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RESEARCH

Students' knowledge of metabolic syndrome after educational intervention

Conhecimento de estudantes sobre síndrome metabólica após intervenção educativa

Conocimiento de estudiantes sobre síndrome metabólico tras intervención educativa

Ramiro Marx Alves Cortez[I], Ana Míria de Oliveira Batista[I], Mariana Rodrigues da Rocha[I], Isa Moema de Sales Santos[I], Jayne Ramos Araújo Moura[I], Ana Roberta Vilarouca da Silva[I]

[I] *Universidade Federal do Piauí. Picos, Piauí, Brazil.*

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ABSTRACT

Objective: To analyze the knowledge of children and adolescents about risk factors for metabolic syndrome (MS) before and after educational interventions. **Method:** A quasi-experimental, comparative, prospective and intervention study conducted in 2015 and 2016 with 43 students in the city of Picos (state of Piauí-PI). Five health education meetings were held. For the knowledge analysis, was applied a questionnaire at three different moments. **Results:** Participants' mean age was 12.6 years (± 2.1), of which 60.5% were female. The 'More than good' level of knowledge went from 20.9% to 55.8% after interventions. When evaluated late, students maintained a higher level of knowledge compared to before the interventions. Most said they were able to change their lifestyle after educational meetings. **Conclusion:** The educational intervention promoted increase of knowledge and stimulated changes in attitudes related to risk factors associated with MS.

Descriptors: Metabolic Syndrome; Health Education; Adolescent; Health Promotion; Risk Factors.

RESUMO

Objetivo: Analisar o conhecimento de crianças e adolescentes acerca dos fatores de risco para síndrome metabólica (SM) antes e após intervenções educativas. **Método:** Estudo do tipo quase experimental, comparativo, prospectivo e de intervenção, realizado em 2015 e 2016, com 43 estudantes em Picos-PI. Realizaram-se cinco encontros de educação em saúde; para a análise do conhecimento, foi utilizado um questionário aplicado em três momentos distintos. **Resultados:** Os participantes tinham em média 12,6 anos (± 2,1), sendo 60,5% do sexo feminino. O nível de conhecimento "Mais que bom" passou de 20,9% para 55,8% após as intervenções. Quando avaliados tardiamente, os estudantes mantiveram um nível de conhecimento maior quando comparados antes das intervenções. A maioria referiu ter conseguido mudar atitudes quanto ao estilo de vida após os encontros. **Conclusão:** A intervenção educativa promoveu aumento do conhecimento e estímulo às mudanças de atitudes acerca dos fatores de risco associado à SM.

Descritores: Síndrome Metabólica; Educação em Saúde; Adolescente; Promoção da Saúde; Fatores de Risco.

RESUMEN

Objetivo: Analizar el conocimiento de niños y adolescentes acerca de los factores de riesgo para el síndrome metabólico (SM) antes y después de intervenciones educativas. **Método:** Estudio casi experimental, comparativo, prospectivo y de intervención, realizado en 2015 y 2016, con 43 estudiantes en Picos, estado del Piauí (PI). Se realizaron cinco encuentros de educación en salud. Para el análisis del conocimiento, se utilizó un cuestionario aplicado en tres momentos distintos. **Resultados:** Los participantes tenían en promedio 12,6 años (± 2,1), siendo el 60,5% del sexo femenino. El nivel de conocimiento 'Más que bueno' pasó del 20,9% al 55,8% después de las intervenciones. Cuando evaluados tardíamente, los estudiantes mantuvieron un nivel de conocimiento mayor comparado con antes de las intervenciones. La mayoría refirió haber logrado cambiar actitudes en

cuanto al estilo de vida después de los encuentros. **Conclusión:** La intervención educativa promovió aumento del conocimiento y estímulo a los cambios de actitudes acerca de los factores de riesgo asociado al SM.
Descriptores: Síndrome Metabólico; Educación en Salud; Adolescente; Promoción de la Salud; Factores de Riesgo.

CORRESPONDING AUTHOR **Ana Roberta Vilarouca da Silva** E-mail: robertavilarouca@yahoo.com.br

INTRODUCTION

Childhood and adolescence are relevant phases in individuals' lives because these stages are marked by several physical, behavioral, emotional, and social transformations. Moreover, as the age increases, so do the desire for independence and the need for greater socialization with people, making individuals more susceptible to adherence to risk behaviors, particularly in relation to diet and physical activity practice.

Adherence to these risk behaviors becomes a concern because the age group in question is a critical period for the onset or persistence of obesity and its complications[1]. Studies conducted by the Brazilian Institute of Geography and Statistics (Portuguese acronym: IBGE) in the Family Budget Survey (Portuguese acronym: POF) between 2008 and 2009 show that excess body weight was identified in 20.5% of the adolescent population of metropolitan areas of Brazil, and in 33.5% of Brazilian children aged 5-9 years[2]. This demonstrates the need for policies aimed at preventing obesity and encouraging physical activity practice.

Excess weight predisposes individuals to several metabolic alterations, such as dyslipidemia, impaired glucose tolerance, arterial hypertension and insulin resistance. The concomitant presence of these factors in a person characterizes the Metabolic Syndrome (MS).

MS is defined as the association of several factors, including high waist circumference (WC), low high-density lipoprotein cholesterol (HDL-c), and high systemic arterial blood pressure, triglycerides and glycemia. For the MS diagnosis, there must be three or more of these factors.

Although there are no defined criteria to diagnose the syndrome in adolescents, Cook (2003) and De Ferrante (2004) performed an adaptation in the criteria proposed for adults by NCEP ATPIII (2001), giving greater emphasis to the risk factor measured by abdominal circumference in the percentile/sex/age relationship[3].

Considering the complexity of MS and its long-term consequences, interventions to prevent its predisposing factors are necessary.

Health Education (HE) is one of the indicated strategies. It is a process, a thinking, an emancipatory pedagogic activity that promotes subjects' autonomy, whether individual or collective, and provides a greater approximation with adolescents by considering the particularities of each group and the social environment where they are inserted[4].

In a study on sexual education with public school adolescents, it was found that these educational actions should be implemented in partnership with health and education professionals and the community in order that these individuals become active subjects of their health. Also according to the study, the school is the best place to work educational actions directed at adolescents[5].

Therefore, in this study, we questioned the occurrence of HE promotion at schools, and if students are encouraged to think about problems related to MS. This was explained by the belief that children and adolescents had little or no knowledge of MS and its risk factors, leading to the need to approach this issue in intervention studies nationally and worldwide, and in health activities at a collective level.

In view of this context, the aim of this study was to analyze the knowledge of children and adolescents about the risk factors for metabolic syndrome before and after educational interventions.

OBJECTIVE

To analyze the knowledge of children and adolescents about the risk factors for metabolic syndrome before and after educational interventions.

METHOD

Ethical aspects

The development of the study met the national standards of ethics in research involving human beings.

Design, place of study and period

This is a quasi-experimental study. It was conducted with 43 children and adolescent students (aged 9-17 years) from a municipality in the Northeast of Brazil between August 2015 and November 2016.

Population or sample; inclusion and exclusion criteria

The sample included students who participated in the first phase of the major project, identified with at least two components of Metabolic Syndrome (inclusion criterion) according to the diagnostic criteria for the syndrome[6-7]. Of these, 106 students were classified with two or more factors for MS. In the following semester, a team went to the schools to investigate the permanence of participants based on the following exclusion criteria: not being enrolled or not regularly attending the school where the study was conducted; and not participating in all health education meetings. After the visit, 43 students were confirmed: 27, in municipal schools; and 16 in state schools.

Study protocol

For the analysis of knowledge, was applied a questionnaire at three different moments (adapted instrument). The pretest was applied at the first moment, before any intervention in order to evaluate the previous knowledge of MS. Then, started the intervention of the health education program; after the test was applied and the informed consent form was handed to participants. The intervention comprised the development of a structured educational program with five health education

meetings and the total workload of 10 hours in each school, which were held in an appropriate room.

During the educational program meetings, there were discussions about MS (definition and contextualization) and risk factors, such as abdominal obesity, hypertension, high blood glucose, low HDL-cholesterol and elevated triglyceride levels. In addition, were discussed physical inactivity/physical activity, healthy eating, alcoholism and smoking.

A day after performing the interventions, was applied the immediate posttest, and 90 days later, there was another visit to the schools for collecting the late posttest and the attitude change questionnaire.

Analysis of results and statistics

After the aforementioned steps, data were analyzed, and the results of the pretest, immediate posttest, late posttest, and attitude change responses were compared using the evaluation of scores and means of knowledge[8]. Mean and standard deviation statistical measures were used for the studied variables through analysis using the SPSS (Statistical Package for Social Sciences), version 20.0. The Kolmogorov-Smirnov test was performed to verify the normality of variables. The Mauchly's test was applied to evaluate the sphericity related to mean scores of the knowledge tests. For statistical analyzes of the level of knowledge in the pretest, immediate posttest and late posttest, were used the ANOVA (Analysis of Variance) for repeated measurements with contrast, and the post hoc Bonferroni test. For associations between independent variables (sex and age group) and the level of knowledge, was used the likelihood ratio.

RESULTS

Participants of the sample were 60.5% of female, 46.5% declared themselves to be of mixed race, and mean age of 12.6 ± 2.1 years. As for socioeconomic data, no child or adolescent was included in class A, and the majority of 58.1% was included in class C1 and C2, 100% only studied, and 88.4% lived with their parents.

In relation to components of metabolic syndrome, 39.5% had high WC value (mean of 75.4 ± 14.0 cm). The mean systolic blood pressure (mean of 105.5 ± 13.5 mmHg) and mean diastolic blood pressure (mean of 69.6 ± 9.7 mmHg) were elevated in 14% and 18.6% respectively; 51.2% had elevated triglycerides (mean of 118.6 ± 63.3 mg) and low HDL-c (mean of 43.8 ± 9.7 mg). Only 2.3% of children and adolescents had increased glycemia (mean of 77.7 ± 10.0 mg).

Table 1 presents the results of the level of knowledge of MS among the 43 students before and after the educational interventions. In the pretest, 39.5% of students had 'very little knowledge', mean score of 2.19 ± 0.78. However, in the immediate posttest, 55.8% of the students had 'more than good knowledge', mean score of 3.29 ± 0.76; and in the late posttest, 37.2% had 'more than good knowledge', mean score of 2.97 ± 0.95. Note that after interventions no schoolchild had 'no knowledge' of MS.

Table 1 – Distribution of students according to level of knowledge of Metabolic Syndrome verified in pretest, immediate posttest and late posttest, Picos, Piauí, Brazil, 2016 (N = 43)

Level of knowledge	Pretest		Immediate posttest		Late posttest	
	n	%	n	%	n	%
None	1	2.3	-	-	-	-
Very little	17	39.5	2	4.7	5	11.6
Good	16	37.2	11	25.6	14	32.6
More than good	9	20.9	24	55.8	16	37.2
Very good	-	-	6	14.0	8	18.6
Mean[¥]	2.19		3.29		2.97	
SD[†]	0.78		0.76		0.95	

Note: [¥]Mean of the 0-5 score. [†]Standard deviation

Table 2 – Association of the level of knowledge with the sex of study participants, Picos, Piauí, Brazil, 2016 (N = 43)

	Pretest										
	None		Very little		Good		More than good		Very good		*p**
	n	%	n	%	n	%	n	%	n	%	
Sex											0.001
Female	1	3.9	7	26.9	15	57.5	3	11.7	-	-	
Male	-	-	10	59.0	1	5.9	6	35.1	-	-	
Age group											0.599
9-13 years	1	3.7	12	44.4	9	33.3	5	18.6	-	-	
14-17 years	-	-	5	31.3	7	43.8	4	24.9	-	-	
	Immediate posttest										
	None		Very little		Good		More than good		Very good		*p**
	n	%	n	%	n	%	n	%	n	%	
Sex											0.823
Female	-	-	1	3.9	6	23.4	16	61.2	3	11.5	
Male	-	-	1	5.9	5	29.4	8	47.1	3	17.6	
Age group											0.001
9-13 years	-	-	2	7.4	9	33.3	16	59.3	-	-	
14-17 years	-	-	-	-	2	12.2	8	50.0	6	37.8	
	Late posttest										
	None		Very little		Good		More than good		Very good		*p**
	n	%	n	%	n	%	n	%	n	%	
Sex											0.012
Female	-	-	1	3.9	6	23.4	14	53.2	5	19.5	
Male	-	-	4	23.5	8	47.1	2	11.8	3	17.6	
Age group											0.384
9-13 years	-	-	4	14.8	9	33.3	11	40.8	3	11.1	
14-17 years	-	-	1	6.1	5	31.3	5	31.3	5	31.3	

*Note: *Likelihood ratio*

Table 3 – ANOVA values for repeated measures with contrast, Picos, Piauí, Brazil, 2016 (N = 43)

		SSD	DF	QM	F	*p**
Test	Pretest – Imm. posttest	51.810	1	51.810	60.563	**< 0.0001**
	Imm.posttest – Late posttest.	4.301	1	4.301	6.949	0.012
Error	Pretest – Imm. posttest	35.930	42	0.855		
	Imm. posttest – Late posttest	25.999	42	0.619		

Note: SSD: Sum of Squared Deviations; DF: Degrees of Freedom; QM: Quadratic Mean F: F test. p: ANOVA for repeated measures.*

Table 4 – Values related to paired comparison, Picos, Piauí, Brazil, 2016 (N = 43)

Comparison		Mean difference	*p**
Pretest	Immediate posttest	-1.098	**< 0.0001**
	Late posttest	-0.781	**< 0.0001**
Immediate posttest	Late posttest	0.316	0.035

*Note: *Adjustment for multiple comparisons of Bonferroni (Post hoc) (ANOVA).*

Regarding gender, in the pretest, the female had better scores compared to male (p = 0.001), as well as in the late posttest (p = 0.012). As for the age group, only in the immediate posttest there was a statistically significant difference, and those aged between 14 and 17 years had at least a 'good' knowledge level (p = 0.001) (Table 2).

In relation to the tests applied, there was a significant difference between the mean values of each step (ANOVA for repeated measures F = 33.240, p <0.0001). After contrast, it is possible to see an increase of knowledge, with a statistically significant difference between the pretest and the immediate posttest, as well as between the immediate posttest and late posttest (Table 3).

Regarding paired comparisons, the mean of the pretest differed from the mean of the immediate and late posttest, which indicates an increase in these mean values, even late (Table 4). The immediate posttest also differed from the late posttest, i.e., after 90 days, students' mean scores were lower. However, it is noteworthy that the late posttest mean is higher than the pretest mean, p<0.0001 (Table 4).

Table 5 presents data regarding the change of attitude after educational interventions. The change of eating habits was reported by 48.8% of students. Of the 11.6% who reported not being able to change their eating habits, and of the 39.5% who referred only partial change, 25% stated they thought the participation in meetings was important. Regarding physical exercise, 62.8% of students said that after participating in meetings, they were able to introduce physical activity into their daily life. Of the 14.0% who said they were not able to introduce physical activity or only in part, 50.0% will continue to try because they want to prevent diabetes and other diseases.

Table 5 – Distribution of students' responses in relation to change of lifestyle, Picos, Piauí, Brazil, 2016 (N = 43)

Questions	Responses	
	n	%
1. Diet?		
1.1 Yes	21	48.8
1.2 No	5	11.6
1.3 In part	17	39.5
1.4 I already had eating habits compatible with what was explained in the meetings.	-	-
2. If you were unable to do so, tick only one of the following:		
2.1 I found it important to participate in the meetings, but I am not interested in stopping to eat things I enjoy.	5	25.0
2.2 Meetings were not enough to motivate the change in eating habits.	-	-
2.3 I tried, but I could not.	3	15.0
2.4 I have not been able to, but I will keep trying because I want to prevent diabetes and other diseases.	11	55.0
2.5 I wish I had changed, but my family cannot buy the recommended foods.	1	5.0
2.6 Another reason	-	-
3. Physical activity		
3.1 Yes	27	62.8
3.2 No	4	9.3
3.3 In part	2	4.7
3.4 I already practiced physical activity before participating in the meetings.	10	23.3
4. If you were unable to do so, tick only one of the following:		
4.1 I found it important to participate in the meetings, but I am not interested in practicing physical activity.	-	-
4.2 Meetings were not enough to motivate the practice of physical activity.	1	16.7
4.3 I tried, but I could not.	-	-
4.4 I could not, but I will keep trying because I want to prevent diabetes and other diseases.	3	50.0
4.5 I wish I had started, but my family cannot afford the physical activity that interests me.	1	16.7
4.6 I wish I had started, but I do not have time.	1	16.7
4.7 Another reason.	-	-

DISCUSSION

Almost half of students in the study presented low level of knowledge of MS before the application of interventions (pretest). Soon after the health education meetings (immediate posttest), the number of children with low knowledge has reduced, with statistical significance, and there was an increase in the mean score obtained by children in the test. When assessed late (late posttest), although the mean score of the test was lower compared to the assessment immediately after the health education, students maintained a higher level of knowledge than that before interventions.

Similarly, in an analysis of 90 students from public schools, were evaluated two educational interventions for DM2 (type 2 diabetes mellitus) in Fortaleza-CE. There was an increase in the level of knowledge in both analyzed groups, with a significant difference. Note that in a group, the intervention was individual, and in the other, it was collective, which resulted in higher mean scores obtained in day 1, and 60 days after the interventions compared to pretest mean scores[9].

Nevertheless, in research evaluating the level of knowledge of diseases of children and adolescents, they frequently present deficient knowledge, even when the analyzed group has the pathology under analysis. This often indicates the need for clarification, especially concerning lifestyle habits[9-11].

This also reinforces the importance of implementing strategies for promoting the empowerment of vulnerable or at-risk individuals. Knowledge can help these individuals with behavior change by promoting autonomy and co-participation in decision-making and attitudes related to their health. The development of skills and knowledge acquisition strengthen individuals' abilities and empowerment. This latter is defined as the process by which people are in situations when they can change the effect of perception of control over their own choice[9].

In addition to promoting increased level of knowledge, educational interventions also aim to provide change of attitude and adoption of healthy living habits. Attention is also drawn to the continuity of actions, since changes in eating habits and lifestyle occur in the medium and long term and depend on individual efforts and professional support. In a study, were analyzed three health education strategies for hypertensive individuals. Results have shown improvement in anthropometric, biochemical and dietary parameters in all groups[12].

The development of educational interventions related to diseases with students showed they receive them positively, and these interventions even assist schools in the educational process. Furthermore, interventions promote acquisition of knowledge related to prevention methods, and lead to deeper knowledge of risk situations[11].

Regarding the evaluation of lifestyle change, in the present study, in general, students were aware of the duty to adopt healthy practices, even those who failed to insert these practices into their daily life. The focus of health intervention programs conducted in Brazilian schools is related mostly to two aspects; physical activity and healthy eating. In that sense, in a study, there was the conclusion that programs promoting physical activity at school succeeded in reducing sedentarism[13].

An intervention study related to diet and physical exercise was conducted with adults with MS. It was found that the association of eating habits changes and regular practice of physical exercise can beneficially reduce triglyceride concentrations and SBP. The findings of the study also indicate that lifestyle changes may induce beneficial effects in the management of MS, even in a relatively short period of time[14].

In another study, an educational program was conducted to raise awareness about cardiovascular risk factors and, based on this, to cause change of habits for healthy lifestyles. It was observed that a simple and basic program was capable of improving cardiovascular symptoms and risk factors in an outpatient population, in spite of participants' high withdrawal rate throughout the study[15].

Periodic and continuous interventions can be more effective for changing behavior and lifestyle, because the change process does not occur only from information. At the same time, it is necessary to encourage people's ability to translate information about practical issues on how to change. This study identified that interventions were able to promote favorable changes in the average consumption of some foods, but as for physical activity, most participants did not reach the recommended levels[12].

If well targeted, educational interventions function as catalysts for the empowerment/liberation process, hence they can create environments conducive to the development of critical thinking and health awareness. Understanding health care also in its educational dimension can be an important way of transformation and emancipation, and help individuals to make conscious choices that are consistent with the type of life they have chosen to value[16].

Therefore, one of the priorities in this study was to discuss with participants their knowledge of MS and its components, and the ways to prevent it, since they already had at least two risk factors for this disorder. The age group under study included children and adolescents, who are living with a range of social, psychic and biological changes. However, these boys and girls are exposed to risks that must be discussed so they can be contained in a timely manner in order to avoid deleterious effects in their future lives. The biggest risks to be understood are inadequate nutrition, sedentary lifestyle and excess weight.

The school is a space for health promotion, and a field for stimulating dialogue and discussions of issues surrounding and problematizing society. There must be openness, so teachers, health and management professionals, and students can build knowledge that concretely provides the health and well-being of these individuals. In the school environment, it is expected that the permanent establishment of these educational practices may result in empowerment of children and adolescents. Such practices should be among the school priorities in its political-pedagogical projects in order to contribute significantly to lifestyle changes of a good part of students.

Study limitations

Among the limitations of the study, the loss of participants during data collection, the short period of follow-up of students, and the short time to perform educational interventions

stood out. The study was conducted amidst some difficulties, highlighting the great number of participating schools and the distance between them, and the loss of adolescents who did not return to the late posttest.

Contributions to the nursing field and public health

The school has shown itself as a propitious field for performing educational activities and practices with active methodologies of health education for the production and/or increase of knowledge. However, it is urgent that schools, in partnership with public health institutions, develop intervention programs with participation and continuous involvement of children and adolescent students, and focused on disease prevention and health promotion of these individuals. Schools need to prioritize nutritional reeducation of students and encourage their engagement in physical activity.

CONCLUSION

In conclusion, there was a knowledge increase by comparing the pretest and immediate posttest and taking into account the mean scores obtained and the statistically significant difference. However, in relation to the immediate and late posttest, there was no knowledge increase, even though the mean score of the late posttest was higher than the pretest mean score. This is due to the nature of the intervention, which requires continuity in the approach with students in order to reinforce the knowledge gain and stimulate the change of attitudes with more intensity.

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