Impact of Structured Physical Activity Programs on Triglyceride Levels in Urban Adolescent Boys

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Abstract

Adolescent obesity is a growing global concern, often leading to metabolic complications such as dyslipidemia. This study aimed to evaluate the impact of structured physical activity programs on triglyceride levels in urban adolescent boys. students were selected from Scott Christian Hr.Sec.School, Nagercoil. A total of 45 overweight students aged 13-15 years were randomly assigned to three groups: Aerobic Exercise Group (AEG), Mind-Body Intervention Group (MBG), and Control Group (CG). The intervention lasted six weeks, with training conducted three days per week for 60 minutes per session. Pre-test and post-test triglyceride levels were assessed, and statistical analyses were conducted using analysis of covariance (ANCOVA) and post-hoc testing. The findings demonstrated a significant reduction in triglyceride levels in both experimental groups compared to the control group, with the aerobic exercise group showing the greatest improvement. These results emphasize the necessity of integrating structured physical activity into adolescent health programs to manage lipid profiles and prevent metabolic disorders.

Keywords: *Physical Activity, Triglycerides, Aerobic Training, Mind-Body Interventions, Adolescent Health*

Introduction

Obesity among adolescents has reached alarming levels worldwide, significantly increasing the risk of cardiovascular diseases, metabolic disorders, and reduced overall well-being. One of the critical biomarkers for metabolic health is triglyceride levels, which, when elevated, contribute to conditions such as atherosclerosis and insulin resistance.

Engaging in structured physical activity has been shown to positively impact lipid metabolism. Aerobic exercise enhances lipid oxidation and cardiovascular efficiency, whereas mind-body interventions, such as yoga and controlled breathing techniques,

influence stress responses and metabolic regulation. This study investigates how these two interventions compare in their effectiveness in lowering triglyceride levels in overweight adolescent boys.

Methodology

Participants and Study Design

Forty-five adolescent boys with BMI values above the 85th percentile were selected for the study. They were randomly divided into three groups (n=15 per group):

- **Aerobic Exercise Group (AEG):** Engaged in running, skipping, and structured aerobic activities.
- **Mind-Body Group (MBG):** Practiced meditation, breathing exercises, and flexibility training.
- **Control Group (CG):** Maintained regular daily activities without structured training.

Training Protocol

The intervention lasted six weeks, with participants attending three training sessions per week**,** each lasting 60 minutes. The exercise protocol was developed following standard adolescent training guidelines to ensure safety and effectiveness.

Data Collection and Analysis

Triglyceride levels were measured pre- and post-intervention using standard blood lipid profiling methods. Statistical analysis was conducted using ANCOVA, and post-hoc comparisons were performed to evaluate group differences at a 0.05 significance level.

Results and Discussion

Table 1: Analysis of Covariance (ANCOVA) for Triglyceride Levels (mg/dL)

Group	Pre-Test Mean	Post-Test Mean	Adjusted Post-Test Mean
Control Group	178.2	179.1	179.5
Mind-Body Group	177.5	174.2	173.6
Aerobic Exercise Group	177.8	169.3	168.5

F-Ratio for post-test: 10.47 ($p<0.05$)
F-Ratio for adjusted post-test: 22.18 ($p<0.05$)

The findings demonstrate a significant reduction in triglycerides in both experimental groups compared to the control group. The **aerobic exercise group** exhibited the most substantial improvement, aligning with previous research indicating the role of endurance training in enhancing lipid metabolism.

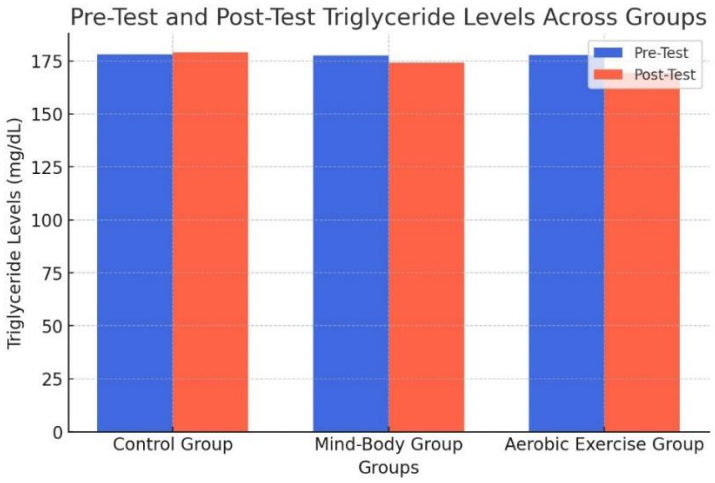
Post-Hoc Test Results

Comparison	Mean Difference	Critical Value
MBG vs. CG	5.9	2.4 ($p<0.05$)
AEG vs. CG	10.6	2.4 ($p<0.05$)
AEG vs. MBG	4.7	2.4 ($p<0.05$)

The results confirm that both experimental groups significantly outperformed the control group. The mind-body group achieved moderate triglyceride reduction, suggesting that relaxation techniques can influence metabolic parameters. However, the aerobic exercise group demonstrated superior lipid-lowering effects, likely due to increased energy expenditure and enhanced enzymatic activity in fat metabolism.

Graphical Representation

Figure 1: Pre-Test and Post-Test Triglyceride Levels Across Groups



Discussion

The observed triglyceride reductions are consistent with previous findings on the effectiveness of exercise in managing metabolic health. Aerobic training facilitates improved fat utilization, while mind-body interventions may regulate hormonal responses and stress-

related lipid imbalances. These findings highlight the importance of structured school-based physical activity programs in addressing adolescent obesity and its associated metabolic risks. While both aerobic training and mind-body practices were beneficial, aerobic exercise was more effective in lowering triglycerides, suggesting a greater role for endurance-based interventions in metabolic health management.

Conclusion

1. Aerobic exercise and mind-body interventions significantly lowered triglyceride levels in overweight adolescents.
2. Aerobic exercise produced the greatest reduction, indicating its potential as a primary intervention for adolescent dyslipidemia.
3. Mind-body interventions were moderately effective, suggesting they may complement structured physical training programs.
4. Incorporating structured physical activity programs in schools can significantly benefit adolescent health.

Future research should examine the long-term sustainability of these interventions**,** the impact of combining both approaches, and their influence on additional metabolic markers.

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