory of exercise biochemistry of Unisc, respecting 12 hours fasting. Serum was separated and analyzed in Miura One (I.S.E., Roma, Itália) with commercial kits from Kovalent®. LDL cholesterol values were obtained through the Friedwald, Levy e Fredrickson equation.<sup>15</sup> The classification of lipid profile was performed according to the normative of National Heart, Lung, and Blood Institute.<sup>16</sup> For evaluation of dyslipidemia we consider the presence of alteration in at least on parameter of lipid profile.

Sedentary behavior was evaluated through the screen time spent by the student (TV, videogame and computer) and self-reported through same the questionnaire used by Burgos et al.<sup>17</sup> Data obtained were classified in 1) little screen time (< 2 daily hours) and 2) long screen time (≥ 2 daily hours) according to the American Academy of Pediatrics.<sup>18</sup> Additionally, it was evaluated cardiorespiratory fitness (CRF) through the 9-minute walk/run test. Students were oriented regarding the use of proper shoes and light clothes when performing the test. The distance was recorded and afterwards it was used the breakpoints established by "Projeto Esporte Brazil",<sup>19</sup> classifying students in fit (good CRF levels) and unfit (low CRF levels).

Evaluation of fruit and vegetables consumption and eating habits was performed using the same questionnaire used by Burgos et al.<sup>17</sup> adapted from Barros and Nahas<sup>20</sup> which consist in the identification of weekly frequency of consumption of these foods.

Data analysis was performed using software SPSS v. 23.0 (IBM, Armonk, NY, EUA). The association between the variable outcome (dyslipidemia) with predictive variables (sociodemographic, sedentary behavior and eating habits) was tested through the Poisson's regression using the prevalence ratio (PR) and confidence interval (CI) for 95%. All the analyses were performed considering  $p < 0.05$ .

## RESULTS

The present study identified the following percentage of students with dyslipidemia (41.7%), low levels of cardiorespiratory fitness (52.0%), that never or only sometimes consume fruits and vegetables (77.7%), spent more than 2 hours in front of TV or computer/video game (56.7%) and that eat watching TV (38.3%) (Table 1).

Table 2 shows that dyslipidemia presented association only with sociodemographic variables. Thus, prevalence of dyslipidemia was 9% higher in downtown region and in municipal (PR: 1.18;  $p = 0.002$ ) and state schools (PR: 1.11;  $p = 0.023$ ). It was not observed relationship with sedentary behavior and the little consumption of fruits and vegetables.

**Table 1** - Descriptive characteristics of subjects.

VARIABLE	n (%)
<b>Socioeconomic level</b>	
A-B	587 (55,4)
C	443 (41,8)
D-E	30 (2,8)
<b>Housing area</b>	
Rural	301 (28,4)
Downtown	266 (25,1)
City outskirts	493 (46,5)
<b>Type of education</b>	
Private	77 (7,3)
Municipal	409 (38,6)
State	574 (54,1)
<b>Dyslipidemia</b>	
No	618 (58,3)
Yes	442 (41,7)
<b>Cardiorespiratory fitness</b>	
Normal	509 (48,0)
At risk	551 (52,0)
<b>Physical activity practice</b>	
Yes	681 (64,2)
No	379 (35,8)
<b>Fruits and vegetables consumption</b>	
Always/Almost always	239 (22,5)
Never/Sometimes	821 (77,5)
<b>Screen time*</b>	
Up to 2 hours daily	459 (43,3)
More than 2 hours a day	601 (56,7)
<b>Eat while watch TV</b>	
No	159 (15,0)
Sometimes	495 (46,7)
Yes	406 (38,3)

\* TV + video game/computer.

**Table 2** - Prevalence ratio for variables associated to dyslipidemia in children and adolescents from Santa Cruz do Sul, Brazil.

VARIABLE	PR (IC 95%)	P
<b>Socioeconomic level</b>		
A-B	1	
C	1,00 (0,96-1,05)	0,941
D-E	0,96 (0,84-1,09)	0,505
<b>Housing area</b>		
Rural	1	
Downtown	1,09 (1,01-1,17)	0,030
City outskirts	1,05 (1,00-1,11)	0,076
<b>Type of education</b>		
Private	1	
Municipal	1,18 (1,06-1,32)	0,002
State	1,11 (1,02-1,22)	0,023
<b>Cardiorespiratory fitness</b>		
Normal	1	
At risk	1,04 (0,99-1,08)	0,098
<b>Physical activity practice</b>		
Yes	1	
No	1,02 (0,97-1,06)	0,478
<b>Fruits and vegetables consumption</b>		
Always/Almost Always	1	
Never/Sometimes	0,99 (0,94-1,04)	0,675
<b>Screen time*</b>		
Up to 2 hours daily	1	
More than 2 hours a day	0,98 (0,94-1,02)	0,309
<b>Eat while watch TV</b>		
No	1	
Sometimes	0,99 (0,93-1,05)	0,753
Yes	1,00 (0,93-1,05)	0,901

\* TV + video game/computer; PR: prevalence ratio; CI: confidence interval.

## DISCUSSION

In this study we observed an elevated prevalence of dyslipidemia in students evaluated (41.7%); similar results was found by another study performed in Belém (Brazil) with students aged 7 to 14 years which reported 48.1% of dyslipidemia in subjects evaluated.<sup>21</sup> However, in Salvador (Brazil) the prevalence of dyslipidemia found in students aged 6 to 19 years was lower (25.5%).<sup>22</sup>

Regarding factors associated to dyslipidemia we verified that this condition is more prevalent among students from downtown (PR: 1.09;  $p = 0.030$ ) and from public schools both in municipal (PR: 1.18;  $p = 0.002$ ) and in state (PR: 1.11;  $p = 0.023$ ) schools. It was not observed relationship with socioeconomic level, which was also reported in a study performed with children from Amsterdam (Netherlands) evaluating separately each component of lipid profile.<sup>23</sup> However, in the study of Silva et al.<sup>24</sup> they didn't observe significant difference for dyslipidemia regarding housing area and nonetheless found higher prevalence of dyslipidemia in girls.

In this study it was not observed significant differences between dyslipidemia and sedentary behavior as for physical inactivity and screen time in TV and computer. A study performed with Spanish adolescents demonstrated that the prolonged time in front of TV was associated with lower levels of HDL cholesterol.<sup>25</sup> Zheng et al.<sup>9</sup> in a survey with Chinese students didn't found association between physical inactivity and dyslipidemia; however, the physical activity at leisure

and school hours are of major importance on prevention and control of dyslipidemia. Moschonis et al. still argue that 45 minutes of intense or moderate physical activity per day, together with 5 meals a day diminishes the probability of children develop dyslipidemia.<sup>26</sup>

In our study dyslipidemia was also not associated to low consumption of fruits and vegetables. Similarly, the study of Bradlee et al.<sup>27</sup> in USA identified that girls who consume more fruits and vegetables, as well as more whole grains are less likely to have high risk lipid levels. In the study of Yuan et al. it was observed inverse association between regular fruits consumption and hypertriglyceridemia, however it was not found any relationship with vegetables consumption.<sup>28</sup> Nevertheless, Takahashi et al.<sup>29</sup> verified that fruits and vegetables ingestion is considered a protection factor for hypertriglyceridemia and that the excess of central and peripheral fat is an important dyslipidemia marker. Song et al.<sup>30</sup> highlight yet that the overconsumption of carbohydrates may be directly linked to the development of dyslipidemia.

Ding et al.<sup>31</sup> in a study with Chinese children and adolescents, highlight a concern regarding the relationship of lipid serum levels and dyslipidemia with obesity and its possible cardiovascular aggravations. Casavalle et al.<sup>10</sup> in their study with 139 obese children and adolescents in Buenos Aires (Argentina) still reinforce that overweight subjects are more likely to develop dyslipidemia, as well as the overweight is an important health predictor that demands concern.<sup>10</sup>

Hovsepian et al.<sup>11</sup> in a review study about dyslipidemia in Iranian children highlight that within the children with dyslipidemia the main indicators were hypertriglyceridemia and low HDL and suggest future interventions considering this markers. However, Elmaoğulları et al.<sup>12</sup> corroborate that the prevalence of dyslipidemia in obese subjects is high and increases with ageing; in some cases might lead to complications such as insulin resistance and hepatoesteatosis, thus suggesting greater propensity to develop clinical and metabolic complications which should be closely monitored.

## CLOSING REMARKS

Dyslipidemia show association with sociodemographic variables being more prevalent in downtown and in public schools (state and municipal). On the other hand sedentary behavior and low consumption of fruits and vegetables were not associated to dyslipidemia. However, it's important to emphasize the high prevalence of dyslipidemia in students evaluated. Finally, the identification of associated variables may help in elaboration of public health strategies.

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