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The Effectiveness of Audiovisual-Based Education on Balanced Nutrition Knowledge and Hydration Management Among Youth Soccer Athletes

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A B S T R A C T

Balanced nutrition and fluid intake are essential for optimizing athletic performance and recovery in youth soccer players. This study evaluated the effectiveness of an audiovisual-based sports nutrition educational intervention in improve understanding of nutrition and fluid regulation across a youth soccer ecosystem. A pre-posttest design involved 54 participants at the Batu Football Academy, including 25 youth athletes, 24 parents, and 5 coaches. The education combined interactive presentations and video instruments on the four pillars of balanced nutrition and rehydration management. Knowledge was evaluated using validated questionnaires and analyzed with a paired t-test. Result showed significant increase in knowledge scores across all three groups post-intervention ($p < 0.001$). Audiovisual-based nutrition education effectively improves the knowledge of the youth soccer support system and promotes nutrition-conscious behaviors to optimize athletic performance.

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INTRODUCTION

The achievements of national youth soccer fluctuate dynamically within the international competitive landscape. Optimal athletic performance relies not only on technical proficiency and psychological resilience but also on adequate physiological preparedness, highlighting the essential role of proper sports nutrition. Nutritional intake should follow the principles of balanced nutrition by ensuring appropriate proportions of macronutrients and micronutrients while incorporating sufficient hydration strategies to maintain endurance and minimize the risk of dehydration during training and competition (Irianto, 2007; Kementerian Kesehatan RI, 2013). For young athletes, balanced nutrition is particularly important as it supports not only the physiological demands of muscular activity but also healthy growth, development, and post-exercise recovery (Majba, 2021).

Nevertheless, evidence from the field indicates persistent deficiencies in nutritional knowledge among youth soccer players. Most adolescent athletes do not follow adequate dietary practices due to insufficient nutrition-related information and limited ability to identify foods that support optimal physiological function. In addition, many develop voluntary dehydration, characterized by inadequate fluid intake during training sessions despite the availability of drinking water (Santos-Sánchez et al., 2025). Pre-training hypohydration is remarkably common in youth soccer academies worldwide, ranging between 60% an 80% of the total athlete population (Dieny, 2015; Santos-Sánchez et al., 2025). From a physiological perspective, a body fluid deficit exceeding 2% of body weight triggers increased cardiovascular stress, accelerates muscle glycogen fatigue, and compromises cognitive functions required for effective tactical decision-making during play (Adan, 2012; Putrianasari & Rahmawati, 2024).

Based on an initial situation analysis of the community engagement partner, the Batu Football Academy (BAFA), several alarming anomalies regarding nutritional status and clinical metabolic manifestations were identified:

a. Approximately 10% of the athletes fell into the undernourished (underweight) category, while 3% experienced overnutrition (overweight).
b. Clinical assesment indicated that 16.67% of the athletes were diagnosed with anemia, wheares 83.33% showed indications of hyperuricemia.
c. Analysis of dietary intake demonstrated marked imbalances in macronutrient consumption. Aproximately 20% of the athletes experienced an energy deficit, while 30% had an excess. Excessive protein intake was the most prevalent finding, affecting 87% of the athletes and reaching 186% of the recommended intake, followed by excessive carbohydrate (27%) and fat (13%) consumption. This gap reflects the poor distribution of nutritional intake commonly found in school-aged academy athletes (Majba, 2021).
d. Hydration assessment revealed that most athletes experienced chronic fluid deficits, which were associated with frequent consumption of sugar-sweetened packaged beverages, such as bottled sweet tea and other ready-

to-drink beverages, as well as inadequate rehydration practices during training sessions.

Novelty of the Engagement Approach

Most sports nutrition educational interventions targeted athletes partially. In reality, the dietary behavior of adolescent athletes is heavily influenced by their micro-ecosystem, namely parents as food providers at home and coaches as activity regulators on the field. Therefore, this community engagement program offers an original approach via a Tri-Centric Intervention (Athletes, Parents, and Coaches). By aligning knowledge among these three pillars using interactive audiovisual media, the program establishes a robust support system to break the cycle of malnutrition and chronic dehydration among young athletes at BAFA.

IMPLEMENTATION AND METHODS

Design and Participants

This community engagement intervention employed a one-group pre-post-test experimental design. The activities were conducted at the homebase sports facility of the Batu Football Academy (BAFA) by an engagement team from the Faculty of Medicine, Universitas Negeri Malang, possessing linear competence in sports nutrition and human physiology. A total of 54 participants actively participated, consisting of 25 adolescent athletes, 24 parents, and 5 BAFA coaches.

Intervention Procedure

The implementation workflow was systematically arranged within a 100-minute duration using the following chronological stages:

[Registration & Climate Building] → [Pre-test (Initial Cognitive Questionnaire)]

↓

[Core Intervention I: Four Pillars of Balanced Nutrition & Video Screening I]

↓

[Core Intervention II: Fluid Physiology & Rehydration Timing & Video Screening II]

↓

[Post-test (Memory Retention Evaluation)] → [Interactive Discussion, Q&A & Closing]

The core materials were delivered by senior academics in sports nutrition. The delivery combined interactive presentation strategies (PowerPoint) and structured educational video screenings designed to facilitate visual and auditory memory retention among participants.

Data Collection and Analysis

Knowledge levels were measured using validated structured questionnaires. The questionnaires were tailored to the capacity of each group: basic hydration knowledge for athletes, kitchen management and food selection for parents, and field water break regulations for coaches. Data normality was tested using the Shapiro-Wilk test (since $n < 50$ per group) and analyzed using the paired t-test with a 95% confidence level ($a = 0.05$).

RESULTS AND DISCUSSION

The intervention proceeded smoothly, characterized by high participation and enthusiasm across the entire BAFA ecosystem**.** *Quantitative evaluation of the effectiveness of this* audiovisual-based educational program demonstrated significant improvements in all target groups. The statistical data are disaggregated and **presented in Table 1:**

Table 1. Comparative Analysis of BAFA Ecosystem Knowledge Scores Before and After Intervention (n=54)

Target Group	Pre-test Mean ± SD	Post-test Mean ± SD	Gain Score	*p*-value	Significance Status
Youth Athletes (n = 25)	56.67 ± 18.33	75.24 ± 14.70	18.57	< 0.001	Highly Significant
Parents (n = 24)	62.50 ± 12.40	84.10 ± 9.15	21.60	< 0.001	Highly Significant
Coaches (n = 5)	68.00 ± 10.50	92.00 ± 5.30	24.00	< 0.001	Highly Significant

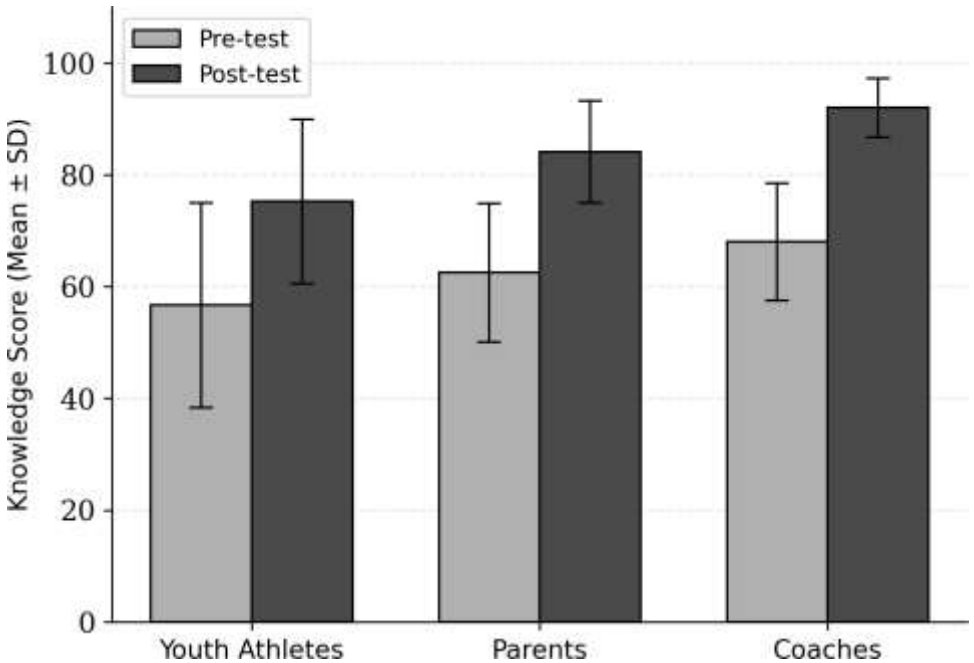

Figure 1. Comparison of Pre-test and Post-test Knowledge Scores Across the BAFA Tri-Centric Ecosystem (Mean ± SD)

The highly significant increase in mean knowledge scores across the three target groups ($p < 0.001$) empirically confirms that an audiovisual-based educational approach is highly effective in transferring information into short-term memory. In terms of educational psychology and neurophysiology, dynamic visualization (video) simultaneously stimulates auditory and visual sensory pathways. The simultaneous activation of auditory and visual pathways enhances learners' understanding of abstract concepts, including fluid regulation, water metabolism, the impact of hypohydration on motor coordination, and the role of balanced macronutrient intake, more effectively than traditional lecture-based instruction.

The uniqueness and strength of this engagement program lie in the tri-centric data analysis results:

1. Youth Athlete Group:
   Experienced an average increase of 18.57 points. This improvement is crucial because an understanding of sports nutrition serves as the primary predictive factor (pioneer step) underlying the formation of independent fluid consumption behaviors and food choices on the field (Buntarian et al., 2021). When athletes comprehend dehydration signs (such as dark urine color), they become more proactive in rehydrating without waiting for instructions (Putrianasari & Rahmawati, 2024; Sunarya, 2025).
2. Parent Group:
   Registered a sharp cognitive increase of 21.60 points. Parents act as the primary gatekeepers (filters and providers) of food at home. Equipping parents with balanced nutrition knowledge helps curb dietary anomalies, such as the extreme protein excess (87% of athletes experienced excessive protein intake) that directly contributed to the clinical hyperuricemia observed in BAFA young athletes (Majba, 2021).
3. Coach Group:
   Recorded the highest final score of 92.00 ± 5.30. On the field, coaches hold full control over hydration management by designing training schemes and scheduling water breaks. Well-educated coaches ensure that their athletes do not experience voluntary dehydration during intensive training sessions (Santos-Sánchez et al., 2025).

The robust cognitive synergy among these three pillars of the supporting ecosystem ensures that the post-intervention maintenance phase runs consistently (Buntarian *et al.,* 2021). This education not only enhances individual knowledge but also creates an environmental climate conducive to sustainable nutritional status improvement.

Figure 2. Documentation of the Activity Implementation

CONCLUSIONS AND RECOMMENDATIONS

The audiovisual-based nutrition and hydration educational intervention proved significantly effective in transforming the cognitive capacity of the tri-centric support ecosystem at the Batu Football Academy (BAFA). The balanced improvement in understanding among athletes, parents, and coaches serves as a vital modality to break the cycle of macronutrient disproportion and suppress the risk of chronic dehydration on the field. This ecosystem synergy is expected to habitualize daily nutrition-conscious behaviors consistently to support healthy physical growth alongside optimal athletic performance in the future.

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