RISK AND PROTECTIVE FACTORS FOR NONCOMMUNICABLE DISEASES AMONG ADOLESCENTS

Fatores de risco e proteção contra doenças crônicas não transmissíveis entre adolescentes

Factores de riesgo y protección para las enfermedades crónicas no transmisibles entre adolescentes

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ABSTRACT

Objective: To know the prevalence of risk factors for noncommunicable diseases (NCDs) among adolescents assisted by the municipal program "Health and Prevention at School" (*Saúde e Prevenção na Escola – SPE*). **Methods**: A cross-sectional study was carried out with students aged 10 to 17 years from six schools located in the municipality of Imperatriz, Maranhão, Brazil, between October 2014 and April 2015. Anthropometric measures were collected at the school and variables related to eating habits and lifestyle were investigated using a self-administered questionnaire. Data were compared between genders using the Chi-squared test. **Results:** A total of 473 students aged 10-17 years were assessed. Overweight and obesity occurred in 13.3% (63) of the sample. The consumption of foods such as rice, beans and fruits is associated with protective factors. There was a higher consumption of these foods among girls (p=0.001) and physical activity was prevalent among boys (p=0.0001). There are no differences in exposure to cigarettes, illicit drugs and alcohol between genders. **Conclusion**: The study population presents different patterns of exposure to risk and protective factors and there is an evident need for educational actions in the school environment conducted by SPE professionals and other school managers.

Descriptors: Students; Education, Primary and Secondary; Feeding; Lifestyle.

Pereira KAS, Nunes SEA, Belfort MGS, Miranda RSA, Horas AD, Almeida JP Júnior et al.

RESUMO

*Objetivo: Conhecer a prevalência dos fatores de risco para doenças crônicas não transmissíveis (DCNT) entre adolescentes assistidos pelo programa municipal Saúde e Prevenção na Escola (SPE). **Métodos:** Estudo de corte transversal realizado com escolares de 10 a 17 anos pertencentes a seis escolas do município de Imperatriz, Maranhão, Brasil, entre outubro de 2014 e abril de 2015. Medidas antropométricas foram coletadas na própria escola e as variáveis associadas aos hábitos alimentares e estilo de vida foram investigadas por meio de questionário autoaplicável, sendo comparados os dados entre os sexos através do teste Qui-quadrado. **Resultados:** Foram avaliados 473 estudantes entre 10 e 17 anos. O sobrepeso e a obesidade ocorrem em 13,3% (63) da amostra. Alimentos como arroz, feijão e frutas têm consumo associado a fatores de proteção e apresentaram maiores proporções de consumo entre o sexo feminino (p= 0,001), enquanto a prática de atividade física prevalece entre o sexo masculino (p = 0, 0001). A exposição ao cigarro, drogas ilícitas e álcool não se distingue entre os sexos. **Conclusão:** A população estudada apresenta distintos padrões de exposição a fatores de risco e proteção, e evidencia a necessidade de ações educativas no ambiente escolar conduzidas pelos profissionais do SPE e demais gestores escolares.*

Descritores: Estudantes; Ensino Fundamental e Médio; Alimentação; Estilo de vida.

RESUMEN

*Objetivo: Conocer la prevalencia de los factores de riesgo para las enfermedades crónicas no transmisibles (ECNT) entre adolescentes asistidos por el programa municipal Salud y Prevención en la Escuela (SPE). **Métodos:** Estudio transversal realizado con escolares entre 10 y 17 años de seis escuelas del municipio de Imperatriz, Maranhão, Brasil, entre octubre de 2014 y abril de 2015. Las medidas antropométricas fueron recogidas en la propia escuela y las variables asociadas con los hábitos alimentarios y el estilo de vida fueron investigadas a través de un cuestionario auto-aplicado. Los datos fueron comparados entre los sexos a través de la prueba Chi-Cuadrado. **Resultados:** Fueron evaluados 473 estudiantes entre 10 y 17 años. El sobrepeso y la obesidad se dieron en el 3,3% (63) de la muestra. Alimentos como el arroz, los frijoles y las frutas tienen el consumo asociado con factores de protección y presentan mayores proporciones de consumo entre las niñas (p= 0,001) mientras la práctica de actividad física prevalece entre los niños (p = 0, 0001). No hay diferencia entre los sexos para la exposición al tabaco, las drogas ilícitas y el alcohol. **Conclusión:** La población estudiada presenta distintos patrones de exposición para los factores de riesgo y protección y es evidente la necesidad de acciones educativas en el ambiente de la escuela que sean conducidas por los profesionales del SPE y demás gestores de las escuelas.*

Descriptores: Estudiantes; Educación Primaria y Secundaria; Alimentación; Estilo de vida.

INTRODUCTION

Over the last decades, exposure to risk factors and health prevention with a focus on the teenage population has become one of the themes most addressed in the literature[1,2]. The importance of studies on this theme is due to the vulnerability of children and adolescents during the period of transition to adult life. Studies point out the likelihood of overweight and obese adolescents becoming obese adults; therefore, obesity in childhood and adolescence is considered an independent risk factor in the development of several noncommunicable diseases[3,4].

Given the severity of noncommunicable diseases (NCDs) and their impact on health systems and society, the United Nations (UN) discussed, in 2011, the global commitments related to the subject, culminating in a political declaration through which member states commit themselves to work to halt the growth of NCDs through actions to prevent their major risk factors and through commitment to ensuring adequate health care[5].

In May 2012, the World Health Assembly approved a global target of 25% reduction in premature mortality from non-communicable diseases between 2015 and 2025, as well as targets for reducing risk factors such as: decreasing the consumption of tobacco, alcohol and salt, physical inactivity and hypertension; halting the growth of obesity and diabetes; treatment of patients with cardiovascular diseases and availability of medications for NCDs[6].

In the 2011-2022 Strategic Action Plan for Tackling NCDs outlined by Brazil, the goals are coincident with those approved by the World Assembly regarding the reduction of mortality from NCDs. The objective of the Plan is to promote the development and implementation of effective evidence-based public policies for the prevention and control of NCDs and their risk factors, as well as to strengthen health services for treating chronic diseases. The plan addresses the four major groups of diseases (cancer, diabetes and cardiovascular and chronic respiratory diseases) and their common risk factors that are modifiable (smoking, drinking, physical inactivity, unhealthy eating, and obesity). One of the national targets proposed by the plan is to reduce the prevalence of obesity in adolescents due to the risks already mentioned[7].

In Brazil, the Health and Prevention at School Project (*Projeto Saúde e Prevenção nas Escolas – SPE*) is one of the actions of the School Health Program (*Programa Saúde na Escola – PSE*), which aims to contribute to the integral education of students in the public basic education network through disease prevention and health promotion and care actions[8].

Given the above, the objective of the present study is to *know the prevalence of risk factors for noncommunicable diseases (NCDs) among adolescents assisted by the municipal program "Health and Prevention at School" (Saúde e Prevenção na Escola – SPE)* so as to propose actions aimed at disease prevention and health promotion targeted at this population.

METHODS

This is a cross-sectional study of students aged 10 to 17 years from six schools in the municipality of Imperatriz, Maranhão, Brazil. The study was carried out between October 2014 and April 2015. The adolescents included in the study met the inclusion criteria: 1) 6th-9th graders, 2) Written Free and Informed Consent (student and parents or guardians), 3) The school should be enrolled in the Health and Prevention at School Project (*Projeto Saúde e Prevenção na Escola – SPE*) of the Municipal Education Secretariat, and 4) Students should be at the school on the day of data collection. The exclusion criteria were: 1) Students receiving nutritional follow-up and 2) Student's lack of interest in participating in the research, even with the written authorization of their parents or guardians.

The sample calculation considered the population of 31,402 students enrolled in Primary School in the municipality according to data from IBGE (2012). Significance level was set at 5% and confidence interval was set at 95% for a sample of 380 students. As eventual losses are likely to occur, the sample was increased by 25%; therefore, 481 students were included. Of these, 5 did not present their parents' or guardians' written consent and 3 did not answer the questionnaire and were then excluded from the research. Therefore, the final sample comprised 473 students.

Data collection stages were as follows: conversation with the managers to request permission to carry out the research at the school, explaining the research methodology and arranging dates and times to collect the data; conversation with students and teachers in the classroom and delivery of the free informed consent form for signature; delivery of the self-administered questionnaire and anthropometric examination of the students. The standardized questionnaire was divided into sections addressing variables related to: 1) demographic information, 2) lifestyle (eating habits, physical activity, drug and alcohol use), and 3) anthropometric data (weight and height). After answering the questionnaire individually, the students were referred to a room provided by the school manager for the anthropometric examination.

The participants were weighed and measured in their school uniform, barefoot and without any accessories. They should stand, keep their feet parallel and arms extended along the body and look straight. Weight was measured using a digital scale with an accuracy of 100g. Height was measured using a measuring tape with markings in millimeters fixed on a flat surface at a 90º angle to the floor.

Body mass index (BMI) was determined by dividing the weight in kilograms by the square of the height in meters[9]. Cut-off points were used for underweight (< Percentile 5), normal or adequate weight (≥ Percentile 5 and < Percentile 85), overweight (> Percentile 85 and ≤ 97) and obesity (> Percentile 97 and ≤ 99.9) for the classification of the BMI percentile of female and male adolescents aged 10 years or over and under 20 years, according to the distribution of percentiles by gender and age recommended by SISVAN[9,10] and WHO[11].

Physical activity was considered when any exercise was performed at least twice a week for 60 minutes[12]. The consumption of cigarettes, alcohol and illicit drugs (marijuana, crack cocaine and/or cocaine), regardless of frequency, and of fruits and vegetables less than once a day were included as risk factors for NCDs. The consumption of fatty foods, such as whole milk (at least once a week), meat with apparent fat, and goodies (chocolate, sandwich cookies, sweets, candies) at any frequency, and soft drinks for at least five times a week were defined as eating habits. Beans were the food chosen to represent the group of vegetables – a consumption of this food at least five times a week was considered an eating habit.

The data collected were organized in a database created in Excel® and analyzed in BioEstat 5.3. After that, the variables were categorized and analyzed as for the frequency (anthropometric measurements, use of alcohol, cigarettes and/or illicit drugs, food profile and physical activity). Associations between categorical variables (BMI classification, physical activity, smoking, drinking, use of illicit drugs, healthy and unhealthy food markers) and genders were checked separately using the Chi-squared test with a significance level of 5% (p <0.05).

The study was approved by the Ethics and Bioethics Commission of the Imperatriz College – Protocol No. 117/14. Written authorization from the students' parents was obtained using a Free Informed Consent Form.

RESULTS

Of the 473 adolescents analyzed, 260 were women and 213 were men. The age distribution of the students ranged from 10 to 17 years, with a mean of 12.80 years (CI: 12.68 – 12.93 and SD ± 1.42). The 7th grade had the highest proportion of students, with 28.2% (133). With regard to the nutritional status of the respondents (underweight, overweight, obesity, normal weight),

underweight was more prevalent than obesity, with 9.5% (45). However, when considering overweight and obesity (overweight + obesity), a prevalence of 13.3% (63) was observed in the total sample. A prevalence of 95.5% (31) of overweight and obesity was found among boys and underweight affected 71.1 (32) of them (Table I).

Table I - Demographic indicators - age, grade and classification of nutritional status according to body mass index percentile (BMIP) by gender of adolescents enrolled in six public primary schools of Imperatriz, Maranhão, 2015.

Variables	Total n (%)	Girls n (%)	Boys n (%)
Age (years)			
10	17 (3.6)	9 (53)	8 (47)
11	76 (16.1)	44 (57.9)	32 (42.1)
12	116 (24.5)	65 (56)	51 (44)
13	106 (22.4)	57 (53.8)	49 (46.2)
14	104 (22)	61 (58.7)	43 (41.3)
15	38 (8)	18 (47.4)	20 (52.6)
16	15 (3.2)	6 (40)	9 (60)
17	1 (0.2)	0 (0)	1 (100)
Grade			
6th grade	109 (23)	57 (52.3)	52 (47.7)
7th grade	133 (28.2)	73 (54.9)	60 (45.1)
8th grade	123 (26)	68 (55.3)	55 (44.7)
9th grade	108 (22.8)	62 (57.4)	46 (42.6)
BMIP**			
<5 (Underweight)	45 (9.5)	13 (28.9)	32 (71.1)
5-15 (Normal)	45 (9.5)	21 (46.7)	24 (53.3)
15-50 (Normal)	154 (32.6)	87 (56.5)	67 (43.5)
50-85 (Normal)	166 (35.1)	107 (64.5)	59 (35.5)
85-95 (Overweight)	45 (9.5)	22 (48.9)	23 (51.1)
>95 (Obesity)	(3.8)	10 (55.6)	8 (44.4)

n: Number of participants included and (%) prevalence in 100%; BMIP: Body mass index percentile

Of the foods considered healthy and consumed daily by more than one respondent (5 days or more per week), rice, beans and fruits stood out, with 90.7% (429), 76.7% (363) and 67% (217), respectively. Yogurt, fish and salad were consumed daily by only 62.2% (294), 36.8% (174) and 63.6% (301) of he respondents, respectively (Table II). Frequent consumption of healthy food markers among the respondents – rice, beans, fish, and salad – was higher in girls (p=0.0001). On the other hand, markers of unhealthy eating habits, such as daily consumption of candies/sweets by 62.2% (294) of the sample, sandwich cookies by 52% (246) of the sample and soft drinks by 46.9 (222) of the sample are in the routine of all adolescents, without differences between genders (p=0.8397). More than one healthy or unhealthy food was consumed simultaneously by the respondents.

Table II - Indicators of consumption of markers of healthy and unhealthy food patterns by gender of adolescents enrolled in six public primary schools of Imperatriz, Maranhão, 2015.

Indicators	Total		Girls		Boys		p-value*
	n¨	%	n	%	n	%	
Daily consumption							
Rice**	429	90.7	241	56.2	188	43.8	0.0001
Beans**	363	76.7	198	54.6	165	45.4	
Fruits**	217	67	72	33.2	145	66.8	
Yogurt**	294	62.2	167	56.8	127	43.2	
Fish**	174	36.8	105	60.3	69	39.7	
Salad**	301	63.6	169	56.1	132	43.9	
Candies or sweets***	294	62.2	167	56.8	127	43.2	0.8397
Sandwich cookies***	246	52	139	56.5	107	43.5	
Cake ***	198	41.9	119	60.1	79	39.9	
Soft drinks***	222	46.9	120	54.1	102	45.9	
Snacks***	150	31.7	83	55.3	67	44.7	
Sandwich or Hamburger***	134	28.3	72	53.7	62	46.3	

* *p*- value for the chi-square of the difference between female and male adolescents; ** Markers of healthy foods; *** Markers of unhealthy foods. ¨ Number of respondents who consumed markers of healthy and unhealthy patterns among the 473 respondents.

Regular physical activity compared with sedentary lifestyle revealed that 27.3% (129) of the respondents did not engage in any type of physical activity. On the other hand, 72.7% (344) of the sample engaged in physical activity (Table III). As for the duration of physical activity, girls spent less time than boys –59.1% (146) of the boys spent about an hour or more; of these, 78.2% (89) worked out 4 to 7 days a week.

Table III - Indicators of physical activity and time spent on electronics by gender of adolescents enrolled in six public primary schools of Imperatriz, Maranhão, 2015.

Variables	Total		Girls		Boys		p value*
	n	%	n	%	n	%	
Physical Activity							
Yes	344	72.7	161	46.8	183	53.2	0.0001
No	129	27.3	99	76.7	30	23.3	
Duration of Physical Activity							
Less than one hour	97	20.5	59	60.8	38	39.2	0.0001
One hour or more	247	52.2	101	40.9	146	59.1	
Did not answer	129	27.3	100	77.5	29	22.5	
Weekly frequency of physical activity							
1 to 3 days	203	42.9	106	52.2	97	47.8	0.0001
4 to 5 days	48	10.2	20	41.7	28	58.3	
6 to 7 days	96	20.3	35	36.5	61	63.5	
Did not answer	126	26.6	99	78.6	27	21.4	
Time spent on electronics*							
1 hour	161	34	90	55.9	71	44.1	0.5308
2 hours	112	23.7	55	49.1	57	50.9	
3 to 4 hours	47	9.9	24	51.1	23	48.9	
More than 4 hours	141	29.8	84	59.6	57	40.4	
Did not answer	12	2.5	7	58.3	5	41.7	

* *p*-value for the chi-square of the difference between female and male adolescents; ** Physical activity: sports and physical exercise. *** Electronics: television, video games, computer and cell phones.

The statistical count for time spent on electronics did not differ between the genders, although the girls spent more than four hours on electronics. With regard to exposure to cigarettes, illicit drugs and alcohol, girls presented a higher prevalence, with 55.3% (21), 58.3% (7) and 57.4% (70), respectively; however, there was no significant difference between the genders (Table IV).

Table IV - Indicators of exposure to cigarettes, illicit drugs and alcohol by gender of adolescents enrolled in six public primary schools of Imperatriz, Maranhão, 2015.

Indicators	Total		Girls		Boys		p-value*
	n	%	n	%	n	%	
Cigarette							
Yes	38	8	21	55.3	17	44.7	0.8951
No	435	92	239	55	196	45	
Illicit drugs**							
Yes	12	2.5	7	58.3	5	41.7	0.9549
No	461	97.5	253	54.9	208	45.1	
Alcohol							
Yes	122	25.8	70	57.4	52	42.6	0.6064
No	351	74.2	190	54.1	161	45.9	

*p-value for the chi-square of the difference between female and male adolescents; ** Marijuana, crack, or cocaine.

DISCUSSION

The present study identified a growth of overweight, especially among girls, which corroborates similar research that highlighted the growth of overweight and obesity[13,14]. The present study was carried out in the second largest city in the state of Maranhão, where public policies have been intensified – for instance, the "more" HDI (Human Development Index) program, whose objective is to reverse the scenario of extreme poverty through initiatives and public policies covering Health, Education, Citizenship, Infrastructure, Welfare and Basic Sanitation. Despite this reality, malnutrition stood out among the male students included in the present study, highlighting the need for intensification of SPE actions for the prevention of NCDs, whose risk factors – obesity, overweight, physical inactivity, and daily consumption of unhealthy foods – prevail among adolescents; however, it should be noted that adolescents live concomitantly with modern morbidity and diseases of poverty.

Of the foods consumed daily and included in the group of healthy foods in the present study, rice (complex carbohydrate) and beans (minerals, fibers and proteins) presented a higher proportion of consumption among adolescents, data that are similar to those of PenSE 2015[2], in which beans appear as a healthy food marker with a higher proportion of consumption. According to the Dietary Guidelines for the Brazilian population, developed by the Health Care Secretariat, the mixture of beans and rice appears in almost all the selected lunches, representing the food reality of the majority of Brazilians, who prefer natural or minimally processed foods[15].

A study on the analysis of the factors associated with excess weight in schoolchildren[14] pointed out that the habit of consuming sweets and soft drinks is more frequent among girls while weekly physical activity is more common among boys. However, all the adolescents interviewed in this research, regardless of gender, reported spending more than three hours watching television. The consumption of unhealthy food markers (candies or sweets, sandwich cookies and soft drinks) did not differ among participants. However, heathy habits such as physical activity, more time spent on it and more days of the week devoted to it were more common among boys. As for the time spent on electronics, the students, regardless of gender, spent about an hour or more watching television, playing video games or using computer and cell phone. Apart from the consumption of unhealthy foods, the other variables were similar to those in the aforementioned study and others already conducted[16,17].

The results of Brazil's 2015 National School-based Student Health Survey (*Pesquisa Nacional de Saúde do Escolar – PeNSE*)[2] for 9th graders in primary education in Brazilian capitals showed that the rate of cigarette experimentation was higher among boys (19.4%) when compared with girls (17.4%). The data also revealed a difference in gender distribution for alcohol experimentation, with a higher prevalence among female adolescents (44.7%). As for experimentation of illicit drugs, the data showed that 9.0% of the students had already used illicit drugs – 9.5% of the boys and 8.5% of the girls. In the present study, the experimentation of cigarettes, illicit drugs and alcohol did not differ statistically between genders, but the experimentation of alcoholic beverages was higher among the female adolescents. This is an important risk factor that was prevalent among

women aged ≥ 18 years analyzed in the Vigitel Survey conducted by the Ministry of Health in 2011[18]. The WHO adopted a relative reduction target of 10% in per capita alcohol consumption in the population aged ≥15 years until 2025[19]. Specific measures targeted at this population should be built, including regulatory actions for trade and publicity and advertising, as well as increased surveillance, both of which are recommended in the Strategic Action Plan for Tackling NCDs[7].

The research model presented in the present study proved to be feasible and provided relevant information on the frequency of risk factors for noncommunicable diseases; however, some limitations should be highlighted, such as: the use of a questionnaire may increase the incidence of bias; imprecise information may have been provided by the students, who may have denied or stated any habit that would cause embarrassment; during data processing and literature review, it was deemed necessary to investigate the behavior of parents regarding the study variables and associate them with the children's habits and compare them with existing studies.

CONCLUSION

The study population presents different patterns of exposure to risk and protective factors, which demonstrates the need for educational actions in the school environment conducted by the professionals of the Health and Prevention at the School program and other school managers for the monitoring of the risk factors for noncommunicable diseases – for instance, physical inactivity, obesity and overweight, use of alcohol, cigarettes and illicit drugs. These actions need to be taken immediately so as to provide adolescents – future adults – with a healthy life.

ACKNOWLEDGEMENTS

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