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INFLUENCE OF NUTRITIONAL EDUCATION ON DIETARY HABITS AND BODY COMPOSITION IN ADOLESCENT ATHLETES

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Abstract

Objective: This quasi-experimental study evaluated the effectiveness of a 10-week nutritional education program on dietary habits and body composition among adolescent athletes. Methods: Seventy adolescent athletes (aged 13–17) were assigned to either a nutrition education group or a control group. The intervention included weekly educational sessions focused on sports nutrition, healthy eating, and practical meal planning. Dietary habits were assessed using a validated food frequency questionnaire, and body composition was measured via bioelectrical impedance analysis at baseline and post-intervention. Results: The education group demonstrated significant improvements in dietary choices, including increased fruit and vegetable intake and reduced consumption of sugary snacks and beverages. Additionally, there was a significant reduction in body fat percentage and an improvement in lean body mass compared to controls. Conclusion: Nutrition education is effective in promoting healthier dietary behaviors and improving body composition in adolescent athletes. Integrating such programs into youth sports development is recommended.

Keywords: Dietary Habits, Body Composition, Adolescent Athletes, Sports Nutrition

1. Introduction

1.1 Background

Adolescence is a critical period for growth, development, and the establishment of lifelong dietary habits. For adolescent athletes, optimal nutrition is essential not only for supporting growth and maturation but also for enhancing athletic performance and recovery (Desbrow et al., 2014). However, research indicates that many young athletes have suboptimal dietary patterns, characterized by inadequate intake of fruits, vegetables, and whole grains, and excessive consumption of processed foods, sugary beverages, and fast food (Papadaki et al., 2020).

1.2 Rationale

Poor dietary habits during adolescence can lead to unfavorable changes in body composition, such as increased body fat and reduced lean mass, which may negatively impact athletic performance and long-term health (Slater & Phillips, 2011). Nutrition education has been identified as a promising strategy to improve dietary behaviors and body composition in youth populations (Hoelscher et al., 2010).

1.3 Literature Review

Several studies have demonstrated the effectiveness of school- and sports-based nutrition education programs in improving knowledge, attitudes, and dietary behaviors among adolescents (Contento et al., 2016). However, evidence regarding the impact of such interventions on body composition, particularly in athletic populations, remains limited and mixed (Meyer et al., 2013). Furthermore, there is a need for well-designed studies that assess both behavioral and physiological outcomes.

1.4 Research Gap

Despite the recognized importance of nutrition for adolescent athletes, there is a paucity of research examining the effects of structured nutrition education on both dietary habits and body composition in this group. The current study aims to address this gap by evaluating a 10-week nutrition education intervention in adolescent athletes.

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1.5 Study Objectives and Hypotheses

Purpose: To assess the influence of a 10-week nutrition education program on dietary habits and body composition in adolescent athletes.

Hypotheses:

1. Nutrition education will improve dietary habits, including increased intake of nutrient-dense foods and reduced consumption of unhealthy foods.
2. Nutrition education will result in favorable changes in body composition, including reduced body fat percentage and increased lean mass.

2. Methodology

2.1 Design

A quasi-experimental, pretest-posttest control group design was employed.

2.2 Participants

Inclusion Criteria:

i. Age 13–17 years
ii. Participation in organized sports (≥3 sessions/week)
iii. Parental consent and participant assent

Exclusion Criteria:

i. Chronic illness affecting nutrition or growth
ii. Use of medications influencing body composition
iii. Previous participation in structured nutrition education within the past year

Recruitment:
Seventy adolescent athletes were recruited from local sports academies and schools. Participants were assigned to the education or control group based on team allocation to minimize contamination.

2.3 Intervention

Nutrition Education Group:

a) Ten weekly, 60-minute sessions led by a registered dietitian
b) Topics included: sports nutrition principles, macro- and micronutrients, hydration, meal planning, label reading, and healthy snack preparation
c) Interactive activities, group discussions, and practical demonstrations

Control Group:

a) Continued usual training and received standard health information pamphlets (no structured nutrition education)

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2.4 Outcome Measures

a) **Dietary Habits:** Assessed using a validated Food Frequency Questionnaire (FFQ) at baseline and post-intervention. Key indicators included daily servings of fruits, vegetables, whole grains, and frequency of sugary snack/beverage intake.

b) **Body Composition:** Measured via bioelectrical impedance analysis (BIA; InBody 720) for body fat percentage, lean body mass, and BMI.

c) **Knowledge Assessment:** Nutrition knowledge quiz administered pre- and post-intervention.

2.5 Data Collection Procedure

Assessments were conducted at baseline (week 0) and immediately post-intervention (week 10) by trained research assistants blinded to group allocation.

2.6 Data Analysis

Data were analyzed using SPSS v27. Descriptive statistics summarized participant characteristics. ANCOVA was used to assess between-group differences in post-intervention outcomes, controlling for baseline values. Statistical significance was set at $p < .05$.

3. Results

3.1 Participant Flow and Baseline Characteristics

Of 78 athletes screened, 70 met eligibility criteria and completed baseline assessments (education: n=35; control: n=35). Four participants (education: n=2; control: n=2) withdrew due to scheduling conflicts.

Table 1. Baseline Characteristics

Variable	Education Group (n=33)	Control Group (n=33)	p-value
Age (years)	15.1 (1.2)	15.0 (1.3)	0.78
Male (%)	55	52	0.81
BMI (kg/m²)	21.8 (2.3)	21.7 (2.4)	0.92
Body Fat (%)	19.6 (4.1)	19.4 (4.3)	0.85
Lean Mass (kg)	44.2 (6.7)	44.5 (6.2)	0.88
Fruit/Vegetable Servings/day	2.1 (0.8)	2.2 (0.7)	0.69

Table 1 presents the baseline characteristics of participants in the Education Group (n = 33) and the Control Group (n = 33). There were no statistically significant differences between the groups for any of the measured variables, as indicated by p-values greater than .05 for all comparisons.

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The mean age of participants was similar between the Education Group (M = 15.1, SD = 1.2) and the Control Group (M = 15.0, SD = 1.3), p = .78. The proportion of male participants was also comparable (55% in the Education Group vs. 52% in the Control Group, p = .81). Body mass index (BMI) was nearly identical between groups (M = 21.8, SD = 2.3 for the Education Group; M = 21.7, SD = 2.4 for the Control Group, p = .92), as were body fat percentage (M = 19.6%, SD = 4.1 vs. M = 19.4%, SD = 4.3; p = .85) and lean mass (M = 44.2 kg, SD = 6.7 vs. M = 44.5 kg, SD = 6.2; p = .88). Daily fruit and vegetable servings were also similar between groups (M = 2.1, SD = 0.8 for the Education Group; M = 2.2, SD = 0.7 for the Control Group, p = .69).

Overall, these results indicate that the two groups were well-matched at baseline, with no significant differences in demographic or health-related characteristics.

3.2 Adherence and Program Feedback

Attendance averaged 91% across sessions. Participants rated the sessions as "very helpful" (mean rating 4.6/5).

3.3 Dietary Habits

Table 2. Changes in Dietary Habits

Outcome	Education (Pre)	Education (Post)	Control (Pre)	Control (Post)	p (group effect)
Fruit/Vegetable Servings/day	2.1 (0.8)	3.5 (1.0)	2.2 (0.7)	2.3 (0.8)	<.001
Sugary Snacks (times/week)	5.2 (2.1)	2.7 (1.4)	5.1 (2.0)	5.0 (2.2)	<.001
Sugar-Sweetened Beverages/wk.	4.8 (1.9)	2.1 (1.2)	4.7 (2.0)	4.6 (2.1)	<.001
Whole Grain Servings/day	1.3 (0.6)	2.2 (0.7)	1.2 (0.5)	1.2 (0.6)	<.001

Interpretation of Table 2: Changes in Dietary Habits

Table 2 summarizes the changes in dietary habits for participants in both the Education and Control groups from pre- to post-intervention. There were significant group effects for all measured dietary outcomes (all p-values < .001).

Specifically, participants in the Education group showed a substantial increase in fruit and vegetable servings per day, rising from a mean of 2.1 (SD = 0.8) at baseline to 3.5 (SD = 1.0) post-intervention. In contrast, the Control group showed only a minimal increase (from M = 2.2, SD = 0.7 to M = 2.3, SD = 0.8).

Similarly, the frequency of sugary snack consumption in the Education group decreased markedly, from 5.2 (SD = 2.1) times per week pre-intervention to 2.7 (SD = 1.4) times per week post-intervention. The Control group showed virtually no change (M = 5.1, SD = 2.0 pre; M = 5.0, SD = 2.2 post).

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Sugar-sweetened beverage intake also declined significantly in the Education group, from 4.8 (SD = 1.9) to 2.1 (SD = 1.2) times per week, while the Control group remained unchanged (M = 4.7, SD = 2.0 pre; M = 4.6, SD = 2.1 post).

Lastly, whole grain servings per day increased in the Education group (from M = 1.3, SD = 0.6 to M = 2.2, SD = 0.7), whereas the Control group did not show any meaningful change (M = 1.2, SD = 0.5 pre; M = 1.2, SD = 0.6 post).

Overall, these results indicate that the educational intervention was effective in improving dietary habits, as evidenced by increased fruit, vegetable, and whole grain intake, and decreased consumption of sugary snacks and beverages, compared to the control group.

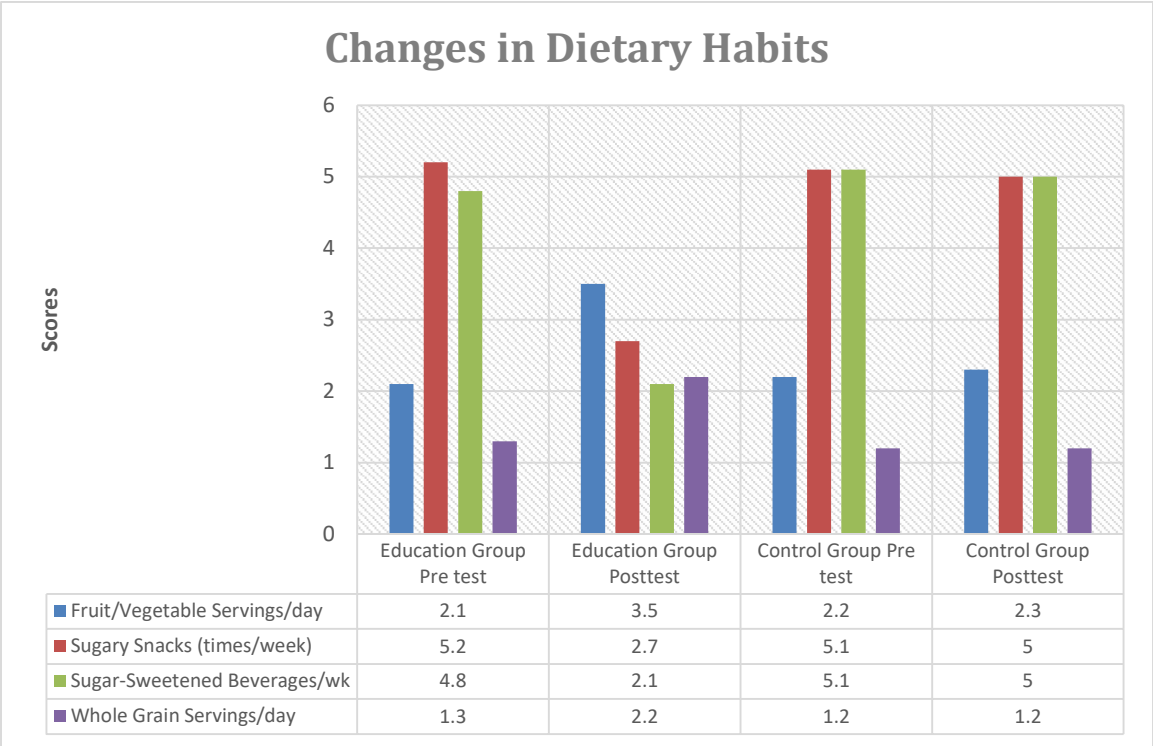

Figure 1: Bar Graph Showing Changes in Dietary Habits: Pretest and Posttest Mean Scores.

3.4 Body Composition

Table 3. Body Composition Outcomes

Outcome	Education (Pre)	Education (Post)	Control (Pre)	Control (Post)	p (group effect)
Body Fat (%)	19.6 (4.1)	17.2 (3.8)	19.4 (4.3)	19.2 (4.4)	0.004
Lean Mass (kg)	44.2 (6.7)	45.8 (6.9)	44.5 (6.2)	44.6 (6.4)	0.02
BMI (kg/m²)	21.8 (2.3)	21.7 (2.2)	21.7 (2.4)	21.8 (2.3)	0.61

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Interpretation of Table 3: Body Composition Outcomes

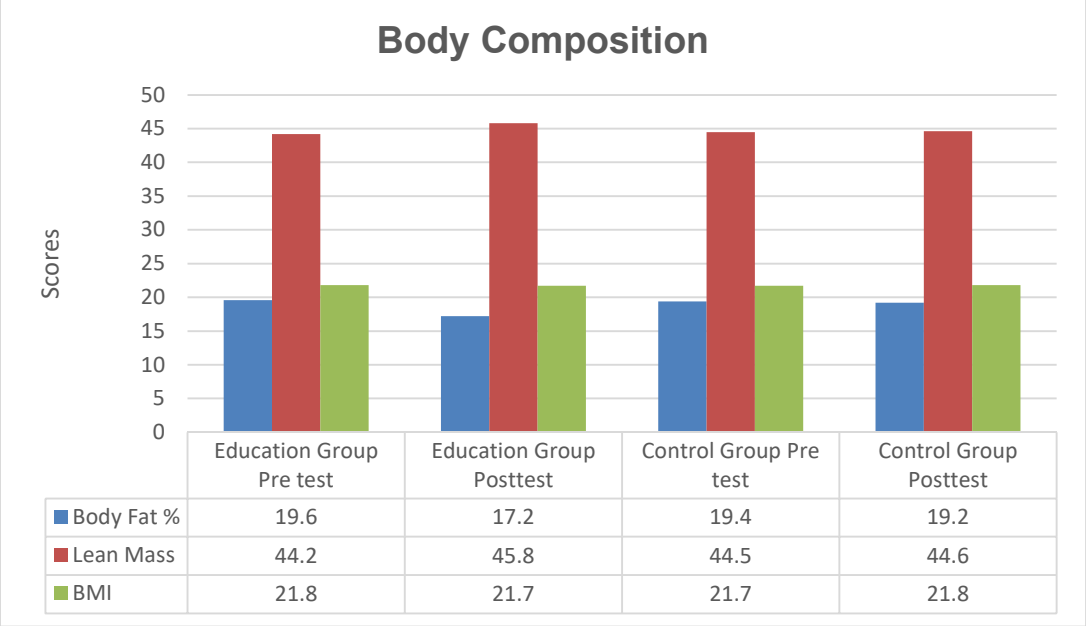
Table 3 presents changes in body composition outcomes for the Education and Control groups from pre- to post-intervention. Significant group effects were observed for body fat percentage and lean mass, while no significant difference was found for BMI.

Specifically, participants in the Education group exhibited a significant reduction in body fat percentage, decreasing from a mean of 19.6% (SD = 4.1) at baseline to 17.2% (SD = 3.8) post-intervention. In contrast, the Control group showed only a minimal decrease (from M = 19.4%, SD = 4.3 to M = 19.2%, SD = 4.4), with a significant group effect ($p = .004$).

Lean mass increased in the Education group, from 44.2 kg (SD = 6.7) pre-intervention to 45.8 kg (SD = 6.9) post-intervention. The Control group showed virtually no change in lean mass (M = 44.5 kg, SD = 6.2 pre; M = 44.6 kg, SD = 6.4 post), and the group effect was statistically significant ($p = .02$).

BMI remained stable in both groups over the course of the intervention (Education group: M = 21.8, SD = 2.3 pre; M = 21.7, SD = 2.2 post; Control group: M = 21.7, SD = 2.4 pre; M = 21.8, SD = 2.3 post), with no significant group effect ($p = .61$).

Overall, these findings suggest that the educational intervention led to favorable changes in body composition, specifically reducing body fat percentage and increasing lean mass, without significantly affecting BMI compared to the control group.



	Education Group Pre test	Education Group Posttest	Control Group Pre test	Control Group Posttest
Body Fat %	19.6	17.2	19.4	19.2
Lean Mass	44.2	45.8	44.5	44.6
BMI	21.8	21.7	21.7	21.8

Figure 2: Bar Graph Showing Body Composition: Pretest and Posttest Mean Scores.

3.5 Nutrition Knowledge

The education group showed a significant increase in nutrition knowledge scores (mean improvement: +4.2 points, $p < .001$), while no change was observed in the control group.

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4. Interpretation

The 10-week nutrition education program resulted in significant improvements in dietary habits, including increased fruit, vegetable, and whole grain intake, and reduced consumption of sugary snacks and beverages. These behavioral changes were accompanied by a significant reduction in body fat percentage and an increase in lean mass, indicating favorable changes in body composition. The absence of significant BMI changes suggests that improvements were primarily due to compositional shifts rather than weight loss.

5. Discussion

5.1 Main Findings in Context

This study demonstrates that structured nutrition education can effectively improve both dietary behaviors and body composition in adolescent athletes. The findings are consistent with previous research indicating that nutrition education enhances knowledge, attitudes, and eating patterns among youth (Contento et al., 2016; Hoelscher et al., 2010). Notably, the observed reduction in body fat percentage and increase in lean mass are particularly relevant for athletic performance and health.

5.2 Mechanisms

The improvements in body composition are likely mediated by healthier food choices, reduced intake of energy-dense, nutrient-poor foods, and increased consumption of nutrient-dense foods that support muscle growth and recovery. Enhanced nutrition knowledge and practical skills likely contributed to sustained behavior change.

5.3 Practical and Policy Implications

1. **Sports Programs:** Incorporating nutrition education into youth sports curricula can optimize athlete development and performance.
2. **Schools:** School-based interventions can reach a large number of adolescents and reinforce healthy habits.
3. **Policy:** Policymakers should support the integration of evidence-based nutrition education in sports and educational settings.

5.4 Strengths and Limitations

Strengths:

a) Quasi-experimental design with control group

b) Use of validated assessment tools

c) High program adherence and participant satisfaction

Limitations:

a) Non-randomized group assignment may introduce selection bias

b) Short intervention and follow-up period; long-term sustainability unknown

c) Reliance on self-reported dietary data

5.5 Future Directions

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Future studies should:

a) Employ randomized controlled designs

b) Assess long-term maintenance of dietary and body composition changes

c) Explore the impact of parental involvement and digital education tools

6. Conclusion

A 10-week nutrition education program significantly improved dietary habits and body composition among adolescent athletes. These results support the integration of nutrition education into youth athlete development programs to promote health and optimize performance.

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