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Olga T. Hardy
University of Massachusetts Medical School

Jean Wiecha
University of Massachusetts Boston

Albert Kim
University of Massachusetts Boston

See next page for additional authors

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Presenter Information
Olga T. Hardy, Jean Wiecha, Albert Kim, Carlos Salas, Rayna Bricenoc, Kwesi Moody, Joan Becker, Greer Glazer, Carol A. Ciccarelli, Ling Shi, and Laura L. Hayman

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Effects of a multicomponent wellness intervention on dyslipidemia in an overweight adolescent population

Olga T Hardya, Jean Wiecha,b, Albert Kimb, Carlos Salasc, Rayna Bricenoc, Kwsiea Moody, Joan Becker, Greer Glazera, Carol Ciccarellia, Ling Shif, Laura J Haymanb

aDepartment of Pediatrics, University of Massachusetts Medical School, Worcester, Massachusetts 01605; bDorchester Academy, Boston, Massachusetts 02124; cOffice of Academic Support Services and Undergraduate Studies, University of Massachusetts, Boston 02125

Abstract

Epidemiologic studies suggest that atherosclerotic processes begin in childhood and are associated with abnormal lipid levels. Behavioral changes are the first line of treatment for dyslipidemia in adolescents but outcome data on the effectiveness of this approach are inconsistent. This study aimed to assess the effect of a 12-week multicomponent wellness intervention program on dyslipidemia in lean and overweight/obese adolescents enrolled at a public high school in Boston, Massachusetts. The intervention was conducted at a university-based youth fitness center where 9 overweight/obese adolescents (body mass index [BMI] > 85th percentile for age and sex) and 9 lean adolescents (BMI < 85th percentile for age and sex) participated in weekly nutrition classes and structured cardiovascular, flexibility and strength training 2 times/week for 5 weeks, followed by up to 4 times/week for 8 weeks. Clinical measurements (BMI, percent body fat, blood pressure [BP] and lipid profile assessment) were conducted at baseline and completion of the intervention. At the completion of the study, the overweight/obese adolescents demonstrated a 15% increase in HDL-C levels (mean, 47 mg/dL vs 54 mg/dL) while the overweight/obese adolescents demonstrated a 15% increase in HDL-C levels (mean, 47 mg/dL vs 54 mg/dL) while there was no improvement in BMI, percent body fat, TC, TG and LDL-C. The participants in the lean group showed no change in their anthropometric and serum parameters. A multicomponent wellness intervention resulted in a significant increase in cardioresilient HDL-C levels which has been associated with coronary health in adulthood. The long-term effects of this intervention indicate cardiovascular health and others like it require further study.

Background

• Atherosclerotic processes begin in childhood and are associated with abnormal lipid levels including a low concentration of high-density lipoprotein cholesterol (HDL-C).
• Behavioral and lifestyle changes are recommended as the cornerstone for dyslipidemia treatment.
• The primary goal of this pilot study was to assess the effect of a 12-week multicomponent wellness intervention program on dyslipidemia in lean and overweight/obese (body mass index [BMI] > 85th percentile for age and sex) adolescents.
• We conducted a sub-study of Fit2Lead, which is a longitudinal behavioral intervention that engages high school students in physical activities, educational workshops, academic classes and training toward becoming future role models and mentors.
• In our sub-study we evaluated the lipid profile of participants before and after participation in the intervention.

HYPOTHESIS: High activity level will lead to an improvement in lipids especially HDL-C which is known to increase with consistent exercise

TABLE. Baseline and post-intervention changes in body composition, cardiovascular parameters and questionnaires responses

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Lean (n=9)</th>
<th>Overweight/Obese (n=9)</th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
<th>Change</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>114 ± 10</td>
<td>136 ± 12</td>
<td>136 ± 12</td>
<td>114 ± 10</td>
<td>22 ± 1.4</td>
<td>0.001</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>31.3 ± 4.3</td>
<td>33.8 ± 3.3</td>
<td>33.8 ± 3.3</td>
<td>31.3 ± 4.3</td>
<td>2.1 ± 0.1</td>
<td>0.011</td>
</tr>
<tr>
<td>HDL-C (mg/dL)</td>
<td>53.6 ± 4.9</td>
<td>54.3 ± 4.9</td>
<td>54.3 ± 4.9</td>
<td>53.6 ± 4.9</td>
<td>0.7 ± 0.1</td>
<td>0.042</td>
</tr>
<tr>
<td>Triglyceride (mg/dL)</td>
<td>51 ± 27</td>
<td>54 ± 30</td>
<td>54 ± 30</td>
<td>51 ± 27</td>
<td>3 ± 0.2</td>
<td>0.001</td>
</tr>
<tr>
<td>Total Cholesterol (mg/dL)</td>
<td>138 ± 17</td>
<td>138 ± 17</td>
<td>138 ± 17</td>
<td>138 ± 17</td>
<td>0 ± 0.0</td>
<td>0.001</td>
</tr>
<tr>
<td>LDL-C (mg/dL)</td>
<td>73 ± 24</td>
<td>76 ± 25</td>
<td>76 ± 25</td>
<td>73 ± 24</td>
<td>3 ± 0.2</td>
<td>0.001</td>
</tr>
<tr>
<td>Systolic BP (mm Hg)</td>
<td>115 ± 10</td>
<td>112 ± 12</td>
<td>112 ± 12</td>
<td>115 ± 10</td>
<td>3 ± 0.2</td>
<td>0.001</td>
</tr>
<tr>
<td>Diastolic BP (mm Hg)</td>
<td>74 ± 4</td>
<td>77 ± 5</td>
<td>77 ± 5</td>
<td>74 ± 4</td>
<td>3 ± 0.2</td>
<td>0.001</td>
</tr>
</tbody>
</table>

*p < 0.05 with lean group at baseline
*p < 0.05 within group, compared with pre-intervention testing
*p < 0.05 within group, compared with pre-intervention testing

Conclusions and Future Directions

Exercise and nutrition education coupled with 30-60 minutes of activity per day, 2-4 days per week for 13 weeks resulted in increased HDL-C levels among overweight and obese adolescents.

• Low concentrations of HDL-C show a significant correlation with the size of atherosclerotic lesions present in autopsies obtained from children.
• Low concentrations of HDL-C show a significant correlation with physical examination (6). Outcome measures were obtained for baseline and 13 weeks. Light was measured using a Porta scale (model BC418, Japan) and height was measured using a stadiometer (Shlir Brand Schoenhofen, Germany). Hemoglobin A1c (HbA1c) was measured using the Hemoglobin A1C test strip divided by the height in meters squared. Overweight/obese was established using BMI, 85th percentile for age and gender according to the CDC guidelines. For the analysis in this study, body fat was determined using a body fat analyzer (Tanita model BC418, Japan). Blood pressure was measured using a sphygmomanometer and identified as elevated according to the NHLBP guidelines (8). Weight, height and blood pressure were measured 5 times and the results were averaged for analysis.

For all of the analyses, the results were considered significant at P ≤ 0.05.

Data Management

Differences between the lean and overweight/obese groups in baseline measures were tested for significance using the t-test for continuous variables and Fisher’s exact test for categorical variables. The effect of the intervention on outcome measures was calculated using analysis of variance (ANOVA) and Student’s t-tests were used for post-hoc testing. The t-test was used to compare the difference in the intervention group to the control group. The significance of the difference of the intervention between the lean and overweight/obese groups. For all of the analyses, the results were considered significant if P ≤ 0.05.

Acknowledgments

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