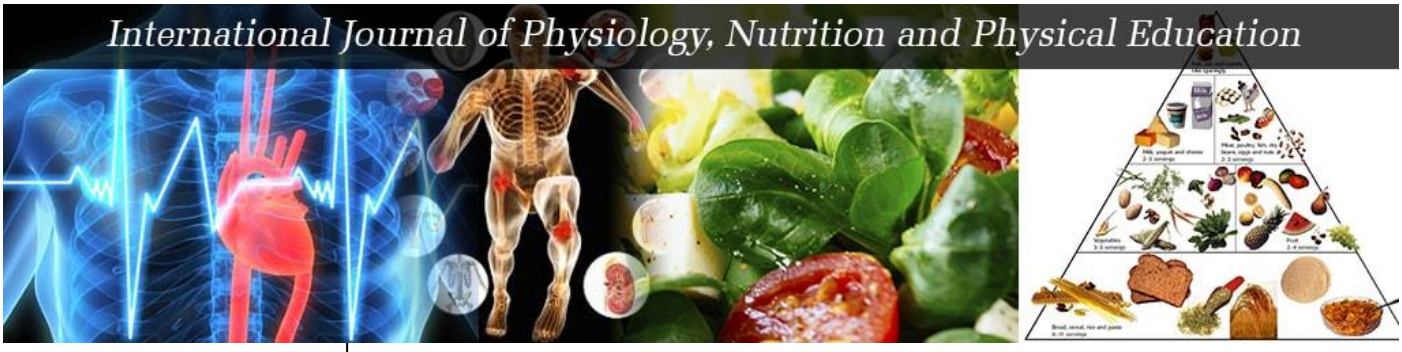

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A study on knowledge, attitude and practices of nutrition education in athletes

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Abstract
Introduction: Nutritional Status has a direct effect on the physical performance level which is why nutrition in sports is a vital part of sports medicine. And despite the popularity of sports, especially football, there is little consideration of nutritional related research in this field.
Aim: To study the Knowledge, Attitude, and Practices of Nutrition Education in Athletes
Methodology: This observational study was conducted in 101 participants where 56% participants belonged to the football sports from the India RUSH soccer club and 44% belonged to the cricket sports. Participants belonged to the 13-25 years age range and were asked to fill out a questionnaire via google forms in both online and offline methods.
Results: The results showed that Total Knowledge Score was significantly associated with Total Attitude Score whereas Total Knowledge Score had no significant relation to Total Practice Score. When the two sports were compared there was a significant association between the male and females in football sports where the male participant had significantly greater practice scores. The BMI also showed a positive correlation with Total Knowledge and Total Attitude Score; however, no association was found between BMI and Total Practice Score. Majority of the participants did not show consumption of nutritional supplements.
Conclusion: A good nutrition knowledge does not directly determine athletic practice. However, a good nutrition knowledge is associated with a good attitude and has impact on practice in a few aspects.

Keywords: Knowledge, attitude, practice, athletes, sports, cricket, football, nutrition

Introduction
An athlete is described as a person who strives to enhance his or her performance, participates actively in competition, formally registers in sport, and has regular sessions of dedicated sports training and competition in comparison to other professional or leisure activities. Level of commitment, exercise training parameters, and epidemiological features are all necessary descriptors (Maria and Paolo, 2020).
For the purposes of this study, the term is specifically used to define mainly football sports players of the Indian Rush Soccer Club and cricket players.
Team sports are those in which two or more athletes work together on a common playing area to defeat an opposing group of competitors. Some common sports include – soccer, volleyball, basketball, football, hockey, and cricket. The most significant difference in energy requirement of team sports athletes is the huge variation in calorie needs. Disparities in calorie requirements also exist due to factors like the type of the sport, position played by the athlete and the individual's body weight. (Fink and Mikesky 2005) [6].
Cricket is an endurance sports and the increased elite level presence in modern cricket has resulted in higher physical performance demands on players. Despite this, little information about the energy cost, dietary intake, and hydration status of Indian cricket players during matches, is available. (Shelly, 2018) Cricket's physiological and nutritional demands are influenced by a variety of factors, including the game's format (Duffield and Drinkwater 2008) [5]. Because of the discontinuous nature of cricket, precise assessments are frequently challenging, due to which extensive research is scarce (Bartlett, 2003) [3] hence, there are limited scientifically sound training programs available for these sports' person.
Association football, sometimes known as soccer or football, is the most popular team sport in the world. Football players must fuel appropriately through good nutrition and water due to the

high intensity of play and training. A restrictive diet and their high requirements for certain nutrients and energy can result in a high risk of suboptimal dietary intake among the players. (Afrifa,D., *et al*. 2020) [1]. Regardless of the influence and recognition of football, and besides the developing field of football-related research, football players' dietary consumption and eating practices have received little attention (García-Rovés, P. M. *et al*. 2014) [8].

Athletes require sufficient nutrition knowledge and skills to appropriately select and consume necessary food and fluids to maintain their health, body composition, and performance needs. Sports nutrition is an important aspect of an athlete's regimen because fitness and performance can be hampered without it. (Folasire, O. F. *et al*. 2015) [7]. Concern for nutrition status as an integral part of the training is now more common among most athletes (Bakhtiar, M *et al*. 2021) [2]. An adolescent athlete is neither aware of nor prepared for the dual demands of sound nutritional practices in general and those demanded by his or her chosen sports activities (Laurie *et al*., 2003; Schmalz *et al*., 1993). The dietary practices of young athletes fail to meet the energy requirement for high performance and may also threaten their well- being (Nancy *et al*., 2005). However, limited studies are available on football players' nutritional awareness, which makes an over-generalization of their knowledge impactful.

Aside from heredity and training, no single factor plays a greater role in optimizing performance than diet; Consequently, most players have the general understanding that improved athletic performance will result from dietary intakes rooted in competent choices (Bakhtiar, M *et al*. 2021) [2] Regardless, it has been suggested that mere cognitive knowledge does not actually influence behaviour and that the attitudes of an individual may have a greater effect. In general, studies indicate that adolescent athletes tend to possess an optimistic attitude towards nutrition and that knowledge is related to a positive attitude – athletes with more information have a more positive attitude towards diet. The athletes also are receptive to new knowledge in areas of deficit regarding nutritional education (Bakhtiar, M *et al*. 2021) [2].

Dietary habits of athletes are supposedly insufficient all over the world. The dietary habits of players exhibit deficient nutritional practice & they consume foods that have plenty of carbohydrates, meat, and saturated fat with less consumption of fruits & vegetables (Waly *et al*. 2013). Equivalent outcomes were stated in combat sports players from spain (Ubeda *et al*. 2010). Athletes have similar problems, such as low energy intake, and a combination of proportions-carbohydrates less than 60%, proteins greater than 20% and fats greater than 30% of total energy. Micronutrient intake, particularly iron and calcium, was below the recommendations. (Malla, H.B., *et al*. 2017) [13]. Skipping meals is commonly observed in athletes, particularly in adult football players in Spain who have the habit of skipping meals, particularly breakfast. (Piacentino *et al*. 2016).

It is common for athletes to consider dietary supplements to try and enhance performance. The most commonly used supplements among adolescent athletes include – Creatine Energy drinks – Caffeine, Protein (Amandeep Kaur, 2019). Supplement use was common among athletes, and excessive use is harmful to health. Athletes have also been found to use anabolic androgenic steroids, amphetamine-like substances, cathinone, ephedrine, and caffeine derivatives. (Piacentino *et al*. 2016).

Methodology

A cross-sectional sampling of 100 participants (male and female) of the age 13-25 years belonging to the athletic population were selected from Mumbai city. Purposive sampling was used. A questionnaire was administered which included general information, anthropometric measurements, knowledge, attitude and practice question, food frequency questionnaire and 24-hour dietary recall. Data was collected, coded and then given for statistical analysis using Statistical Package for Social Sciences (SPSS) software (version 20). Frequencies, percentages. Advanced statistics was done by t-independent test, Karl Person's correlation co-efficient and ANOVA. Findings were found to be significant when p values were; less than 0.05.

Results

Analysis for Basic anthropometric characteristics like height, weight, BMI and the total knowledge, attitude and practice scores were conducted. The dietary intake of energy, carbohydrates, proteins, fats, calcium, iron and vitamin D along with the BMI and the total knowledge score was also analysed. The supplement use by the participants was also assessed.

Table 1: Basic characteristics of study group

Basic characteristics	Gender Male=1 Female=2	N	Mean ± SD	p value
Age- years	1	43	18.42 ± 5	0.023*
	2	58	20.29 ± 3.1	
Height- m	1	43	1.71 ± 0.09	0.000*
	2	58	1.62 ± 0.07	
Weight-kgs	1	43	61.3 ± 13.3	0.000*
	2	58	53.3 ± 9.4	
BMI-Kg/m²	1	43	20.8 ± 3.5	0.667
	2	58	20.5 ± 2.9	

*p<0.05

As per Table 1, the age of the participants ranged from 13 to 25 years, with a mean age of 19 years. The mean age for male participants was 18 years, and for the female participants, it was 20. Years. The age of female participants was significantly higher than that of male participants. (p=0.023).

The mean weight of the male participants was 61.33 kg, and for the female participants, it was 53.35 kg. The weight of the female participants was significantly lower than that of male participants (p=0.000).

The mean BMI of the male participants was 20.8, and for the female participants, it was 20.5. There is no significant difference between the BMI of the male and female participants (p>0.05).

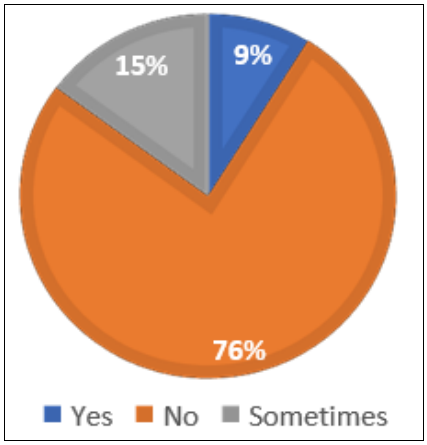

Fig 1: Consumption of Nutritional Supplements by the athletes

The findings from figure 1 were opposed to the findings of Jovanov, P. *et al*. (2019) [10] who found that a majority of athletes consumed supplements and protein supplements were most commonly consumed whereas according to Silva., A, *et*

al. (2010) [4] Dietary supplement are used by a majority of athletes however footballers showed far fewer supplement consumption than other athletes.

Table 2: Total knowledge score

Total Knowledge Score	Age p=0.826	Weight (in kgs) p=0.96	BMI (kg/m²) p=0.56	Total attitude score p=0.307	Total practice score p=0.847
Poor	22	56	19.8	51	19
Moderate	19.6 ± 3.6	56.2 ± 11.4	21.2 ± 3.5	53.3 ± 4	17.4 ± 4.6
Good	19.4 ± 4.3	57 ± 10	20.5 ± 3	54.7 ± 4.8	17.9 ± 4.7

According to Table 2, the means for all the participants, of the total knowledge score was categorized into poor, moderate and good score and there was no significant correlation seen between the knowledge score and age, weight, BMI, Total Attitude Score or Total Practice Score since p>0.05 between all the variables.

Table 3: Total Attitude Score

Parameters	Total Attitude Score	N	Mean	P value
Age	Moderate	16	20.1 ± 3.9	0.508
	Good	85	19.4 ± 4.1	
Weight (in kgs)	Moderate	16	57.6 ± 8.4	0.73
	Good	85	56.6 ± 11.4	
BMI	Moderate	16	20.8 ± 2.3	0.868
	Good	85	20.6 ± 3.3	
Total Knowledge Score	Moderate	16	20.5 ± 2.6	0.153
	Good	85	22 ± 3.7	
Total Practice Score	Moderate	16	18.7 ± 4.3	0.398
	Good	85	17.6 ± 4.7	

According to Table 3, for all the participants, the total attitude score was categorized into poor, moderate and good score and there were no participants in the poor attitude score range. There was no correlation between the total attitude score and the age, weight, BMI, Total knowledge score or Total practice score since p>0.05 for all the variables.

As it also reported by Zaman., N. N, *et al*. (2021) in the study conducted that at pre-test no athlete had poor attitude while a majority of total athletes had a neutral attitude wherein, a majority of male athletes had positive attitude a majority of female athlete had neutral attitude.

Table 4: Total Practice Score

Total Practice score	Age p=0.94	Weight (in kgs) p=0.219	BMI (kg/m²) p=0.784	Total attitude score p=0.442	Total knowledge score p=0.083
Poor	22 ± 6.3	55.4 ± 16.8	20 ± 3.8	53 ± 2.7	22 ± 3.1
Moderate	18.9 ± 3.8	55.5 ± 10.2	20.6 ± 3.1	54 ± 4.2	21 ± 3.9
Good	19.8 ± 3.8	59.6 ± 10.5	20.9 ± 3.2	55.13 ± 5.6	22.8 ± 2.3

According to Table 4, the means for all the participants, of the total practice score was categorized into poor, moderate and good score. There was no correlation between the total practice score and the age, weight, BMI, Total knowledge score or Total practice score since p>0.05 for all the variables.

Table 5: BMI Classification

Parameters	Underweight N=21 20.8% Mean	Normal weight N=59 58.4% Mean	Overweight N=13 12.9% Mean	Obese N=8 7.9% Mean	P value
Age(years)	16 ± 3.9	19.3 ± 3.6	22 ± 2	24 ± 5	0.000*
Total Knowledge Score	37.8 ± 3.7	38.3 ± 3.9	38.8 ± 4.5	42.4 ± 2.8	0.034*
Total Attitude	53.2 ± 2.7	54 ± 4.6	57.8 ± 5.9	54 ± 4.2	0.029*
Score					
Total Practice Score	17.1 ± 4.7	18.1 ± 4.5	16.2 ± 4.4	19.1 ± 6.6	0.424
Energy (kcals)	1164 ± 235	1243 ± 279	1049 ± 240	1232 ± 124	0.091
Carbohydrate (gms)	151 ± 42.7	146 ± 41	129 ± 28.3	126 ± 22.4	0.241
Protein (gms)	35.7 ± 10	39.2 ± 13.1	35.2 ± 12.6	52.1 ± 19	0.018*
Fats (gms)	42 ± 14.3	54 ± 18.6	42.1 ± 13.4	55.6 ± 10	0.010*
Calcium (mgs)	250 ± 76.6	393.4 ± 188	347.5 ± 134	335 ± 133	0.008*
Iron (mgs) p= 0.284	8.2 ± 2.6	8.9 ± 3	7.7 ± 2	9.8 ± 2.2	0.284
Vitamin D (mcg)	0.450 ± 0.53	0.664 ± 1.2	0.301 ± 0.4	2.3 ± 3	0.004*

*$p<0.05$

According to table 5, when the BMI is classified, there is a statistically significant relation between the BMI classes; that when the BMI is higher the following variables of Age (p=0.000), Total Knowledge Score (p=0.034), Total Attitude Score (p=0.029), Proteins (p=0.018), Fats (p=0.010), Calcium (p=0.008) and Vitamin D (p=0.004) were also higher.

There is no significant relationship between the BMI and Total Practice Score, Energy, and carbohydrates (p=0.241) since p>0.05.

Table 6: Classified knowledge scores and gender

Gender	Knowledge Score		Age (years)	Weight (in kgs)	BMI	Total knowledge score	Total Attitude Score	Total practice score
	F value		5.334	14.7	0.186	0.615	0.439	4.529
	P		0.023*	0.000*	0.667	0.435	0.509	0.036*
Males	Moderate N=11	Mean ± SD	18.8±4.4	60.8±15	21.4±4.5	17.8±2.67	54±2.6	19±5.5
	Good N=32	Mean ± SD	18.3±5.3	61.5±13	20.7±3.1	23.47±1.7	54.8±5	18.9±4.2
Female	Poor N=1	Mean ± SD	22	56	19.8	9	51	19
	Moderate N=18	Mean ± SD	20±3.2	53.5±7.5	21±2.9	17.56±2.5	52.8±4.6	16.4±3.9
	Good N=39	Mean ± SD	20.4±3	53.2±7.5	20.3±2.9	23.56±2.1	54.69±4.7	17.13±5

*p<0.05

According to Table 6, The Total knowledge scores of both the genders following in the moderate category showed that their total knowledge and attitude score were similar while total practice scores were comparatively lower in the female participants.

Since the female participants were of greater percentage than male this analysis was found to be similar to the review conducted by Heany, S, *et al*. (2011) [9] where it was stated that females had a greater knowledge than male participants

The Total knowledge scores of both the genders following in the good category showed that their total knowledge and attitude score were similar, and their knowledge scores were comparatively higher than those falling under the 'poor' and 'moderate' category while total practice scores were comparatively lower in the female participants.

When Total Knowledge Score are analysed on the basis of the two genders, Knowledge score has significant positive correlation with the variables Age, Weight, Total Practice Score as p<0.05 which indicated that as knowledge scores increased the practices also improved. Results found in table 6 were similar to the study conducted by Bakhtiar, M *et al*. (2021) [2] where Knowledge was positively correlated with practice. And it was unlike the study by Supriya, V., & Ramaswami, L.S. (2013) [16] where no significant was seen between nutrition knowledge and practice. Furthermore, there was no significant relationship with BMI, Total Knowledge Score nor Total Attitude Score since p>0.05.

Conclusion

There was a significant positive correlation seen between energy, carbohydrates, protein, calcium, and iron when the total knowledge score was classified (poor, moderate, or good) in the study population indicating an increase in the consumption of the above variables as the knowledge increases. And when the two sports were compared, it was seen that calcium consumption was greater in the cricketers. According to the findings of this study, nutritional supplements were not consumed by a majority of the participants.

Thus, the study concluded that knowledge and attitude of all athletes were positively correlated; as the knowledge increased, attitude towards nutrition education also improved. The males in the football sport had greater practice than the female athletes. And a good nutrition knowledge does not directly determine athletic practice. However, a good nutrition knowledge is associated with a good attitude and has impact on practice in a few aspects. The role of a qualified nutritionist in improving the performance of the athletes by imparting nutritional awareness about correct dietary practice is also emphasized.

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