

Development of a Content Validated Tool to Assess Knowledge, Attitude and Practices about Sports Nutrition Amongst Elite Indian Athletes

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Abstract

Background: Knowledge, attitudes, and practices (KAP) about sports nutrition is found to influence performance of athletes, recovery, and injury prevention. However, there is no instrument available in India that is standardized, relevant in terms of culture, and also is a validated one to assess KAP about sports nutrition in Indian elite athletes.

Objective: To develop a validated tool which aims to assess the knowledge, attitude, and practices of Indian elite athletes about sports nutrition.

Methods: The study incorporated a sequential tool development design in three phases: item generation, expert validation, and index calculation (content validity). The primary questionnaire was developed through an extensive literature review and focus group inputs from sports nutritionists, physiotherapists, and coaches. The initial draft had 80 items across five sections—(I) General Information, (II) Sports Profile, (III) Dietary Knowledge, (IV) Dietary Attitude, and (V) Dietary Practice and was reviewed by seven experts (two nutritionists, two physiotherapists, two coaches, and one sports professor). Each item was rated on a 5-point Likert scale of relevance (1 = Strongly Disagree to 5 = Strongly Agree). Item-level (I-CVI) and scale-level (S-CVI) Content Validity Indices were calculated.

Results: The I-CVI values ranged from 0.71 to 1.00, with 81% of items showing complete agreement (I-CVI = 1.00). The average scale-level CVI (S-CVI/Ave) was 0.94, and universal agreement (S-CVI/UA) was 0.81, indicating excellent content validity. All five sections demonstrated satisfactory validity (S-CVI/Ave = 0.93–0.96). Items with I-CVI < 0.70 were worked upon for better clarity.

Conclusion: The developed questionnaire demonstrated excellent content validity and can be considered as a valid tool for assessing the knowledge, attitude, and practices related to sports nutrition among Indian elite athletes. Construct and criterion validity along with reliability analysis can be useful for the tool to use for on-field administration.

Keywords: Sports nutrition, content validity, questionnaire development, KAP, elite athletes, India

Introduction

Sports performance is greatly influenced not only by physical conditioning and sports-specific skills but also by optimal nutrition [1]. Proper nutrition plays an important role in meeting the increased energy demands of training and competition, enhancing recovery, supporting muscle adaptation, and preventing injuries [2]. Athletes with a proper understanding and practice of sports nutrition are better equipped to

improve performance and maintain overall health throughout their sporting careers [3]. Despite its importance, research indicates that nutrition-related knowledge, attitudes, and practices (KAP) among Indian athletes are not consistent. Factors such as limited access to nutrition education, varied cultural dietary habits, and misconceptions about supplements, food habits have found to contribute to this variability [4]. One of the key barriers in addressing these gaps is there is no standardized, culturally relevant tool to address or understand KAP about sports nutrition for Indian athletes specifically.

The currently existing KAP questionnaires have been developed in Western countries and may not reflect the unique dietary patterns, food availability, and cultural practices of Indian athletes. Directly applying these tools may lead to inaccurate assessments and limit the effectiveness of nutrition interventions tailored to this population [5]. Therefore, there is a clear need to develop a comprehensive, context-specific tool that can systematically assess knowledge, attitudes, and practices related to sports nutrition among Indian elite athletes.

In response to this gap, the present study was designed to develop a sports nutrition KAP questionnaire specifically for Indian athletes and establish its content validity through expert evaluation. This tool aims to provide a reliable foundation for future research and interventions, ultimately supporting better nutrition practices and enhanced performance among athletes in India.

Study Design

The study adopted a sequential mixed-method design involving three distinct phases: Item Generation, Expert Evaluation, and Content Validity Analysis [6]. The primary objective was to develop and validate a questionnaire to assess the knowledge, attitude, and practices (KAP) regarding sports nutrition among Indian elite athletes. The research process followed established guidelines for instrument development proposed by Lynn (1986) and Polit & Beck (2006) [7] [8].

Item Generation

An extensive review of existing literature, including peer-reviewed journals, textbooks, and validated nutrition KAP tools, was conducted to identify the domains and indicators relevant to sports nutrition among athletes [9]. The domains of the questionnaire were formed under three major headings:

- **Knowledge:** Awareness and understanding of sports-specific nutritional requirements, macronutrients, hydration, and supplements.
- **Attitude:** Beliefs, perceptions, and motivational orientation towards adopting sound nutrition habits.
- **Practices:** Actual dietary behaviors, supplementation habits, and hydration strategies during training and competition.

The literature review identified key determinants of nutrition behavior among athletes and served as the foundation for developing an item on the scale under each construct which was relevant to the Indian population. A preliminary pool of approximately 100 items was created to represent each construct. These items were then reviewed for relevance and clarity aligning with the objective of creating this tool. After several edits, a total of 80 items were retained and categorized under five sections:

1. Section I: General Information (7 items)
2. Section II: Sports Profile (9 items)
3. Section III: Dietary Knowledge (25 items)
4. Section IV: Dietary Attitude (15 items): Each item was framed as a 5-point Likert scale statement (1 = Strongly Disagree to 5 = Strongly Agree), allowing both quantitative scoring and qualitative interpre-

tation of responses.

5. Section V: Dietary Practices (24 items)

Expert Evaluation (Content Validation)

A panel of seven subject experts was purposively selected based on their academic qualifications and professional experience in sports sciences. The panel comprised of two Sports Nutritionists with ≥ 5 years of experience in athlete dietary counseling, two Physiotherapists specializing in sports rehabilitation, two Sports Coaches, and one Assistant Professor of Sports Coaching with research expertise in athletic performance. All experts were given an overview about the study objectives, structure of the tool, and expected outcomes prior to evaluation. Each expert independently reviewed all 80 items on the scale for relevance, clarity, and how well each question represented the construct using a five-point Likert where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. Experts could also suggest modifications, deletions, or rewording for any item that lacked clarity or precision. Their responses were compiled anonymously to prevent bias.

Content Validity Analysis

In this process, experts evaluate each item's relevance to the target domain. Typically, the experts should be independent of those involved in the item generation; multiple experts are preferred (5–7 experts). The consensus-building exercise can involve Delphi methods and panel discussion. For the present study, content validity analysis was done using the Item-level content validity index (I-CVI) and Scale level content validity index (S-CVI). The I-CVI is defined as the proportion of raters who considered an item to be relevant for a given construct. The formula to calculate $I-CVI = \frac{\text{number of experts, who endorsed an item as relevant}}{\text{total number of experts}}$ [10]. The final value ranges from 0 to 1. An acceptable value depends on the number of experts involved: if 3–5 raters are involved, an I-CVI of 1 is acceptable, while for 6–10 raters, a value ≥ 0.78 is acceptable. According to Polit and Beck's guidelines [8].

- $I-CVI \geq 0.78 \rightarrow$ Item considered valid
- $I-CVI = 0.70\text{--}0.77 \rightarrow$ Needs revision
- $I-CVI < 0.70 \rightarrow$ Considered for elimination

Two indices were derived to represent the overall scale's validity: S-CVI/Ave (Average method): Mean of all I-CVI values across items, and S-CVI/UA (Universal Agreement): Proportion of items with complete agreement ($I-CVI = 1.00$) [11]. These indices provide an overall estimate of the questionnaire's content representativeness and expert agreement. Following accepted psychometric values for these indices are:

- $S-CVI/Ave \geq 0.90 \rightarrow$ Excellent content validity
- $S-CVI/Ave 0.80\text{--}0.89 \rightarrow$ Good content validity
- $S-CVI/Ave < 0.80 \rightarrow$ Requires revision

Results and Interpretation

The content validation process yielded I-CVI values between 0.71 and 1.00, with a scale-level CVI (S-CVI/Ave) of 0.94 and universal agreement (S-CVI/UA) of 0.81, indicating excellent content validity of the developed tool. Minor revisions were made for items with lower I-CVI scores to enhance clarity and contextual relevance. The final validated tool retained all 80 items across the five sections. All statistical computations were conducted in Microsoft Excel 365. I-CVI values were interpreted against the accepted

threshold of ≥ 0.78 for strong content validity. The S-CVI/Ave and S-CVI/UA were used to determine the overall content representativeness of the tool.

The present study yielded I-CVI values ranging from 0.71 to 1.00, S-CVI/Ave = 0.94, and S-CVI/UA = 0.81, reflecting excellent consensus among experts. To strengthen future reliability, test–retest reproducibility and internal consistency (Cronbach’s α) are recommended for subsequent validation phases.

Table 1. Summary of Content Validity

Section	I-CVI Range	Mean (S-CVI/Ave)	Interpretation
I. General Information	0.86–1.00	0.96	Excellent
II. Sports Profile	0.86–1.00	0.94	Excellent
III. Dietary Knowledge	0.71–1.00	0.93	Excellent
IV. Dietary Attitude	0.71–1.00	0.95	Excellent
V. Dietary Practices	0.71–1.00	0.94	Excellent
Overall Tool	0.71–1.00	0.94	Excellent

Discussion

This present study successfully developed a comprehensive, culturally relevant KAP questionnaire to assess sports nutrition among Indian elite athletes. The high scale-level content validity index (S-CVI/Ave = 0.94) across all domains indicates that the questionnaire items are highly representative of the construct being measured, reflecting excellent content validity. The involvement of a multidisciplinary panel of experts like nutritionists, physiotherapists, and coaches, strengthened the tool’s comprehensiveness. Nutritionists ensured scientific accuracy and alignment with current dietary guidelines, physiotherapists contributed insights on practical applicability during training and recovery, and coaches provided contextual relevance to real-world training and competition scenarios.

These findings are consistent with methodologies adopted in international studies on KAP tool development, where S-CVI/Ave values above 0.90 are widely recognized as indicative of strong content validity [12]. The results of the current study, therefore, support the reliability and appropriateness of the developed questionnaire for the Indian sports context. Items with relatively lower item-level content validity index (I-CVI = 0.71), such as those addressing carbohydrate percentage, almond water consumption, or meal frequency during competition, were carefully revised to improve clarity and ensure cultural and practical relevance. This focuses the importance of expert feedback in producing a tool that is both scientifically robust and contextually meaningful [13].

The development of this questionnaire addresses a significant gap in sports nutrition research in India, where existing tools are often derived from Western contexts and may not reflect local dietary patterns, cultural food practices, or training environments. By providing a validated, culturally tailored assessment instrument, this study enables more accurate evaluation of athletes’ knowledge, attitudes, and practices related to nutrition. Such assessments can inform targeted educational interventions, promote evidence-based dietary strategies, and ultimately support performance optimization and injury prevention among Indian athletes.

Future research can expand on the present work by testing the questionnaire’s reliability, construct validity, and predictive utility across diverse sports disciplines and age groups. Longitudinal studies could examine how nutrition knowledge and practices, as measured by this tool, influence performance

outcomes, recovery, and long-term athlete health. Overall, the present study establishes a foundation for advancing sports nutrition research and practice within the Indian elite athlete population.

Conclusion

The newly developed questionnaire demonstrated excellent content validity (S-CVI/Ave = 0.94) and satisfactory universal agreement (S-CVI/UA = 0.81). It can be effectively used to evaluate knowledge, attitude, and practices regarding sports nutrition among Indian elite athletes. Further studies assessing construct validity, reliability (Cronbach's alpha), and test-retest stability is recommended before large-scale field use.

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