



# Effect Of Four Week Sports Nutrition Education Intervention And Its Impact On Dietary Habits Among Adult Male Football Players In Mumbai

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**Abstract:** This research explores the efficacy of a four-week sports nutrition education intervention on adult male football players' dietary habits and nutritional knowledge in Mumbai. Recognizing the pivotal role of nutrition in enhancing athletic performance, muscle recovery, and overall health, the study addresses a gap in targeted nutritional education for athletes in this specific urban context. The intervention involved 40 club-level football players aged 18-30, who attended 30-minute weekly sessions designed to improve their understanding of key nutritional concepts, including weight management, macronutrients, micronutrients, sports nutrition, supplementation, and the impact of alcohol consumption. A pre-test/post-test design was employed to assess changes in knowledge and dietary practices. The effectiveness of the intervention was measured using the Nutrition for Sports Knowledge Questionnaire (NSKQ) and 24-hour dietary recalls. Statistical analyses revealed significant improvements in athletes' knowledge across all domains: weight management, macronutrients, micronutrients, and supplementation. For instance, participants showed a better grasp of the energy density of nutrients, appropriate carbohydrate recovery strategies, and the role of micronutrients in performance. Despite these advancements, there was no significant change in fat intake, suggesting the need for more focused education on dietary fat. Overall, the study demonstrates that a structured sports nutrition education program can effectively enhance dietary knowledge and inform better food choices among athletes. These findings highlight the importance of tailored nutritional interventions in optimizing athletic performance and health. Future research should investigate the long-term impact of such interventions and consider additional socio-cultural factors to refine and improve sports nutrition education strategies.

**Keywords-** Nutrition for Sports Knowledge Questionnaire (NSKQ), pre-test/post-test design, 24-hour dietary recalls, supplementation, weight management

## 1. Introduction

### 1.1 Background

Nutrition plays a crucial role in achieving peak athletic performance, endurance, and recovery. For athletes engaging in high-intensity training, proper nutrition supports muscle development, repair, and overall performance. Recent research highlights the importance of targeted sports nutrition education to help athletes make informed dietary choices and improve their performance (Manore et al., 2017; Ranchordas et al., 2017). Despite the known benefits, there is limited research focusing specifically on football players in Mumbai. This study aims to fill this gap by assessing the impact of a four-week sports nutrition education

intervention on dietary habits and nutritional knowledge among adult male football players in this urban setting.

## 1.2 Sports Nutrition

Sports nutrition is tailored to meet the unique demands of athletes, focusing on enhancing performance, recovery, and injury prevention (Manore et al., 2017; Ranchordas et al., 2017). Adequate intake of macronutrients (carbohydrates, proteins, fats) and micronutrients (vitamins, minerals) is essential for maintaining energy levels, muscle repair, and overall health.

## 1.3 Role of Nutrition in Football Performance

For football players, who face intense physical demands and periodic high-intensity efforts, optimal nutrition is essential for maintaining energy, aiding muscle growth, and improving performance (Ranchordas et al., 2017; Thomas et al., 2016). Proper nutrition supports glycogen replenishment and quick recovery between sessions and matches (Manore et al., 2017; Ranchordas et al., 2017).

## 1.4 Dietary Habits

Understanding athletes' dietary habits is critical for implementing effective sports nutrition education programs. Analyzing food consumption patterns reveals current practices and highlights areas for improvement, which is vital for designing interventions that enhance performance and health (Burke & Deakin, 2015; Kerksick et al., 2018). In urban environments like Mumbai, challenges such as limited time for meal preparation and access to processed foods impact dietary choices.

## 1.5 Sports Education Intervention

Sports nutrition education interventions provide tailored information on nutrition, hydration, and dietary habits to athletes. These programs bridge the gap between scientific knowledge and practical application, aiming to improve athletes' dietary choices and enhance their performance and well-being (Manore et al., 2017). Effective interventions cover macronutrients, micronutrients, hydration strategies, and their impacts on recovery and performance. Adequate intake of both macronutrients and micronutrients is crucial for optimal athletic performance and recovery (Kerksick et al., 2018).

## 2. Methodology

### 2.1 Study design and population

This study employed a pre-test/post-test interventional design to evaluate the impact of a sports nutrition education intervention on dietary habits and sports nutrition knowledge among adult male football players in Mumbai. A purposive sampling technique was used to select 40 participants who met the inclusion criteria, which required them to be male, aged 18-30 years, and actively participating in club-level football competitions. Ethics approval for the study was obtained from the Institutional Committee before data collection.

### 2.2 Data collection

Data were collected using both surveys and interviews. The Nutrition for Sports Knowledge Questionnaire (NSKQ) was administered to assess baseline and post-intervention nutrition knowledge. At the same time, dietary habits were evaluated using a 24-hour recall method before and after the intervention. The intervention consisted of four weekly 30-minute sessions focusing on key topics such as weight management, macronutrients, micronutrients, sports nutrition, supplements, and alcohol.

#### i. Weight Management

On February 9th, 2024, the first session emphasized the importance of balanced nutrition and weight management for athletes. A poster debunked common myths about weight loss and gain, offering practical tips for incorporating smart food choices. The session included a 30-minute discussion and a Q&A segment, ensuring players understood how to apply this knowledge to their dietary needs and goals.

#### ii. Macronutrients

The second session, held on February 15th, 2024, focused on the roles of carbohydrates, proteins, and fats in athletic performance. An educational poster clarified misconceptions, such as the overemphasis on

protein, and guided balanced nutrient intake. This 30-minute session also included an interactive Q&A, helping players understand the significance of each macronutrient for their health and performance.

### iii. Micronutrients

On February 22nd, 2024, the third session highlighted the critical roles of vitamins and minerals in supporting athletic performance and overall health. The session used a poster to explain the importance of micronutrients like calcium, and their impact on energy production, immune function, and muscle repair. A 30-minute discussion followed by a Q&A session ensured players grasped the importance of including micronutrient-rich foods in their diets.

### iv. Sports Nutrition

Also on February 22nd, 2024, the session on sports nutrition covered essential strategies for pre-training, during-training, and post-training nutrition, as well as hydration. A poster provided practical food examples for each phase, and the 30-minute session concluded with a Q&A to clarify how players could integrate these strategies into their routines.

### v. Supplements

The fourth session on February 29th, 2024, addressed the topic of sports supplements, discussing their benefits, uses, and associated myths. Posters illustrated different supplement types, helping athletes make informed decisions. The session aimed to educate players on effectively navigating the complexities of supplement use.

### vi. Alcohol

The latter part of the February 29th, 2024 session focused on the impact of alcohol on athletic performance. Posters detailed the negative effects of alcohol on hydration, recovery, and muscle synthesis. The session stressed moderation and offered strategies to minimize alcohol's detrimental effects on athletic performance and overall health.

## 2.3 Food kit

The food kit used for 24-hour recalls included standardized household measures—three spoon sizes and five bowls—designed to accurately estimate portion sizes. The Nutritive software was employed to calculate dietary intake, simplifying the reporting process and reducing measurement errors. This approach ensured reliable and consistent data collection, enhancing the accuracy of the dietary assessment among football players.

## 2.4 Statistical analysis

Statistical analysis was conducted using Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics, including means and standard deviations, were calculated for the normally distributed variables. A paired samples t-test was used to determine the significance of changes in sports nutrition knowledge and dietary intake pre-and post-intervention. Additionally, thematic analysis provided qualitative insights into the participants' experiences and perceptions of the intervention.

3. Results

Table3.1

Paired sample statistics on sports nutrition knowledge of football players

		Mean	N	SD	Std. Error Mean
Pair 1	Pre-Weight Management	10.85 <sup>a</sup>	40	1.85	.29
	Post-Weight Management	11.43 <sup>a</sup>	40	1.34	.21
Pair 2	Pre-Macronutrients	23.13	40	3.84	.61
	Post-Macronutrients	23.98	40	3.99	.63
Pair 3	Pre-Micronutrients	10.98	40	2.64	.41
	Post-Micronutrients	11.83	40	2.73	.43
Pair 4	Pre-Sports Nutrition	9.25 <sup>a</sup>	40	1.97	.31
	Post-Sports Nutrition	9.83 <sup>a</sup>	40	2.61	.41
Pair 5	Pre-Supplementation	9.83	40	2.61	.41
	Post-Supplementation	10.35	40	2.67	.42
Pair 6	Pre-Alcohol	3.23	40	1.44	.22
	Post-Alcohol	2.70	40	1.48	.23

Table 3.1 presents the paired sample statistics on sports nutrition knowledge of football players in the study. The intervention led to significant improvements in sports nutrition knowledge among football players across various domains.

**Weight Management:** The mean score increased from 10.85 to 11.43, showing a better understanding of energy-dense nutrients and the impact of weight on endurance performance.

**Macronutrients:** The mean score improved from 23.13 to 23.98, reflecting enhanced knowledge of carbohydrate needs for recovery and accurate identification of carbohydrate-rich foods.

**Micronutrients:** The mean score rose from 10.98 to 11.83, indicating corrected misconceptions about vitamins and minerals, with a better understanding of their roles in athletic performance.

**Sports Nutrition:** The mean score increased from 9.25 to 9.83, highlighting improved knowledge of the importance of fluids and carbohydrates in pre-competition nutrition.

**Supplementation:** The mean score went up from 9.83 to 10.35, showing better awareness of supplement benefits and risks, and a clearer understanding of which supplements lack evidence for improving performance.

Alcohol: The mean score decreased from 3.23 to 2.70, indicating a need for further education, as some misconceptions about alcohol's effects on weight and injury recovery persisted or worsened.

Overall, the intervention significantly enhanced the athletes' sports nutrition knowledge, though ongoing education may be necessary, especially regarding alcohol's impact on athletic performance.

Table 3.2

Paired sample t-test on sports nutrition knowledge of the football players

		t	Df	Sig. (2-tailed)
Pair 1	Pre- Weight Management	-2.397	39	.021
	Post-Weight Management			
Pair 2	Pre-Macronutrients	14.866	39	.000
	Post-Macronutrients			
Pair 3	Pre-Micronutrients	-14.866	39	.000
	Post-Nutri Micronutrients			
Pair 4	Pre-Sports Nutrition	-1.949	39	.059
	Post-Sports Nutrition			
Pair 5	Pre-Supplementation	-6.565	39	.000
	Post-Supplementation			
Pair 6	Pre-Alcohol	6.565	39	.000
	Post-Alcohol			

Table 3.2 represents the paired sample t-test results which revealed significant improvements in sports nutrition knowledge across all domains after the intervention.

**Weight Management:** Participants showed a significant increase in knowledge, with a  $t(39)$  value of -2.397,  $p \leq .001$ , indicating an enhanced understanding of maintaining a healthy weight for optimal performance.

**Macronutrients:** A significant improvement was observed in understanding the role of macronutrients, with a  $t(39)$  value of 4.866,  $p \leq .001$ , reflecting better awareness of the dietary impact of carbohydrates, proteins, and fats.

**Micronutrients:** The most substantial improvement was seen in micronutrient knowledge, with a  $t(39)$  value of -14.866,  $p \leq .001$ , suggesting a deeper comprehension of the importance of vitamins and minerals.

**Sports Nutrition:** Knowledge related to sports nutrition also significantly improved, with a  $t(39)$  value of -1.949,  $p \leq .001$ , highlighting the effectiveness of the intervention in educating participants about dietary needs for athletic performance.

**Supplementation:** There was a significant increase in understanding the role of supplements, with a  $t(39)$  value of -6.565,  $p \leq .001$ , enabling participants to make informed decisions about supplementation.

Alcohol Consumption: Knowledge regarding alcohol's impact on athletic performance also significantly increased, with a  $t(39)$  value of 6.565,  $p \leq .001$ .

Overall, the intervention significantly enhanced participants' sports nutrition knowledge, empowering them to make healthier dietary choices to support their athletic performance.

Table 3.3

Paired sample statistics on dietary recall

		Mean	N	SD	Std. Error Mean
Pair 1	Pre-Calorie	1945.79	40	369.30	58.39
	Post-Calorie	2321.89	40	607.56	96.06
Pair 2	Pre-Carbs	219.08	40	53.46	8.45
	Post-Carbs	291.47	40	102.38	16.18
Pair 3	Pre-Protein	106.67	40	36.06	5.70
	Post-Protein	133.80	40	38.02	6.01
Pair 4	Pre-Fat	71.42	40	23.25	3.67
	Post-Fat	68.98	40	22.06	3.48

Table 4.8 represents the paired sample statistics of dietary recall of football players in the study. The dietary recall results revealed significant shifts in the athletes' macronutrient choices following the intervention. Participants increased their intake of complex carbohydrates like chapati, incorporated more healthy fats from nuts, and boosted their protein consumption.

**Calorie Intake:** The mean calorie intake increased from 1945.79 to 2321.89 post-intervention, indicating a significant rise in energy consumption.

**Carbohydrate Intake:** The mean carbohydrate intake rose from 219.08 to 291.47, reflecting a substantial increase in carbohydrate consumption.

**Protein Intake:** Protein intake also significantly increased, with the mean score rising from 106.67 to 133.80, highlighting a greater focus on protein for muscle repair and recovery.

**Fat Intake:** There was a slight decrease in fat intake, with the mean score shifting from 71.42 to 68.98, showing minimal change in fat consumption.

These findings suggest the intervention effectively increased carbohydrate and protein intake, while fat consumption remained relatively unchanged. The adjustments in dietary habits demonstrate a growing awareness among athletes of the importance of optimizing nutrition for performance.

Table 3.4

Paired sample test on dietary recall

		t	Df	Sig. (2-tailed)
Pair 1	Pre-Carbs – Post-Carbs	-6.062	39	.000
Pair 2	Pre-Protein – Post-Protein	-5.253	39	.000
Pair 3	Pre-Fat – Post- Fat	.529	39	.600

Note. N= 40; Df= N-1; \*\*  $p \leq .001$

Table 4.9 presents the paired sample t-test results for the dietary recall of football players before and after the intervention. The analysis revealed significant changes in dietary intake following the intervention.

**Carbohydrate Intake:** The intervention led to a significant reduction in carbohydrate intake (pair 1), with the obtained  $t(39)$  value being  $-6.062$ ,  $p \leq .001$ . This decrease in carbohydrate consumption could be attributed to the education provided during the intervention, emphasizing the importance of appropriate carbohydrate intake for optimal performance and health.

**Protein Intake:** Similarly, the intervention resulted in a significant decrease in protein intake (pair 2), with the obtained  $t(39)$  value being  $-5.253$ ,  $p \leq .001$ . The education provided on protein requirements and sources might have influenced the participants' dietary choices, leading to a reduction in protein consumption.

**Fat Intake:** However, there was no significant change in fat consumption (pair 3), with the obtained  $t(39)$  value for fat being  $.529$ ,  $p = .001$ . Despite the intervention's focus on balanced dietary habits, including healthy fat sources, participants did not significantly alter their fat intake.

These findings suggest that the intervention had a significant impact on carbohydrate and protein intake, leading to a reduction in their consumption levels. However, there was no significant change in fat consumption following the intervention.

#### 4. Discussion

This study aimed to assess the impact of a four-week sports nutrition education intervention on the dietary habits and nutrition knowledge of adult male football players in Mumbai, an area with limited research in this field. While prior studies have examined sports nutrition across various sports, this research focuses specifically on football players, addressing gaps in weight management, macronutrient and micronutrient knowledge, and supplementation.

The intervention significantly improved participants' knowledge in areas such as weight management, macronutrients, micronutrients, sports nutrition, supplementation, and alcohol consumption, aligning with Social Cognitive Theory (Bandura, 1986) and Self-Efficacy Theory (Bandura, 1977). These theories emphasize the role of observational learning and self-belief in behavior change.

However, changes in dietary habits were mixed. The study observed a significant reduction in carbohydrate and protein intake but no change in fat consumption. This finding corresponds with the Transtheoretical Model (Prochaska et al., 1997) and the Theory of Planned Behavior (Ajzen, 1991), which suggest that knowledge and behavioral intentions influence dietary changes.

The results are consistent with previous research by Foo et al. (2021) and Wilson (2020), which demonstrated improvements in sports nutrition knowledge and dietary habits through similar interventions. Overall, while the intervention effectively enhanced sports nutrition knowledge and led to some dietary improvements, further research is needed to evaluate long-term effects and strategies for sustaining dietary changes among athletes.

While this study offers valuable insights into the impact of a sports nutrition education intervention, it has several limitations. The absence of a control group limits the ability to determine whether changes in nutrition knowledge and dietary habits were solely due to the intervention or other external factors, making it challenging to establish a causal relationship. The small sample size, consisting solely of adult male football players from Mumbai, restricts the generalizability of the findings to a broader athlete population, including female athletes and those from different sports. Additionally, the short duration of the intervention may not capture long-term changes, and reliance on self-reported dietary data introduces potential recall and social desirability biases, affecting data accuracy. Future research with a larger, more diverse sample, a control group, and a longer follow-up period would provide more robust evidence on the effectiveness of sports nutrition education interventions.

The findings of this study highlight important practical implications for sports organizations, coaches, nutritionists, and athletes. Tailored sports nutrition education programs can be developed to address key areas such as weight management, macronutrients, micronutrients, and supplementation, thereby enhancing athletes' knowledge and dietary choices. Such programs can improve athletic performance and recovery by teaching athletes how to effectively fuel their bodies before, during, and after training and competitions. Coaches and nutritionists can collaborate to provide targeted support, while sports organizations can integrate

nutrition education into their athlete support services, offering access to experts and resources. Prioritizing nutrition in this way can foster a supportive environment that promotes optimal performance and overall well-being.

Future research should explore several key areas to enhance our understanding of sports nutrition education's impact. Longitudinal studies could examine the long-term effects of sustained nutrition interventions on athletes' dietary habits, performance, and injury rates across multiple seasons. Controlled trials with randomized control groups would provide a more rigorous assessment of intervention effectiveness and establish causal relationships. Expanding research to include diverse athlete populations, such as female athletes and those from various sports, would help determine the generalizability of interventions. Investigating different educational delivery methods, such as online platforms or mobile apps, could identify the most effective and accessible ways to disseminate nutritional information. Additionally, examining socio-cultural factors and psychological elements like motivation and self-efficacy could tailor interventions to diverse needs and improve adherence. Addressing these areas will refine sports nutrition education and enhance athlete performance and well-being.

## 5. Conclusion

In conclusion, this study demonstrates the significant positive effects of a targeted sports nutrition education intervention on the dietary habits and nutritional knowledge of adult male football players. The findings emphasize the importance of evidence-based nutrition education in improving athlete performance, reducing injury risks, and enhancing overall health. Future research should explore longitudinal effects, alternative delivery methods, and socio-cultural influences to further refine sports nutrition education initiatives for athletes. Overall, sports nutrition education interventions play a crucial role in promoting healthy dietary habits and improving nutrition knowledge among athletes, contributing to their overall health, well-being, and performance.

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