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Enhancing nutritional knowledge and practices: The impact of nutrition education on iron and calcium consumption among cricket players

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ABSTRACT

Background Problems: This study emphasises the critical importance of maintaining a balanced intake of nutrients relative to individual needs, as deficiencies or excesses can significantly impact health and nutritional status. Among these essential nutrients are iron and calcium. **Research Objectives**: The aim of this research is to assess the impact of nutrition education on the knowledge and dietary practices related to iron and calcium among athletes. **Methods**: The research used a pre-experimental design with a one-group pretest-posttest. To evaluate the effect of the intervention, the subjects were given a pretest, nutrition education, and posttest. The study was conducted on a total of 30 cricket players from the Special Capital Region of Jakarta over a period of 1 month, with a frequency of 4 intervention meetings, each session lasting 60 minutes. Data analysis was performed using an independent t-test. The participants in this research were cricket players from Jakarta. **Findings and Results**: The results indicated that nutrition education significantly improved athletes' nutritional knowledge (p-value 0.000) and dietary practices (p-value 0.011). **Conclusion**: This research demonstrates the effectiveness of targeted nutrition education interventions in enhancing athletes' knowledge and adoption of healthier dietary practices, particularly concerning iron and calcium consumption. These findings contribute valuable insights to the field of sports nutrition, emphasising the importance of well-designed educational programs in promoting good nutritional behaviour and supporting overall health and performance in athletes. This study underscores the critical role of nutrition education in the advancement of both the scientific understanding and practical application of sports nutrition.

Keywords: Nutrition education; nutrition knowledge; dietary practice; athletes

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INTRODUCTION

Nutrition plays a vital role in optimising athletic performance, with adequate nutrient intake being crucial for athletes (Smith et al., 2015; Varillas Delgado et al., 2020). In Indonesia, which has diverse dietary practices

and significant variation in nutrient intake, understanding the impact of tailored nutrition education on athletes is extremely important. Although the benefits of iron and calcium for athletic performance have been widely discussed, there is still a lack of research on how targeted education can influence the consumption of these nutrients among Indonesian athletes.

Iron is essential for energy metabolism, oxygen transport, and overall acid-base balance, which are vital for optimal athletic performance (Hinton, 2014). It is also a key component of haemoglobin, which aids in the binding and distribution of oxygen throughout the body (Mairbäurl, 2013). However, many athletes in Indonesia face issues with iron deficiency, which affects their overall performance and health (Nurdini & Probosari, 2017). The high prevalence of iron deficiency anaemia among athletes highlights the need for effective educational interventions (Heffernan et al., 2019). A study by Nuryani (2018) indicates that calcium deficiency is also common among adolescents and young adults in Indonesia. Therefore, this study aims to address these deficiencies by exploring how nutrition education can enhance iron intake and improve health outcomes.

Another crucial nutrient is calcium, which is vital for bone health, enzyme activity, and muscle function (Beto, 2015; Ghazzawi et al., 2023). In young athletes, adequate calcium intake is positively associated with bone mineralisation, which is essential for preventing injuries and optimising performance (Liberato et al., 2013). Despite this, research on how nutrition education affects calcium intake among young athletes in Indonesia is limited. Calcium deficiency remains common, and this study will provide insights into how targeted education can address this issue and improve calcium consumption (Yusni et al., 2017).

Although the roles of iron and calcium have been recognised, deficiencies remain a problem among Indonesian athletes, with many failing to meet their daily nutritional needs (Assyifa & Riyadi, 2023). This study aims to investigate the impact of nutrition education on athletes' knowledge and dietary practices regarding iron and calcium consumption. By focussing on the specific nutritional challenges faced by Indonesian athletes, this research not only contributes to the theoretical understanding of nutrition education but also provides practical guidance for developing effective programs tailored to local needs. The innovative aspect of this study lies in its unique methodological approach and specific focus on the outcomes of tailored nutrition education interventions. Through this approach, we hope to identify strategies that can improve the health and performance of athletes in Indonesia.

METHOD

The study employed a pre-experimental design with a one-group pretest-posttest approach. The study used a pre-experimental design with a one-group pretest-posttest approach based on the research objective to determine the effectiveness of nutrition education in improving participants' knowledge and consumption practice. Additionally, this design is relatively effective for assessing the direct impact of the given intervention. The design also aimed to assess changes in nutrition knowledge and dietary practices regarding iron and calcium consumption before and after a nutrition education intervention. Participants in this study were 30 cricket players from the Special Capital Region of Jakarta, selected based on relevant inclusion criteria, including their active participation in cricket and willingness to engage in the study.

The inclusion criteria for the sample in this study are cricket athletes in the Special Capital Region of Jakarta who are active and willing to participate in the study. This study used pretest and posttest assessments to measure participants' knowledge and dietary practices related to iron and calcium. These instruments were developed or adapted specifically for this study. First, the participants took pretest questionnaires, after which they received an intervention in the form of nutrition education delivered directly by the researcher using lecture techniques and the distribution of leaflets periodically for 4 weeks, with each session lasting 60 minutes. After completing the 4-week intervention, the participants then took posttest questionnaires. The schematic procedure of this study is shown by the following flowchart.

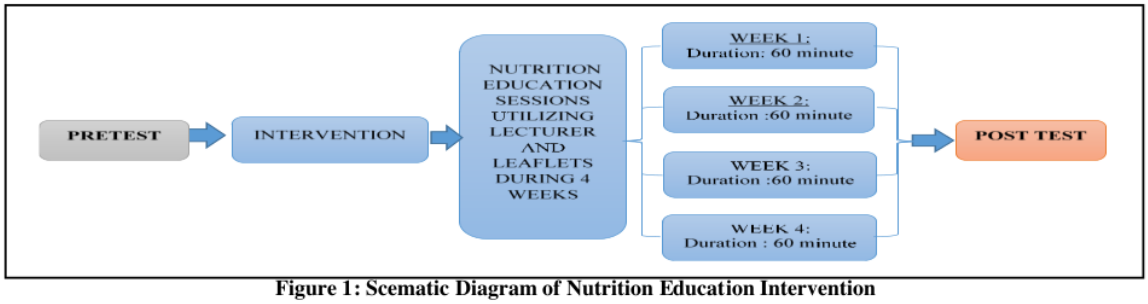

Figure 1: Scematic Diagram of Nutrition Education Intervention

The pretest and posttest assessments were developed or adapted specifically for this study to ensure they accurately measured participants' knowledge and dietary practices related to iron and calcium. The independent t-tests were used to determine the statistical significance of changes in the participants' knowledge and dietary practices, providing a robust analysis of the intervention's effectiveness.

RESULTS AND DISCUSSION

The Effect of Nutrition Education on Nutritional Knowledge about Food Sources of Iron and Calcium

Table 1 summarises the changes in athletes' nutrition knowledge before and after the nutrition education intervention. Initially, only 6.66% of athletes demonstrated good nutrition knowledge, while 93.33% had poor knowledge. Post-intervention, 66.66% of athletes achieved good nutrition knowledge, and 33.33% reached a sufficient level, with none retaining poor knowledge.

This increase in nutritional knowledge among athletes is significant as it enhances their awareness and comprehension of food sources rich in iron and calcium. Such knowledge is crucial for improving dietary practices aimed at increasing iron and calcium intake, which are vital for cognitive and physical performance in athletes (Marzban et al., 2021; Nicotra et al., 2023). Iron deficiency, exacerbated by factors such as inadequate intake and menstruation-related losses, can impair athletic performance, particularly among female athletes (Badenhorst et al., 2022). Similarly, insufficient calcium intake can lead to fatigue, reduced fitness, and heightened susceptibility to sports injuries (Larson-Meyer, 2013; Vasudeva et al., 2021).

Table 1. Athletes' Nutrition Knowledge Before and After Being Given Nutrition Education

Level of Nutrition Knowledge	Before	After
Good	2 (6.66%)	20 (66.6%)
Enough	0 (0%)	10 (33.33%)
Not enough	28 (93.33%)	0 (0%)
Amount	30 (100%)	30 (100%)

The substantial improvement in nutritional knowledge with a p-value of 0.000 highlights the effectiveness of the nutrition education intervention. This is consistent with the literature demonstrating the efficacy of various educational approaches, such as lectures and multimedia platforms, in improving athletes' dietary practices and understanding (Sánchez-Díaz et al., 2020; Tam et al., 2019; Zares & Simanungkalit, 2021; Prasetyo et al., 2023). Such improvements are critical, given the impact of adequate iron and calcium intake on cognitive and physical performance (Marzban et al., 2021; Nicotra et al., 2023).

The Effect of Nutrition Education on Nutrition Dietary Practice

Table 2 presents the athletes' dietary practices before and after the intervention. Initially, 6.66% of athletes had good dietary practices, 80% had adequate practices, and 13.33% had inadequate practices. Post-intervention, the proportion of athletes with good dietary practices remained at 6.66%, while those with inadequate practices decreased to 6.66%. This suggests that nutrition education effectively enhances athletes' dietary behaviours, aligning with previous literature emphasising the crucial role of education in improving

nutritional practices among athletes (Folasire et al., 2015; Hamulka et al., 2018; Mohd Elias et al., 2018; Zaman et al., 2021; Bakhtiar et al., 2021).

Table 2. Nutritional Dietary Practice Before and After Given Nutrition Education

Nutritional Dietary Practice	Before	After
Good	2 (6.66%)	2 (6.66%)
Enough	24 (80%)	26 (86.66%)
Not enough	4 (13.33%)	2 (6.66%)
Amount	30 (100%)	30 (100%)

The results of this study highlight a significant effect of nutrition education on athletes' dietary practices, evidenced by a p-value of 0.011. This indicates a notable improvement in moderate dietary practices among the athletes. While there was no observed increase in the number of athletes with exemplary dietary practices, the reduction in those with inadequate practices underscores the intervention's success in shifting dietary behaviours toward more appropriate practices. This aligns with the findings of Folasire et al. (2015) and Hamulka et al. (2018), which similarly noted that nutrition education interventions can effectively alter dietary practices, even if the number of individuals achieving ideal practices does not immediately rise.

The observed improvement in moderate practices is particularly significant. It suggests that the intervention was effective in promoting dietary behaviours that are more aligned with recommended guidelines, even if they do not yet reach the optimal level. This finding supports the research by Zaman et al. (2021), which emphasises that improvements in dietary behaviour can be incremental and still valuable, especially in contexts where baseline practices are suboptimal.

The reduction in inadequate dietary practices is a crucial outcome of this study. It underscores the intervention's success in addressing poor dietary habits, which is essential for improving overall nutritional status. According to Bakhtiar et al. (2021), reducing inadequate practices can lead to significant health benefits and improved performance outcomes. Therefore, even without an increase in good practices, the decrease in inadequate practices represents a meaningful step towards enhancing athletes' nutrition.

This study's findings reinforce the importance of targeted nutrition education. The effectiveness of such interventions in improving both knowledge and dietary practices aligns with the work of Wiafe et al. (2023) and Solly et al. (2023), who highlight the crucial role of education in enhancing athletes' nutritional habits. These results are particularly relevant as they demonstrate the practical impact of nutrition education, bridging a gap that has been noted in previous research.

In the context of Indonesia, where there has been limited research on the effectiveness of nutrition education for athletes, this study provides valuable insights. It confirms that tailored nutrition education can be effective in improving dietary practices and knowledge among athletes in specific contexts. This contribution is particularly important given the unique dietary and cultural factors present in Indonesia, which can influence the effectiveness of nutritional interventions.

Future research should continue to explore the effectiveness of nutrition education in diverse settings and with different populations. Additionally, further studies could investigate why improvements in dietary practices did not lead to an increase in good practices and explore strategies to enhance the effectiveness of such interventions. The study's results offer a foundation for developing more comprehensive and contextually relevant nutrition education programs, which could further optimise athletes' dietary behaviours and overall performance.

CONCLUSION

This study underscores the critical role of nutrition education in enhancing athletes' knowledge and dietary practices related to iron and calcium consumption. Initially, a significant proportion of athletes exhibited poor nutrition knowledge and inadequate dietary practices. However, following the nutrition education intervention, there was a substantial improvement in both knowledge levels and dietary practices among the participants. Specifically, there was a notable increase in athletes who acquired good nutrition knowledge and

adhered to appropriate dietary practices. These improvements are crucial for supporting optimal athletic performance and mitigating the risks associated with deficiencies in essential nutrients like iron and calcium.

A notable limitation of this study is its focus on short-term outcomes immediately following the intervention. It does not assess long-term sustainability or behavioural changes in dietary practices. Future research should address these limitations by examining the long-term impact of nutrition education and its effectiveness across diverse athlete populations. Future studies should explore the long-term effects of nutrition education on athletes' dietary practices and performance. Additionally, research could investigate the impact of various educational methods on different athlete populations to further refine and optimise nutrition education strategies.

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CONFLICT OF INTEREST

All authors have no conflict of interest.

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