Stage of readiness to change of behavior in adolescents interested in joining the Multiprofessional Obesity Treatment Program

Estágio de prontidão para mudança de comportamento de adolescentes interessados em ingressar no Programa Multiprofissional de Tratamento da Obesidade

Estadio de prontitud para cambio de comportamiento de adolescentes interesados en ingresar en el Programa Multiprofesional de Tratamiento de la Obesidad

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ABSTRACT

Objective: To access the stage of readiness to change (SRC) dietary and physical activity behavior in adolescents and verify the association between the variables gender, age, body mass index (BMI) classification and the SRC.

Methods: 145 adolescents aged from ten to 18 years interested in joining the Multiprofessional Obesity Treatment Program were evaluated. Assessments included, in addition to SRC, anthropometric parameters. For independent analysis, Student's *t*-test was applied and Mann-Whitney test was applied to compare groups. The chi-square was used to verify possible associations between the variables of the study. A $p<0.05$ value was was considered significant.

Results: About the feeding behavior (amount and portion size), there was an association between BMI classification and SRC. The older adolescents showed more advanced stages in relation to consuming fruits and vegetables, and physical activity. The same was shown in relation to routine physical activities.

Conclusions: There was an association between BMI classification and SRC regarding the amount and portion size, as well as between age and SRC related to fruits and vegetables consumption and physical activity. Experimental studies to verify the influence of SRC dietary and physical activity behaviors on the obesity treatment are needed.

Key-words: adolescent behavior; obesity; feeding behavior; motor activity.

RESUMO

Objetivo: Avaliar o estágio de prontidão para mudança do comportamento (EPMC) alimentar e de atividade física de adolescentes e verificar a associação entre as variáveis gênero, faixa etária e classificação do índice de massa corpórea (IMC) com o EPMC.

Métodos: Foram avaliados 145 adolescentes entre dez e 18 anos interessados em ingressar no Programa Multiprofissional de Tratamento da Obesidade (PMTO). As avaliações incluíram, além dos EPMC, parâmetros antropométricos. A análise estatística envolveu a aplicação do teste *t* de Student para amostras independentes e do teste de Mann-Whitney na comparação entre os grupos. O teste do qui-quadrado de tendência foi utilizado para verificar se houve ou não associação entre as variáveis do estudo, sendo significante $p<0,05$.

Resultados: Em relação ao comportamento alimentar (quantidade e tamanho das porções), verificou-se associação entre IMC e o EPMC. Também foi observado que os adolescentes mais velhos apresentaram EPMC mais avançado em relação ao consumo de frutas e verduras. O mesmo se verificou em relação à prática habitual de atividade física.

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Fonte financiadora: Fundação Araucária-Apoio ao Desenvolvimento Científico e Tecnológico do Paraná
Conflito de interesse: nada a declarar

Recebido em: 04/2/2011
Aprovado em: 17/8/2011

Conclusões: Há associação entre IMC e o EPMC relacionado ao comportamento alimentar (quantidade e tamanho das porções), do mesmo modo que entre a idade e o EPMC relacionado ao consumo de frutas e vegetais e prática habitual de atividade física. Recomenda-se a realização de estudos experimentais a fim de verificar se o EPMC tem poder preditivo em programas de intervenção destinados ao tratamento do excesso de peso.

Palavras-chave: comportamento do adolescente; obesidade; comportamento alimentar; atividade motora.

RESUMEN

Objetivo: Evaluar el estadio de prontitud para cambio del comportamiento (EPMC) alimentar y de actividad física de adolescentes y verificar la asociación entre las variables género, franja de edad y clasificación del índice de masa corporal (IMC) con los EPMC.

Métodos: Se evaluó a 145 adolescentes entre 10 y 18 años interesados en ingresar en el Programa Multiprofesional de Tratamiento de la Obesidad (PMTO). Las evaluaciones incluyeron, además de los EPMC, parámetros antropométricos. El análisis estadístico involucró la aplicación de la prueba *t* de Student para muestras independientes y de la prueba de Mann-Whitney en la comparación entre los grupos. La prueba del chi cuadrado de tendencia fue utilizada para verificar si hubo o no asociación entre las variables del estudio, siendo significante $p<0,05$.

Resultados: Respecto al comportamiento alimentar (cantidad y tamaño de las porciones), se verificó la asociación entre IMC y los EPMC. También se observó que los adolescentes mayores presentaron EPMC más avanzados respecto al consumo de frutas y verduras. Lo mismo se verificó respecto a la práctica habitual de actividad física.

Conclusiones: Hay asociación entre IMC y los EPMC relacionados al comportamiento alimentar (cantidad y tamaño de las porciones), del mismo modo que entre la edad y los EPMC relacionado al consumo de frutas y vegetales y práctica habitual de actividad física. Se recomienda la realización de estudios experimentales a fin de verificar si el EPMC tiene poder predictivo en programas de intervención destinados al tratamiento del exceso de peso.

Palabras clave: comportamiento del adolescente; obesidad; comportamiento alimentar; actividad motora.

Introduction

The increase in the prevalence of obesity in a large number of countries has driven investigators to consider it a world epidemic. According to Monteiro, Conde e Popkin[1], obesity increased about 70% among men and 63% among women from 1989 to 2003. Children and adolescents' data are also alarming. The European countries with the largest prevalence of overweight and obesity in children and adolescents are Ireland (27.3% among girls) and Spain (31.7% among boys)[2]. In Brazil, the amount of cases of children and adolescents' obesity increased from 4.1% to 13.9% from 1970 to 1990, i.e., in a little over 20 years the amount tripled[3].

Although genetic factors determine a predisposition to overweight and obesity, dietary habits and physical activities (PA) seem to interfere in a more significant way in the development of this disorder[4]. Programs aimed at changing these behaviors are therefore important and strongly recommended therapeutic strategies, which may lessen the impact of the disorder among adolescents[5,6].

To implement this intervention it is necessary to evaluate the stage of readiness to change (SRC) behavior[7], for this information will help the staff and the subject to identify improper habits which must be changed[8]. SRC's model, also called transtheoretical model (TM), is applied since the 1980s to fight smoking addiction[9] and has been widely used in the evaluation of and/or intervention on risk behaviors, such as improper dietary habits[10,11] and sedentarism[12,13]. The advantage of TM is that in it changes occur in stages, within a decisional balance and seeking a self-efficacy in the process of change, instead of considering that individuals are ready for action (change in behavior)[14].

The classification of individuals in their respective SRC's favors thus the distinction between those willing to change and those who have no intention to change their lifestyles. This classification allows interventions to be more effective in changing dietary and PA practices[11,12]. Because it is easy to use and has a low cost, TM may be used by health professionals both in research and in primary care[12]. This study aimed to evaluate SRC dietary and physical activity behavior of adolescents joining the Multiprofessional Program of Obesity Treatment (Programa Multiprofissional de Tratamento da Obesidade – PMTO) and to analyze the relation between the variables gender, age, body mass index (BMI) classification and SRC.

Method

An observational, cross-sectional study was conducted at Universidade Estadual de Maringá, Brazil. Obese adolescents interested in joining a PMTO promoted by the Multiprofessional Nucleus for the Study of Obesity (Núcleo de Estudos Multiprofissional da Obesidade – NEMO) were included in the convenience sample. This program cares for adolescents of both sexes, aged from 10 to 18, and accepts new participants every beginning of semester, coinciding with the Brazilian school year. Data were, thus, collected in the beginning of each semester from 2008 on. Adolescents who were not obese according to the cutoffs for age and gender defined by Cole *et al*[15] and who did not participate in the SRCs and anthropometric assessment in the beginning of the intervention period were excluded from the analysis. Thus, the sample for this study was of 145 obese adolescents.

To assess the SRC dietary and PA behavior the *stage of change* (SOC) questionnaire was applied, based on the TM proposed by Sutton *et al*[10] and translated to the Brazilian context by Cattai, Hintze e Nardo Junior[16], who followed rigorously the international methodology for translation and cultural adaptation with a sample of obese adolescents. These authors concluded the instrument is appropriate for this population of obese adolescents, since it presented a good reliability and internal validity. The main advantages of using this instrument are that it can be self-administered and it contemplates SRCs, based on a group of items related to the process of losing weight[10,16]. The instrument is made of 38 propositions distributed in four domains: size and amount of portions (9 propositions); amount of fat in the diet (11 propositions); fruit and vegetable consumption (9 propositions); and PA practice (9 propositions). The answers for each proposition are in a Likert scale, from 1 to 5: 1 – precontemplation. 2 – contemplation; 3 – preparation; 4 – action; 5 – maintenance. To obtain the SRCs of each of the four domains the mean score for each was obtained. To analyze the association the following classification was used: 1 to 1.4 – precontemplation; 1.5 to 2.4 – contemplation; 2.5 to 3.4 – preparation; 3.5 to 4.4 – action; 4.5 to 5 – maintenance.

Besides applying the questionnaire, information concerning gender, age and anthropometric data were collected. Weight assessment was performed with an electronic scale (Welmy) with a 300kg capacity and a 0.1kg precision. Height was measured with a stadiometer coupled to the scale, with a precision of 0.1cm and capacity to measure up to 2m. These measurements were used to calculate the BMI according to the equation BMI=weight (kg) / height^2 (m). The waist circumference (WC) and hip circumference (HC) were measured with an inextensible measuring tape (WISO). The perimeter of the lower abdominal region and the largest portion of the gluteal region were used as reference for the measurement of WC and HC, respectively. With these two anthropometric measurements were made the calculations of the waist/hip ratio (WHR). The anthropometric assessment followed the procedures previously standardized by Lohman, Roche, and Martorell[17].

The information regarding SRCs were gathered during the meetings performed to clarify to the adolescents' guardians the procedures used by the multiprofessional staff during the intervention period. The anthropometric measurements were performed in the first day of PMTO.

To analyze the data the 145 adolescents were divided in two groups through the mean value (50%) of the BMI of the sample itself. That made possible to differentiate those with a higher BMI from others. Adolescents were also divided in age groups, from 10 to 12 and from 13 to 18. Gender division was also used in the study. These stratifications were made to verify if there was an association between these variables and the SRCs for the four domains of the questionnaire.

The data were tabulated and organized in Excel 2007 for Windows spreadsheets, while the statistical treatments were performed with the program Statistical Package for the Social Sciences (SPSS), version 15.0. To assess the symmetry in data distribution the Kolmogorov-Smirnov test was used. Descriptive statistics used to characterize the sample involved measures of central tendency and dispersion (median and interquartile range). The parametric Student's *t* test for independent samples and the nonparametric Mann-Whitney test were used to test the null hypothesis (that there was no significant difference between groups in demographics). Comparisons between the distribution of adolescents in relation to the SRC and to the strata of gender, age and BMI classification were performed using the chi-square test for trend. All analyzes adopted a significance level of 5% ($p<0.05$).

Procedures used in this study followed the Brazilian National Health Council Resolution n. 196/96 on research with human beings. The project was evaluated and approved by the Research Ethics Committee of Universidade Estadual de Maringá.

Results

Of the 145 adolescents who joined the program, 60 (41.4%) were boys. The median age was 13 years for both genders. The boys had the following anthropometric data expressed as median (interquartile range): BMI of 27.14 (7.71)kg/m², WC of 93.25 (15.18)cm, HC of 108 (12.05) cm and WHR of 0.86 (0.09), while girls had a BMI of 27.58 (8.60)kg/m², WC of 88 (12.5)cm, HC of 109 (14.7) cm and WHR of 0.80 (0.08). The Student's *t* test for independent samples pointed towards a significant difference in the HC variable, while the Mann-Whitney U test showed differences in WHR.

Adolescents were categorized according to the 50% mark of the BMI (27.32kg/m²), calculated with the sample of obese adolescents itself. After applying the normality test, only the variables age and WHR were found as non-parametric. Differences were found in all of the anthropometric variables, except WHR. Adolescents with BMI>27.32 kg/m² (n=72) presented higher values than the ones found in adolescents with BMI≤27.32 kg/m² (n=73) for the variables weight (kg) 93.1 (14.4) *versus* 70.4 (17.8), height (cm) 1.63 (0.12) *versus* 1.58 (0.11), WC (cm) 95.5 (11.5) *versus* 84.2 (12.8), HC (cm) 114.5 (12.0) *versus* 103.0 (11.2) and age (years) 13 (3) *versus* 12 (2) – data expressed as median (interquartile range).

When categorized according to age, adolescents from 13 to 18 years (n=83) had significantly higher values in all of the assessed variables when compared to adolescents from 10 to 12 (n=62). Differences in weight (kg) 85.7 (19.8) *versus.*70.7 (21.5), height (cm) 1.68 (0.10) *versus* 1.54 (0.10), BMI (kg/m²) 29.16 (7.36) *versus* 25.62 (7.11), CC (cm) 93.5 (13.3) *versus* 86.8 (14.2), CQ (cm) 111 (11) *versus* 103 (14) and RCQ 0.82 (0.08) *versus* 0.85 (0.08) – data expressed as median (interquartile range).

Tables 1 to 4 present results of the association between the four domains of the assessment questionnaire of SRC dietary and PA behavior and the variables gender, BMI classification and age group. An association between BMI

Table 1 - Association between gender, body mass index classification and age with the stage of readiness to change behavior related to the size and amount of portions

	Precontemplation	Contemplation	Preparation	Action	Maintenance	p-value
Gender						
Male	2	14	28	16	0	0.587
Female	1	27	38	18	1	
BMI classification						
<27.32	2	28	29	13	0	0.004
≥27.32	1	13	37	21	1	
Age						
10 to 12 years	2	18	32	9	1	0.182
13 to 18 years	1	23	34	25	0	
Total	**3**	**41**	**66**	**34**	**1**	

BMI: body mass index

Table 2 - Association between gender, body mass index classification and age with the stage of readiness to change behavior related to the amount of fat in diet

	Precontemplation	Contemplation	Preparation	Action	Maintenance	p-value
Gender						
Male	3	13	22	20	2	0.550
Female	6	18	34	25	2	
BMI classification						
<27.32	4	20	26	21	1	0.218
≥27.32	5	11	30	24	3	
Age						
10 to 12 years	6	14	19	21	1	0.629
13 to 18 years	3	17	37	24	3	
Total	**9**	**31**	**56**	**45**	**4**	

BMI: body mass index

Table 3 - Association between gender, body mass index classification and age with the stage of readiness to change behavior related to fruit and vegetable consumption

	Precontemplation	Contemplation	Preparation	Action	Maintenance	p-value
Gender						
Male	3	21	23	13	0	0.834
Female	0	20	47	8	0	
BMI classification						
<27.32	0	28	36	8	0	0.625
≥27.32	3	23	34	13	0	
Age						
10 to 12 years	2	25	32	3	0	0.014
13 to 18 years	1	26	38	18	0	
Total	**3**	**51**	**70**	**21**	**0**	

BMI: body mass index

Table 4 - Association between gender, body mass index classification and age with the stage of readiness to change behavior related to physical activity practice

	Precontemplation	Contemplation	Preparation	Action	Maintenance	p-value
Gender						
Male	4	18	24	14	0	0.525
Female	1	32	42	10	0	
BMI classification						
<27.32	1	30	31	10	0	0.373
≥27.32	4	20	35	14	0	
Age						
10 to 12 years	3	23	32	4	0	0.036
13 to 18 years	2	27	34	20	0	
Total	**5**	**50**	**66**	**24**	**0**	

BMI: body mass index

and SRC dietary and PA behavior was found in relation to the amount and size of portions ((Table 1). Table 2 presents the results of the SRC assessment in relation to the amount of fat in diet. In this case, no association was found to the other variables of this study (BMI classification, age and gender). Older adolescents were more frequently in more advanced stages in relation to fruit and vegetable consumption (Table 3) and frequent PA practice (Table 4), when compared to younger adolescents.

Discussion

In comparing the anthropometric variables of boys and girls, no differences were found in age, height, weight, BMI and WC. Differences were only found in the variables HC, in which girls presented significantly higher values than boys, and WHR, in which boys had the higher values. These results are in accordance to the literature, which reports that boys present a higher accumulation of subcutaneous fat in the torso than in the limbs. This leads to the increase of the (WC) numerator[18,19]; consequently, boys present higher WHR values than girls.

Adolescents classified as above the 50% mark in BMI presented weight, height, WC and HC higher than the adolescents classified in the lower category. These results were expected, since the larger degree of overweight of these adolescents directly influences their bodily mass and fat amount in localized regions. Adolescents with a higher degree of overweight were also significantly older than adolescents in the other group, which reinforces the differences found in the other anthropometric variables.

Although, in this study, there is a limitation in not assessing sexual maturation, the results of the comparison between anthropometric variables according to age must have been influenced by this variable. This possibility agrees with data reported in the literature, which indicates that adolescents in more advanced stages of maturation have higher values

of weight, height and anthropometric variables, when compared to individuals in less advanced stages[19].

Changes in lifestyle are of great importance in the treatment of obesity. The adoption of healthy habits, such as decreasing the consumption of foods rich in sugars and fat, increasing fruit, vegetable and grain consumption, and adopting a more active lifestyle, are behaviors that should be adopted by those seeking a healthier life[7,20].

The association between the domain "size and number of servings" and the BMI classification may be linked to the fact that adolescents are joining a PMTO, having already realized the need to reduce the size and amount of portions they consume. Adolescents with higher levels of overweight appeared to be more aware of their problem and thus were more frequently in the stages "preparation" and "action" than adolescents classified with lesser degrees of overweight, demonstrating concern about the amount and size of portions they consume. There was no association identified of this domain with the variables gender or age.

In a study with individuals who went to a primary health care service in the United States, Wee, Davis and Phillips[21] found a high percentage of overweight individuals in the stages "preparation", "action" and "maintenance" in relation to weight loss. The authors reported that the knowledge that their high weight was a serious health risk was a factor associated with these individuals' higher scores of SRC behavior. Thus, over 50% of overweight subjects involved in that study were classified in the stages "preparation" and "action", while among those with a BMI below 25kg/m², less than 30% were in the same stages.

Fruit and vegetable consumption has been associated with lower energy consumption, lower intake of sugars and fats[22], besides lower BMI and WC[23]. Children and adolescents often do not have very healthy eating habits, mainly due to the omission of breakfast, consumption of foods high in fat and sugar, and low consumption of fruits, greens and vegetables[24].

In this study, the SRC behavior for fruit and vegetable consumption were associated with age of the participants. Older teenagers were in advanced stages with regard to fruit and vegetable consumption. National surveys with adolescents found an association of fruit and vegetable consumption with gender (boys consumed more fruits and vegetables), but not with age[11]. In a study by Toral *et al*[11] the majority of adolescents in the sample were in the first and last stages (35 and 32% of the boys were at the stage of pre-contemplation and maintenance, respectively, for fruit and vegetable consumption) .

In addition to proper nutrition, it is known that the usual practice of PA is an important contributor to both weight loss and its maintenance[7], proving to be a predictor of success in the treatment of obesity[25]. Thus, it is very important that adolescents who want to lose weight are more advanced in the SRC behavior in relation to PA practice. In our study, there was an association between the SRC for the regular PA practice and the age of subjects. Older adolescents (13–17 years) were more advanced in their SRC when compared to the younger ones (11–12 years). On the other hand, a study conducted by Kim[26] with adolescents aged 13 to 18 years found that those of less age (13–15 years) had more advanced stages of readiness in relation to the practice of PA than adolescents from 16 to 18 years. The same was verified by Bourdeaudhuij *et al*[27] in older adolescents, who were in less advanced stages. On a national study, it was found that SRC of regular PA practice are less advanced as the school grade advances, i.e., the older were in less advanced SRCs than the new[28]. However, it is noteworthy that these data refer to children with normal weight. No study was found in which this association was made with obese adolescents. These discrepancies probably are due to differences between the studied samples. In our study, the sample consisted of adolescents who were interested in losing weight, and one could assume that these, even when older, were more willing to change habits to aid them to complete the process of weight loss, engaging in practices such as regular PA practice.

This study has some limitations. The diagnosis of SRC is not the only point that makes up the TM, although there is a focus in studies on assessing it[29]. The factors decisional balance (how to work with the pros and cons of changing habits), self-efficacy (confidence to change behavior, even when going through difficulties) and change processes (experiences and behaviors that, when put into practice, assist in the passage from one stage to another) are also important, and together comprise the whole process of changing a risk behavior[30]. However, in relation to what was possible to check in the literature, there are no validated questionnaires in Portuguese and directed to the obese adolescent population assessing these variables. Even as a limitation, it is worth noticing that the sample for this study sample was selected through the divulgation of PMTO, so that all who attended were assessed. However, this selection strategy prevented the randomization of the assessed subjects.

Given the results of this study, it is possible to argue that there is an association between the BMI classification and the SRC related to the amount and size of portions. Additionally, age was associated with SRC related to fruit and vegetable consumption and PA practice. However, experimental design studies should be carried out in order to check whether the SRC dietary and PA behavior at the beginning of an intervention influence the results obtained in the treatment period. Moreover, the assessment of behavioral variables, such as food consumption and PA level should be included.

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