Stage to Change Eating behavior and physical activity among adolescents with an excess body mass: impact on metabolic profile
Marciele Alves Bolognese¹, Danilo Fernandes da Silva¹², Josiane Aparecida Alves Bianchini¹³, Rose Mari Benemmamm¹⁴, Nelson Nardo Junior¹

Abstract

Introduction: Obesity in children and adolescents is usually related to metabolic alterations, and intervention programs are one of the strategies for the treatment of obesity and associated comorbidities. At the beginning of the intervention, the stages of readiness to change behavior indicate specific habits that the teenager plans to modify or not, and how long he or she intends to make the alterations.

Objective: To assess the metabolic profile and their association with the stages of readiness to change eating habits and exercise behaviors in adolescents with overweight.

Methods: Eighty-three adolescents with excess body weight underwent an assessment of anthropometric variables and metabolic profile (glucose, total cholesterol, LDL-c, HDL-c, non-HDL-c, VLDL, triglycerides, insulin). Besides, the stages of readiness to change behaviors for “size and amount of portions,” “amount of fat in the diet,” “fruits and vegetable consumption,” and “physical activity practice,” anthropometric variables and metabolic profile were compared according to the stages of change.

Results: About “fruits and vegetable consumption,” adolescents in the Maintenance group presented lower body weight than those from Action and Preparation groups. The Action group presented higher body weight than group “Contemplation” and it showed higher non-HDL-cholesterol than the groups “Pre-contemplation” and “Preparation.” In “physical activity practice,” the Maintenance group presented lower body weight, Body Mass Index, and body fat (in kg) than Action, Preparation, and Contemplation groups. The alterations in HDL-cholesterol reduced as the stages of change progressed in the “physical activity practice” domain.

Conclusion: The stages of readiness to change behaviors impact anthropometric and metabolic variables in adolescents with excess body weight, and it is a recommended instrument to monitor intervention programs.

Keywords: adolescent behavior, eating habits, pediatric obesity, metabolic syndrome.

INTRODUCTION

The relationship between metabolic alterations and obesity during childhood and adolescence has been widely demonstrated\(^1\)\(^-\)\(^5\), as well as a pro-inflammatory profile that seems to be more common in children and adolescents with excess body weight\(^1\)\(^-\)\(^5\). Several studies have indicated that the prevalence of metabolic syndrome in adolescents with obesity varies from 6 to 52% and is higher than the overall pediatric population, ranging from 2.6 to 10%\(^6\)\(^-\)\(^9\).

However, in the clinical setting, overweight and obesity treatment programs manage adolescents with different degrees of excess body weight\(^10\),\(^11\). Studies\(^10\),\(^12\),\(^13\) that compare alterations of metabolic syndrome risk factors in adolescents with different degrees of excess body weight (e.g., overweight, obesity, and severe obesity) are scarce and present conflicting results regarding having or not greater metabolic impairments\(^10\),\(^12\),\(^13\).

Additionally, it is unknown if, when engaging in an intervention program with a multidisciplinary team, adolescents who present metabolic impairments are in different stages of readiness to change eating behaviors. The stages of readiness to change behaviors when embarking on an intervention program provide relevant information. They can contribute with the intervention team indicating specific behaviors that the adolescent is planning not to modify, and when he/she intends to change\(^14\),\(^15\).

To the best of our knowledge, it is unknown if stages of readiness to change behaviors are related to the metabolic profile (e.g., metabolic syndrome risk factors) in adolescents with excess body weight who engage in a multidisciplinary program for obesity treatment (MPOT).

Thus, this study’s objective is to assess the metabolic profile and its association with the readiness stages to change eating habits and physical activity behaviors in adolescents with excess body weight.

METHODS

Experimental design and study participants

It is a cross-sectional study with comparative and associative analysis. The study was promoted in the local media to recruit adolescents aged 16 to 18 years interested in participating in the MPOT. The MPOT lasted 16 weeks, carried out twice a year, and had a multidisciplinary team composed of physical exercise professionals, nutritionists, a psychologist, and a pediatrician.

The multidisciplinary team’s main goal was to contribute to positive changes in body weight and composition, in the medium-term, by encouraging physical activity practices and recommending healthy eating habits based on cognitive behavioral therapy.

Adolescents took part in the MPOT three times per week, on Mondays, Wednesdays, and Fridays, from 4 to 6 pm. From 4 to 5 pm discussed physical exercise behaviors. At this same time, adolescents participated in the nutritional group intervention on Wednesdays and the psychological group intervention on Fridays. The second hour of intervention (from 5 to 6 pm) of all the three days was designated for the exercise practices. The intervention protocol can be found in Da Silva et al.\(^16\).

Eighty-three adolescents selected on the following inclusion criteria:

- Having body mass index (BMI) in the overweight and obesity category according to the cut-off points described by Cole and Lobstein\(^17\);
- Being residents in Maringá city or surrounding areas;
- Availability to participate in the intervention program fully.

The adolescents engaged in other types of overweight (e.g., pharmacological or surgical), consumed alcohol during long-term, or used glucocorticoids or other appetite-related drugs were excluded.

The adolescent’s parents attended a presentation on the study scope during the recruiting process. Those who agreed with the protocol signed the study consent form, previously approved by the local ethics board, based on document #466/2012 from the National Council of Health.

Evaluations

The week before the intervention, adolescents went through a battery of evaluations, including body weight, height, and BMI. Bodyweight calculated by a Welmy scale, measuring up to 300 kg and a precision of 0.05 kg, with adolescents wearing light clothes. A stadiometer with a scale of up to 2 meters and a precision of 0.1 cm measured the height. BMI was calculated by dividing body weight by squared height.

Body fat (absolute and relative to body mass) was assessed by an octapolar multifrequency bioelectrical...
impedance (InBody, model 520). Participants wore light clothes with no metallic objects, following the protocol: fasting for a minimum of 2 h including water; urinate about 30 min before the assessment; avoid consuming caffeinated beverages in the last 48 hours; avoid vigorous exercises in the last 24 hours; do not use diuretics in the last seven days, and not being in the menstrual period for girls.

Metabolic profile was assessed by a blood test to determine glucose levels, total cholesterol, LDL cholesterol, HDL cholesterol, non-HDL cholesterol, VLDL cholesterol, triglycerides, and insulin following the protocol of a specialized laboratory after 12 h fasting during the morning (Carlos Chagas, Parana, Brazil). Total cholesterol, HDL cholesterol, and triglycerides were classified as altered according to the cut-off points recommended by Back et al.\textsuperscript{18}: total cholesterol \( \geq 170 \text{ mg/dL} \), HDL cholesterol \(< 45 \text{ mg/dL} \), LDL cholesterol \( \geq 130 \text{ mg/dL} \), and triglycerides \( \geq 130 \text{ mg/dL} \). Blood glucose of \( \geq 100 \text{ mg/dL} \) was considered altered\textsuperscript{19}.

The questionnaire Stage of Change (SOC) was applied to determine the stages of readiness for eating and exercise behavior change, proposed by Sutton et al.\textsuperscript{15}, validated for the Brazilian context by Cattai et al.\textsuperscript{20}, who rigorously followed an international methodology for the translation and cultural adaptation with a sample of adolescents living with obesity. These authors concluded that the instrument is appropriate for the target population since it presented adequate scores of reliability and internal validity.

The main advantages of the SOC instrument are that it can be self-administered and contemplate the stages of readiness for behavior change, based on a list of items related to weight management\textsuperscript{15,20}.

The instrument composed by 38 sentences distributed in four domains denominated: “size and amount of portions” (nine sentences); “amount of fat in diet” (11 sentences); “consumption of fruits and vegetables” (nine items); and “physical activity practice” (nine sentences). The answers for each sentence vary as a Likert scale from 1 to 5, with 1 being pre-contemplation, 2. contemplation, 3 preparation; 4 actions; and 5. maintenance.

A mean score was calculated to classify the stages for each of the four domains. For analysis purpose, data was classified as: 1 to 1.4 – pre-contemplation; 1.5 to 2.4 – contemplation; 2.5 to 3.4 – preparation; 3.5 to 4.4 – action; 4.5 to 5 – maintenance\textsuperscript{16,20}.

### Statistical Analysis

Descriptive and inferential statistics analyzed data, and the Shapiro-Wilk test assessed normality. Data presented as median (interquartile range). Comparisons of different readiness stages of behavior change (4 domains) for the metabolic variables (continuous data) were performed using the non-parametric tests of Kruskal-Wallis and Mann-Whitney when needed (as a post hoc). The Chi-square test showed the associations between categorical variables. Significance was set at P<0.05.

#### RESULTS

Of the 83 adolescents engaged in the MPOT, three (3.6%) presented incomplete data and were excluded. From the 80 adolescents included in the analysis, four (5%) adolescents were classified as pre-contemplation 16 (20%) contemplation, 35 (43.8%) preparation, 21 (26.3%) action and four (5%) maintenance for the “size and amount of portions” domain. In the “amount of fat in diet” domain, three (3.8%) were classified as pre-contemplation, 12 (15%) contemplation, 27 (33.8%) preparation, 30 (37.5%) action and eight (10%) maintenance.

For the “consumption of fruits and vegetables” domain, there were two (2.5%) pre-contemplation, 13 (16.3%) contemplation, 32 (40%) preparation, 24 (30%) action and nine (11.3%) maintenance. In the “physical activity practice” domain, one (1.3%) adolescent was classified as pre-contemplation, 22 (27.5%) contemplation, 38 (47.5%) preparation, 15 (18.8%) action and four (5%) maintenance.

Tables 1, 2, 3 and 4, describe a comparison among the five readiness stages of behavior change of the metabolic variables, according to each domain of SOC questionnaire.

### Table 1: Comparison between metabolic variables according to the stages of readiness for behaviour change (size and amount of portions)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre-contemplation (n=4)</th>
<th>Contemplation (n=16)</th>
<th>Preparation (n=35)</th>
<th>Action (n=21)</th>
<th>Maintenance (n=4)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (kg)</td>
<td>88.2 (52.6)</td>
<td>79.4 (18.4)</td>
<td>91.6 (24.5)</td>
<td>89.8 (18.5)</td>
<td>67.6 (67.3)</td>
<td>0.283</td>
</tr>
<tr>
<td>BMI (kg/m(^2))</td>
<td>31.6 (11.1)</td>
<td>29.4 (7.3)</td>
<td>30.8 (8.6)</td>
<td>28.7 (6.7)</td>
<td>26.3 (15.0)</td>
<td>0.263</td>
</tr>
<tr>
<td>Body fat (kg)</td>
<td>41.3 (25.2)</td>
<td>31.4 (13.2)</td>
<td>34.3 (17.9)</td>
<td>30.1 (17.7)</td>
<td>23.7 (36.1)</td>
<td>0.482</td>
</tr>
<tr>
<td>Body fat (%)</td>
<td>43.7 (6.3)</td>
<td>39.7 (16.9)</td>
<td>39.0 (13.9)</td>
<td>37.5 (14.1)</td>
<td>35.0 (10.9)</td>
<td>0.398</td>
</tr>
<tr>
<td>TC (mg/dL)</td>
<td>144.5 (34.5)</td>
<td>152.5 (22.5)</td>
<td>147.0 (37.0)</td>
<td>145.0 (3.5)</td>
<td>171.0 (39.8)</td>
<td>0.734</td>
</tr>
<tr>
<td>HDL-c (mg/dL)</td>
<td>43.3 (12.2)</td>
<td>41.1 (11.2)</td>
<td>42.8 (13.1)</td>
<td>42.8 (8.4)</td>
<td>65.3 (41.6)</td>
<td>0.530</td>
</tr>
<tr>
<td>Non-HDL-c (mg/dL)</td>
<td>103.0 (43.3)</td>
<td>111.0 (36.1)</td>
<td>102.3 (33.0)</td>
<td>99.5 (45.7)</td>
<td>97.6 (36.6)</td>
<td>0.926</td>
</tr>
<tr>
<td>LDL-c (mg/dL)</td>
<td>86.2 (40.0)</td>
<td>90.7 (31.9)</td>
<td>88.3 (35.1)</td>
<td>82.7 (35.9)</td>
<td>88.9 (30.9)</td>
<td>0.890</td>
</tr>
</tbody>
</table>

Continuation - Table 1: Comparison between metabolic variables according to the stages of readiness for behaviour change (size and amount of portions)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre-contemplation</th>
<th>Contemplation</th>
<th>Preparation</th>
<th>Action</th>
<th>Maintenance</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLDL-c (mg/dL)</td>
<td>13.9 (9.8)</td>
<td>14.1 (6.8)</td>
<td>14.8 (8.0)</td>
<td>16.8 (12.4)</td>
<td>10.5 (9.9)</td>
<td>0.259</td>
</tr>
<tr>
<td>TG (mg/dL)</td>
<td>69.5 (49.0)</td>
<td>70.5 (33.8)</td>
<td>74.0 (40.0)</td>
<td>84.0 (62.0)</td>
<td>52.5 (49.3)</td>
<td>0.259</td>
</tr>
<tr>
<td>Glucose (mg/dL)</td>
<td>86.0 (19.5)</td>
<td>86.5 (9.8)</td>
<td>85.0 (8.0)</td>
<td>84.0 (7.5)</td>
<td>80.5 (4.5)</td>
<td>0.435</td>
</tr>
<tr>
<td>Insulin (μU/mL)</td>
<td>11.1 (22.0)</td>
<td>11.4 (12.5)</td>
<td>10.2 (8.4)</td>
<td>8.6 (13.3)</td>
<td>5.7 (4.8)</td>
<td>0.373</td>
</tr>
</tbody>
</table>

*p < 0.05 in the Kruskal-Wallis test.

Table 2: Comparison between metabolic variables according to the stages of readiness for behaviour change (amount of fat in diet)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre-contemplation</th>
<th>Contemplation</th>
<th>Preparation</th>
<th>Action</th>
<th>Maintenance</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (kg)</td>
<td>80.3</td>
<td>76.0 (31.3)</td>
<td>90.4 (14.4)</td>
<td>90.2 (26.6)</td>
<td>85.1 (41.2)</td>
<td>0.741</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>27.0</td>
<td>29.4 (8.5)</td>
<td>30.5 (7.4)</td>
<td>29.0 (7.6)</td>
<td>28.5 (14.6)</td>
<td>0.557</td>
</tr>
<tr>
<td>Body fat (kg)</td>
<td>29.4</td>
<td>32.5 (23.1)</td>
<td>34.1 (15.1)</td>
<td>29.2 (17.3)</td>
<td>28.8 (31.4)</td>
<td>0.816</td>
</tr>
<tr>
<td>Body fat (%)</td>
<td>35.9</td>
<td>41.6 (10.8)</td>
<td>41.0 (14.3)</td>
<td>38.0 (10.2)</td>
<td>34.7 (13.1)</td>
<td>0.507</td>
</tr>
<tr>
<td>TC (mg/dL)</td>
<td>117.0</td>
<td>151.0 (18.3)</td>
<td>148.0 (26.0)</td>
<td>146.0 (44.0)</td>
<td>146.5 (26.3)</td>
<td>0.294</td>
</tr>
<tr>
<td>HDL-c (mg/dL)</td>
<td>49.0</td>
<td>41.2 (16.4)</td>
<td>44.0 (11.2)</td>
<td>41.8 (12.6)</td>
<td>42.6 (9.4)</td>
<td>0.383</td>
</tr>
<tr>
<td>Non-HDL-c (mg/dL)</td>
<td>75.2</td>
<td>106.2 (29.4)</td>
<td>99.7 (30.0)</td>
<td>103.2 (48.4)</td>
<td>102.1 (20.3)</td>
<td>0.179</td>
</tr>
<tr>
<td>LDL-c (mg/dL)</td>
<td>64.6</td>
<td>91.0 (22.3)</td>
<td>87.1 (29.3)</td>
<td>89.1 (40.9)</td>
<td>86.2 (21.5)</td>
<td>0.334</td>
</tr>
<tr>
<td>VLDL-c (mg/dL)</td>
<td>9.0</td>
<td>14.5 (9.7)</td>
<td>14.6 (9.0)</td>
<td>14.3 (8.5)</td>
<td>18.0 (8.3)</td>
<td>0.124</td>
</tr>
<tr>
<td>TG (mg/dL)</td>
<td>45.0</td>
<td>72.5 (48.3)</td>
<td>73.0 (45.0)</td>
<td>71.5 (42.3)</td>
<td>90.0 (41.3)</td>
<td>0.124</td>
</tr>
<tr>
<td>Glucose (mg/dL)</td>
<td>84.0</td>
<td>84.5 (13.3)</td>
<td>85.0 (8.0)</td>
<td>84.5 (8.5)</td>
<td>84.0 (11.5)</td>
<td>0.921</td>
</tr>
<tr>
<td>Insulin (μU/mL)</td>
<td>10.8</td>
<td>14.4 (9.2)</td>
<td>11.3 (10.6)</td>
<td>8.5 (9.5)</td>
<td>6.2 (5.0)</td>
<td>0.206</td>
</tr>
</tbody>
</table>

#Amount of participants allows only the median calculation. *P < 0.05 in the Kruskal-Wallis test.

Table 3: Comparison between metabolic variables according to the stages of readiness for behaviour change (consumption of fruits and vegetables)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre-contemplation</th>
<th>Contemplation</th>
<th>Preparation</th>
<th>Action</th>
<th>Maintenance</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (kg)</td>
<td>74</td>
<td>85.5 (16)</td>
<td>90.7 (17.7)</td>
<td>91.5 (17.7)</td>
<td>65.7 (27.4)</td>
<td>0.019*</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>26.5</td>
<td>30.1 (5.8)</td>
<td>30.5 (8.0)</td>
<td>31.4 (8.5)</td>
<td>26.3 (10.1)</td>
<td>0.162</td>
</tr>
<tr>
<td>Body fat (kg)</td>
<td>29.1</td>
<td>33.9 (13.8)</td>
<td>34.2 (18.4)</td>
<td>35.3 (15.5)</td>
<td>25.5 (21.6)</td>
<td>0.456</td>
</tr>
<tr>
<td>Body fat (%)</td>
<td>39.7</td>
<td>43.2 (15.6)</td>
<td>39.8 (13.6)</td>
<td>37.0 (11.6)</td>
<td>36.6 (10.7)</td>
<td>0.779</td>
</tr>
<tr>
<td>TC (mg/dL)</td>
<td>124.0</td>
<td>153.0 (27.0)</td>
<td>145.5 (37.5)</td>
<td>150.0 (29.5)</td>
<td>146.0 (51.0)</td>
<td>0.136</td>
</tr>
<tr>
<td>HDL-c (mg/dL)</td>
<td>52.7</td>
<td>41.4 (13.4)</td>
<td>42.6 (11.9)</td>
<td>42.6 (8.3)</td>
<td>44.6 (28.8)</td>
<td>0.264</td>
</tr>
<tr>
<td>Non-HDL-c (mg/dL)</td>
<td>71.2</td>
<td>117.4 (25.9)</td>
<td>97.6 (34.8)a</td>
<td>104.6 (33.6)</td>
<td>96.7 (28.7)</td>
<td>0.035*</td>
</tr>
</tbody>
</table>

*a.b* Amount of participants allows only the median calculation. *P < 0.05 in the Kruskal-Wallis test.
Differences were statistically significant for the “consumption of fruits and vegetables” and “physical activity practice” domains. Concerning the “consumption of fruits and vegetables” domain, the adolescents classified as “maintenance” presented lower body weight than those classified in “action” and “preparation” stages. Besides, the “action” group showed higher body weight than the “contemplation” group; this last one showed higher non-HDL cholesterol than adolescents in the “pre-contemplation” and “preparation” stages.

In the “physical activity practice” domain, those individuals included in the “maintenance” stage had lower body weight, BMI, and body fat (in kg) than those categorized in the stages “action,” “preparation,” and “contemplation.” There was no association between the stages of readiness for behavior change and metabolic impairment, except for HDL cholesterol alteration which was lower as stages progressed for the “physical activity practice” domain (pre-contemplation: 100%; contemplation: 81.8%; preparation: 60.5%; action: 46.7%; maintenance: 25%) (Figure 1).
DISCUSSION

The “size and amount of portions” and “amount of fat in diet” domains did not present differences among the stages of readiness for behavior change for any of the analyzed variables (i.e., anthropometric or metabolic profile), which means that the stage the adolescent was classified did not affect these outcomes. In contrast, with regards to the “consumption of fruits and vegetables,” adolescents from the “maintenance” stage showed lower body weight than those in the “action” and “preparation” groups. Moreover, those adolescents classified in the “action” range had higher body weight than those of the “contemplation” group. and this last one had higher non-HDL cholesterol than the “pre-contemplation” and “preparation” groups.

In the “physical activity practice” domain, the “maintenance” group showed lower body weight, BMI, and body fat (in kg) than the “action,” “preparation,” and “contemplation” groups. In this way, adolescents who embarked in the MPOT in more advanced stages for “consumption of fruits and vegetables” and “physical activity practice” presented more favorable anthropometric and metabolic profiles, mainly for the “action” and “maintenance” stages. The prevalence of altered HDL cholesterol was lower as stages progressed for the “physical activity practice” domain.

The fact that more adolescents in almost all the SOC questionnaire domains classified in the “preparation” stage is a positive outcome for the multidisciplinary team. In this stage, individuals tend to be more open to the treatment requirements, and consequently, they have more considerable changes in presenting satisfactory results from the intervention. According to Toral et al., many individuals have a wrong interpretation of eating behaviors and believe they already have appropriate eating habits without knowing that they can be harmful. It is one of the biggest obstacles to achieving healthful eating changes. It is crucial to recognize that changes are required, not only for eating habits but also for physical activity practice.

The stages of readiness for behavior change are components of the Trans theoretical model, initially proposed as a component of intervention programs to cease tobacco use. However, the stages were adapted to assess patients seeking for eating changes and increase physical activity levels.

Da Silva et al. studied the impact of readiness’s stages on behavior change of physical activity and its effects on physical fitness and body composition. They identified that adolescents who initiated the intervention program in more advanced stages (e.g., maintenance) achieved better outcomes on anthropometric variables, diastolic blood pressure, and cardiorespiratory fitness. They also highlighted that an intervention program based on cognitive behavioral therapy could promote benefits even for adolescents in the early stages of readiness for behavior change (e.g., pre-contemplation or contemplation).

According to the Trans theoretical model, individuals classified in advanced stages tend to increase positive attitudes towards nutrition and physical activity, which will ultimately allow them to have a better health status. This current study evidenced a better HDL cholesterol profile. These positive outcomes reflect the relationship between the stages of readiness to modify behaviors and the factors that facilitate behavioral transformations, mainly with greater stimulus control. This factor can exist before the intervention, even before the baseline assessment, which would explain the best results observed in advanced stages.

In contrast with that, adolescents in early stages can have this relationship between their readiness for behavior change (e.g., pre-contemplation and contemplation) and the change processes, however, in a lower magnitude.
According to Prochaska\textsuperscript{29}, Prochaska, and Di Clemente\textsuperscript{37}, long-term improvements can occur due to increased knowledge and their capacity to self-evaluate, followed throughout the treatment by the psychology team\textsuperscript{16}.

From a practical point of view, the association between the progress in the readiness stages of behavior change for the “physical activity practice” domain and the decrease in the frequency of adolescents with altered HDL cholesterol was expected, given the potential benefits of exercise to control this cholesterol fraction\textsuperscript{29}. The study performed by Chen \textit{et al.}\textsuperscript{30} did not identify changes in HDL cholesterol in children living with excess body weight, and a hypothesis they raised to explain this finding is that the physical activity levels of these children were already relatively high.

Our study presents interesting findings with potential practical implications; however, there are still limitations. A minimal sample size calculation was not performed since our study focused on adolescents engaging in a multidisciplinary intervention program to treat pediatric obesity. In this case, it is expected a low sample size in the last stages (\textit{i.e.}, pre-contemplation and maintenance) even though the determination of the stages of readiness for behavior change and their impact on metabolic variables are essential to understand the fundamental characteristics of adolescents to seek this type of health service.

Given that, our study brings the novelty related to the association between stages of readiness for eating and physical activity behavior change with the metabolic profile. Before beginning the intervention, an association between how open for behavior changes the adolescent is, and their anthropometric and metabolic profile was observed. These results can provide useful information for a multidisciplinary team during the intervention program.

\textbf{CONCLUSION}

The “consumption of fruits and vegetables” and “physical activity practice” domains found an association between readiness stages for behavior changes on anthropometric variables and metabolic profile.

The alteration in the HDL cholesterol was associated with the readiness stages for behavior change for the “physical activity practice” domain.

\section*{REFERENCES}

1. Ho M, Garnett SP, Baur, LA. Childhood obesity and insulin resistance: how should it be managed? Curr Treat Options Cardiovasc Med.2014 Dec; 16(12): 351. DOI: https://doi.org/10.1007/s11936-014-0351-0


Resumo

Introdução: A obesidade em crianças e adolescentes geralmente está relacionada com alterações metabólicas, sendo os programas de intervenção uma das estratégias para o tratamento da obesidade e das comorbidades associadas. Ao iniciar a intervenção, os estágios de prontidão para mudança do comportamento indicam hábitos específicos que o adolescente planeja ou não mudar e em quanto tempo ele pretende realizar a mudança.

Objetivo: Avaliar o perfil metabólico e sua associação com os estágios de prontidão para mudança do comportamento alimentar e atividade física em adolescentes com excesso de peso.

Método: Foram avaliados 83 adolescentes com excesso de peso. Os adolescentes foram avaliados em relação às variáveis antropométricas e perfil metabólico (glicemia, colesterol total, colesterol LDL, HDL, não-HDL, VLDL, triglicerídeos, insulina). Além disso, foram avaliados os estágios de prontidão para mudança do comportamento para os domínios “tamanho e quantidade das porções”, “quantidade de gordura na dieta”, “consumo de frutas e vegetais” e “prática de atividade física”. Foi feita comparação das variáveis antropométricas e perfil metabólico de acordo com os estágios de prontidão.

Resultados: Em relação ao domínio “Consumo de Frutas e Vegetais”, os adolescentes do grupo Manutenção apresentaram peso menor que os do grupo Ação e Preparação. O grupo Ação apresentou peso maior que o Contemplação, e o grupo Contemplação apresentou colesterol não-HDL maior que os grupos Pré-contemplação e Preparação. No domínio “Prática de Atividade Física”, o grupo Manutenção apresentou peso, IMC e gordura corporal (em kg) menores que os grupos Ação, Preparação e Contemplação. A prevalência de alteração do colesterol HDL foi progressivamente menor conforme progrediram os estágios de prontidão para mudança do comportamento para o domínio “prática de atividade física”.

Conclusão: Os estágios de prontidão para mudança do comportamento têm impacto sobre variáveis antropométricas e perfil metabólico de adolescentes com excesso de peso, sendo um instrumento recomendado para o monitoramento de programas de intervenção.

Palavras-chave: comportamento do adolescente, hábitos alimentares, obesidade pediátrica, síndrome metabólica.