



## **KNOWLEDGE, ATTITUDE, AND PRACTICE OF SPORTS NUTRITION AMONG ADOLESCENT INDIAN KABADDI PLAYERS**

**Sneha Majumder<sup>1,\*</sup>**

<sup>1</sup>*Symbiosis Institute of Health Sciences, Symbiosis International (Deemed University), Pune, India.*

**Debojyoti Das<sup>2</sup>**

<sup>2</sup>*Sports Science Centre, Sports Authority of India, Netaji Subhash Western Centre, Gandhinagar, India.*

**Kavitha Menon<sup>1+</sup>**

<sup>1</sup>*Email: [sneha@sihspune.org](mailto:sneha@sihspune.org)*

<sup>2</sup>*Email: [debojyotidas.phy@gmail.com](mailto:debojyotidas.phy@gmail.com)*

<sup>\*</sup>*Email: [kavitha@sihspune.org](mailto:kavitha@sihspune.org)*



(+ Corresponding author)

### **ABSTRACT**

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#### **Keywords**

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Kabaddi is an emerging sport in India that has gained immense importance after the victory at Asian games. The adolescent Kabaddi players are at their growth spurt, thus nutritional requirements are at peak. Thus, a cross sectional study was designed to explore the determinants of sports nutrition Knowledge, Attitude and Practice (KAP) among adolescent Kabaddi players ( $n=156$ ) at Sports Authority of India, Gandhinagar. The Mean $\pm$ SD scores of knowledge, attitude and practice were  $5\pm1.7$ ,  $5\pm1.6$  and  $5.1\pm1.5$ , respectively. Coaches imparted nutrition information to most of the players (76.3%). Knowledge scores were significantly correlated to practice ( $P=0.004$ ). The females and rural residents had significantly higher nutrition knowledge and practice than males and urban players, respectively. Older adolescents, and players with secondary and above education had better attitude scores. Multivariate analysis showed that mother's educational status predicted the knowledge scores ( $P=0.01$ ) and inversely practice scores ( $P=0.02$ ). The study underscores the need for nutrition education to players that would translate to healthier food choices and better sports performance.

**Contribution/Originality:** The study is one of the few studies that investigated the KAP of Kabaddi players and identified the determinants of KAP. The insights would be beneficial to the coaches, trainers and managers of the Kabaddi teams to optimize their nutritional status to improve the performance of the players.

## **1. INTRODUCTION**

Kabaddi, an Indian sport, gained immense popularity after securing gold medals at the Asian Games (Kumar, 2014) requires a combination of agility, speed, power, strength, and co-ordination (Thakur, 2016). In addition, adolescent players are in their second growth spurt and nutritional requirements peak during this phase (Das et al., 2017). Ensuring adequate nutrition to meet both increased demands of their growth and for engaging in Kabaddi would mean special attention and care for these young players, especially during their performance. The rigorous training and preparation for sport participation often happen in schools and colleges where facilities and trained professionals for nutrition counselling are unavailable (Torres-McGehee et al., 2012). Most of the time, the trainers, who are not professionally qualified in nutrition care and counselling, provides information on diets and supplements to improve their strength, power, and performance. As a result, the players are unable to obtain appropriate nutritional support and often suffer from nutrient deficiencies and imbalances that could adversely affect the performance (Thomas, Erdman, & Burke, 2016).

In low resource settings, to ensure proper nutrition for the players, knowledge of adequate nutrition, developing a positive attitude to acquire good nutritional status and practice of appropriate nutrition concepts are critical. Good nutrition practices would support adolescent sport players to optimize their sports performance. Studies showed that poor nutrition knowledge leads to the consumption of inadequate nutrients and poor nutrient diets in adolescent players (Heaney, O'Connor, Michael, Gifford, & Naughton, 2011).

Most of the studies that investigated nutrition knowledge, attitude and practice of sports players have indicated the need for sports-specific nutrition education for the players. Often, coaches are the primary source of nutrition information, however, the sports-specific nutrition knowledge remains limited in most of these coaches (Cockburn, Fortune, Briggs, & Rumbold, 2014). While nutrition education remains a priority to improve the performance and excellence in sports, in the absence of such practice, often the information is transmitted from other sources – parents, teammates, friends, or family (Sewak & Singla, 2018). The nutrition information from untrained sources misleads the players, lacks scientific merits and are often less beneficial to players. Such scenarios underpin the necessity of having appropriate nutrition knowledge among players to manage themselves.

Being a rural Indian origin sport with involvement of many adolescents, there is a paucity of information on the nutrition Knowledge, Attitude, and Practice (KAP) in these Kabaddi players. Therefore, a preliminary study was conducted as the first step to understand the KAP of these sports players. Further, the present study aimed to investigate the potential sociodemographic factors that may influence the nutrition KAP of adolescent players.

## **2. METHODS**

### *2.1. Research Area*

Kabaddi is a contact team sport played by the two teams at a time and consists of seven players in each team. This study was carried out at the Sports Authority of India (SAI), Netaji Subhas Western Centre (NSWC), Gandhinagar, Gujarat, India. The data was collected from the Kabaddi players who participated in a three-day national level Inter SAI Kabaddi Tournament organized by the SAI. The tournament had Sub-Junior and Junior categories of matches for both the genders and about 45 teams from different states of India participated in the tournament.

### *2.2. Participants*

Adolescent Kabaddi players of both genders aged between 12-19 years from different parts of the country participated in the tournament. The study had the following inclusion/exclusion criteria: Kabaddi players who were not willing to provide information, who were not interested in participating in the study and those who were injured during the match were excluded from the study.

### *2.3. Study Design*

A cross-sectional study was carried out to assess the KAP of the Kabaddi players using a purposive sampling method. One hundred and fifty-six adolescent Kabaddi players agreed to participate in the study. The study was explained to the players and written informed consent was taken prior to their recruitment to the study. The study adhered to all the principles of Helsinki and the necessary ethics permissions were sought from the SAI.

### *2.4. Data Collection Tools*

#### *2.4.1. Development of the Questionnaire*

The research team developed a well-structured standardized questionnaire to elicit information on the knowledge of nutrition that covered the key areas of sports-specific nutrition. The structured questionnaire was sent to four subject experts for content validation. Based on their recommendations, necessary corrections were made, and the questionnaires were revised and pre-tested before administering to the study participants.

The content validated and pre-tested questionnaire had four distinct sections. The first section had questions about the sociodemographic details of the participants. The information on age, gender, maternal and paternal education status, location of the residence (i.e., urban vs rural), occupational status of parents, number of years of training and number of hours of sleep was captured. The second, third and fourth sections had questions on nutrition Knowledge, Attitude and Practice in sports-specific Nutrition, respectively. The nutrition knowledge section had 10 multiple choice questions regarding the nutrient content of specific foods, foods that help in weight management and foods that address specific exercise issues like muscle cramps and post-exercise recovery. Each correct answer scored one mark. The total score was calculated based on the number of correct responses out of the total of 10 marks. The attitude section had 11 questions related to the importance of nutrition in sports, food choices and influences, bodyweight management, and the importance of certain types of foods and supplements. The responses were recorded on the *Likert Scale* (1. Strongly agree, 2. Agree, 3. Neutral/Undecided, 4. Disagree, 5. Strongly Disagree). One mark was awarded to each correct response and the total score was calculated based on the number of correct responses out of 11 questions. The practice section had 10 questions that were based on daily eating practices and focused on dietary patterns, meal skipping habits, consumption of supplements and compliance to dietary regimens. The responses for this section of questions were recorded as a choice between yes or no. Each question carried one mark for the correct practices and the total score was calculated based on the number of correct responses out of 10 marks. No negative marks were deducted for any incorrect responses. The lower scores depicted poorer knowledge, attitude, and practices, while the higher scores indicated vice-versa.

### **2.5. Data Collection**

The participants were selected as teams, from the participating team's list provided by the tournament organizing committee, with the prior permission of the respective team coaches. The list had 45 teams including both genders and tournament categories. Teams were chosen to have representation from different regions of India. Based on the approval from the coaches or trainers, 17 teams (9 junior teams with 3 girls' and 6 boys' teams; and 8 sub-junior teams with 3 girls' and 5 boys' teams) agreed to participate in the study according to their schedule of matches. Each Kabaddi team member reported to the investigators after completion of their match followed by twenty minutes to half an hour of rest. The data was collected by the investigators for three consecutive days. The investigators explained the purpose, objectives, and methods of the study to the participants and the team manager. Informed signed assent from the players and consent from the coaches were obtained before the recruitment of the players of the study. After recruitment to the study, questionnaires framed in English were provided to the participants during the scheduled time slot and were asked to mark their responses. Upon completion, questionnaires were collected and kept in a well-sealed cover. The data was entered on MS EXCEL sheet, and was validated, cleaned, and verified before using it for analysis.

### **2.6. Data Analysis**

Statistical analysis was carried out using SPSS version 22 and STATA version 15.1, StataCorp, USA. Participant characteristics, anthropometric data and scores of knowledge, attitude and practice were summarized using descriptive statistics such as Mean and Standard Deviation (SD). Frequencies and Percentages were used to summarize responses for knowledge, attitude, and practice scores. An independent T-test was used to estimate differences in the mean of scores of nutrition knowledge, attitude and practice across the gender and residential areas.

Univariate and multivariate regression analyses were performed to explore the associations between KAP scores and various socio-demographic variables. Socio-demographic variables tested included gender of the participant (i.e., male vs female), educational status of the participants (i.e., below secondary level vs above secondary level of education) and both of their parents (i.e., no formal education and educated), the occupational

status of participant's mothers (i.e., home-makers non-home maker) and fathers (i.e., unskilled vs skilled occupation) and participant's residence (i.e., urban, and rural). Significant univariate associations were tested for the same variables against KAP scores. Associations with a  $p < 0.20$  were included in the multivariate analyses. It was *a priori* decided to adjust for age and gender in all multivariate models. In all analyses the level of significance was kept at  $P \leq 0.05$ .

### 3. RESULTS

The present study collected data from the National level Kabaddi players who attended Inter Sports Authority of India (SAI) Kabaddi Tournament at SAI, Gandhinagar, Gujarat. A total of 156 players were recruited during the three-day tournament based on their availability during the competition.

The demographic characteristics of participants and the mean differences in KAP scores are presented **Table 1**. The study consisted of 53.8% ( $n=84$ ) boys and 46.2% ( $n=72$ ) of girls. A half of the participants resided in rural and urban areas of India (rural vs urban: 50.5% vs 49.5%). The Mean $\pm$ Standard Deviation (SD) age of the participants was  $16.1 \pm 1.6$  years. More than 90% of the mothers of the participants were homemakers and 66% of the fathers were occupied in unskilled professions. About a three fourth of the parents had formal education.

The mean $\pm$ SD scores of knowledge, attitude and practice are  $5 \pm 1.7$ ,  $5 \pm 1.6$  and  $5.1 \pm 1.5$ , respectively. The mean $\pm$ SD scores of KAP were disaggregated over different sociodemographic variables **Table 1**.

**Table 1.** Demographic characteristics of participants and their mean differences in KAP scores.

Parameters	n	Knowledge		Attitude		Practice	
		Score (Mean $\pm$ SD)	P Value	Score (Mean $\pm$ SD)	P Value	Score (Mean $\pm$ SD)	P Value
Age group							
Age (Years) (Pooled)	156 ( $16.1 \pm 1.6^*$ )	$5.0 \pm 1.7$		$5.0 \pm 1.6$		$5.1 \pm 1.5$	
<15 years	50 (32)	$5.2 \pm 1.5$	0.27	$4.6 \pm 1.3$	0.03**	$5.4 \pm 1.6$	0.11
>15 years	106 (68)	$4.9 \pm 1.8$		$5.2 \pm 1.7$		$5.0 \pm 1.5$	
Gender							
Male	84 (54)	$4.4 \pm 1.6$	<0.001**	$5.1 \pm 1.6$	0.273	$4.8 \pm 1.6$	0.01**
Female	72 (46)	$5.6 \pm 1.6$		$4.8 \pm 1.6$		$5.4 \pm 1.4$	
Educational Status of Participants							
Up to Pre-secondary	66 (42)	$5.0 \pm 1.6$	0.90	$4.5 \pm 1.5$	0.006**	$5.0 \pm 1.8$	0.46
Secondary and above	90 (58)	$5.0 \pm 1.8$		$5.3 \pm 1.6$		$5.2 \pm 1.3$	
Educational Status of Participant's Parents							
Mothers							
No formal education	42 (27)	$4.1 \pm 1.7$	<0.001**	$5.6 \pm 1.5$	0.008**	$4.7 \pm 1.5$	0.03**
Educated	114 (73)	$5.3 \pm 1.6$		$4.8 \pm 1.6$		$5.3 \pm 1.5$	
Fathers							
No formal education	32 (20.5)	$4.3 \pm 1.9$	0.01**	$5.6 \pm 1.6$	0.02**	$4.9 \pm 1.3$	0.38
Educated	124 (79.5)	$5.2 \pm 1.6$		$4.8 \pm 1.6$		$5.2 \pm 1.6$	
Occupation of Participant's Parents							
Mothers							
Homemaker	144 (92)	$5.0 \pm 1.7$	0.63	$5.0 \pm 1.6$	0.096	$5.1 \pm 1.6$	0.82
Non-Home Maker	12 (8)	$5.2 \pm 1.7$		$4.2 \pm 1.9$		$5.2 \pm 0.9$	
Fathers							
Unskilled occupation	103 (66)	$4.8 \pm 1.6$	0.20	$5.2 \pm 1.6$	0.01**	$5.2 \pm 1.6$	0.27
Skilled occupation	53 (34)	$5.2 \pm 1.8$		$4.5 \pm 1.5$		$4.9 \pm 1.4$	
Residents of participants							
Urban	77 (49)	$4.4 \pm 1.6$	<0.01**	$5.1 \pm 1.6$	0.27	$4.8 \pm 1.6$	0.01**
Rural	79 (51)	$5.6 \pm 1.6$		$4.8 \pm 1.6$		$5.4 \pm 1.4$	

Note: \*Mean $\pm$ Standard Deviation (SD); \*\*Independent T Test-Significance $< 0.05$  level (2-tailed); Up to pre secondary: < 10th Standard; Secondary and Above:  $\geq$ 10th Standard; Unskilled occupation: not professionally trained; Skilled occupation: trained for occupation; Non-Home Maker: Working/Self-employed/ Any occupation.

The late adolescents compared to the early adolescents had better nutritional attitudes (<15 years vs >15 years:  $4.6 \pm 1.3$  vs  $5.2 \pm 1.7$ ;  $P=0.03$ ). Similarly, participants with educational status above the secondary level compared to the pre-secondary had significantly better nutritional attitudes (Up to pre-secondary vs. secondary and

above:  $4.5 \pm 1.5$  vs  $5.3 \pm 1.6$ ;  $P=0.006$ ). The females exhibited significantly better scores in the nutritional knowledge (male vs. female:  $4.4 \pm 1.6$  vs  $5.65 \pm 1.6$ ;  $P=<0.001$ ) and practice (male vs. female:  $4.8 \pm 1.6$  vs  $5.4 \pm 1.4$ ;  $P=0.01$ ) than their male counterparts. The educational status of parents played a significant role in the player's nutritional knowledge, attitude and practice. Nutritional knowledge (No formal education vs. formally educated:  $4.1 \pm 1.7$  vs.  $5.3 \pm 1.6$ ;  $P=<.001$ ) and practice (No formal education vs. formally educated:  $4.7 \pm 1.5$  vs.  $5.3 \pm 1.5$ ;  $P=0.03$ ) were significantly higher among participants of educated mothers ( $n=114$ ). Conversely, the nutritional attitude scores were significantly higher among participants whose mothers had no formal education ( $n=42$ ) (No formal education vs. formally educated:  $5.6 \pm 1.5$  vs.  $4.8 \pm 1.6$ ;  $P=0.008$ ). The participants whose fathers were formally educated ( $n=124$ ) had significantly higher knowledge scores (No formal education vs. formally educated:  $4.3 \pm 1.9$  vs.  $5.2 \pm 1.6$ ;  $P=0.01$ ), however, they had lower nutritional attitude scores (No formal education vs. formally educated:  $5.6 \pm 1.6$  vs.  $4.8 \pm 1.6$ ;  $P=0.02$ ). Participants whose fathers were involved in unskilled occupations ( $n=103$ ) compared to skilled professions ( $n=53$ ) had significantly better nutritional attitudes (Unskilled occupation vs. skilled occupation:  $5.2 \pm 1.6$  vs.  $4.5 \pm 1.5$ ;  $P=0.01$ ). Both knowledge (Urban vs. rural:  $4.4 \pm 1.6$  vs  $5.6 \pm 1.6$ ;  $P=<0.01$ ) and practice (Urban vs. rural:  $4.8 \pm 1.6$  vs  $5.4 \pm 1.4$ ;  $P=0.01$ ) were significantly higher among the participants from rural ( $n=79$ ) than the urban residents ( $n=77$ ).

The anthropometric status, nutritional status, training years and sources of nutritional information of the participants are presented [Table 2](#).

**Table 2.** Nutritional status, source of nutrition information and training duration of the participants.

Nutritional Status of the participants		
Undernourished	1	0.6
Normal	140	89.7
Overweight	15	9.6
Obese	0	0
Sources of nutritional information		
Coach	119	76.3
Television	1	0.6
Internet	1	0.6
Books	4	2.6
Family and Friends	19	12.2
Others	2	1.3
Never gathered information	10	6.4
Training duration		
Training (Years)	156	$4.3 \pm 2.2^*$

Note: \*Mean  $\pm$  Standard Deviation.

The Mean  $\pm$  SD height, weight and Body Mass Index (BMI) of the participants were  $163.6 \pm 8.1$  cm,  $57.2 \pm 7.6$  kg,  $21.4 \pm 2.0$  kg/m<sup>2</sup>, respectively. Most of the players (89.7%) were nutritionally normal, however, 9.6% were found to be overweight. The primary sources of nutrition information for the participants were the coaches ( $n=119$ , 76%), followed by the family and friends ( $n=19$ , 12.2%). There were players that never gathered any information related to nutrition ( $n=10$ , 6.4%). The players had Mean  $\pm$  SD  $4.3 \pm 2.2$  years of training in Kabaddi.

Further, based on the categories of sociodemographic variables, proportion of players who scored above and below the mean  $\pm$  SD scores are presented ([Table 3](#)).

Most of the early adolescents (82%) scored below the mean nutritional attitude scores. The male participants scored lower (i.e., below mean  $\pm$  SD scores) in all three domains- knowledge (71%), attitude (60%) and practice (65%) than females. The knowledge (79%) and practice (69%) scores were lower than the mean  $\pm$  SD scores among the players whose mothers were formally educated. However, more than half of the players (52%) whose mothers did not receive formal education scored above the mean  $\pm$  SD scores on nutritional attitude. The proportion of players whose fathers had no formal education and who scored lower than the mean  $\pm$  SD score of knowledge and practice were (75%) and (62.5%), respectively. Greater than half of the children whose mothers were home makers could not

score above the mean $\pm$ SD scores for knowledge (60%), attitude (62.5%) and practice (58%). Also, the proportion of children whose fathers involved in skilled occupation had shown similar lower scores than the mean $\pm$ SD in all three areas of knowledge (55%), attitude (81%) and practice (64%).

**Table 3.** Proportion of players who scored above and below the Mean $\pm$ SD scores.

Parameters	n	Knowledge		Attitude		Practice	
		Below mean n (%)	Above mean n (%)	Below mean n (%)	Above mean n (%)	Below mean n (%)	Above mean n (%)
<b>Age group</b>							
Age (Years) (Pooled)	156	92 (59)	64 (41)	99 (63.5)	56 (36.5)	92 (59)	64 (41)
<15 years	50	23 (46)	27 (54)	41 (82)	9 (18)	28 (56)	22 (44)
>15 years	106	69 (65)	37 (35)	58 (55)	48 (45)	64 (60)	42 (40)
<b>Gender</b>							
Male	84	60 (71)	24 (29)	50 (60)	34 (40)	55 (65)	29 (35)
Female	72	32 (44)	40 (56)	49 (68)	23 (32)	37 (51)	35 (49)
<b>Educational Status of Participants</b>							
Up to Pre-secondary	66	37 (56)	29 (44)	50 (76)	16 (24)	41 (62)	25 (38)
Secondary and above	90	55 (61)	35 (39)	49 (54)	41 (46)	51 (57)	39 (43)
<b>Educational Status of Participant's Parents</b>							
<b>Mothers</b>							
No formal education	42	33 (79)	9 (21)	20 (48)	22 (52)	29 (69)	13 (31)
Educated	114	59 (52)	55 (48)	79 (69)	35 (31)	63 (55)	51 (45)
<b>Fathers</b>							
No formal education	32	24 (75)	8 (25)	16 (50)	16 (50)	20 (62.5)	12 (37.5)
Educated	124	68 (55)	56 (45)	83 (67)	41 (33)	72 (58)	52 (42)
<b>Occupation of Participant's Parents</b>							
<b>Mothers</b>							
Homemaker	144	86 (60)	58 (40)	90 (62.5)	54 (37.5)	83 (58)	61 (42)
Non-Home Maker	12	6 (50)	6 (50)	9 (75)	3 (25)	9 (75)	3 (25)
<b>Fathers</b>							
Unskilled Occupation	103	63 (61)	40 (39)	56 (54)	47 (46)	58 (56)	45 (44)
Skilled Occupation	53	29 (55)	24 (45)	43 (81)	10 (19)	34 (64)	19 (36)
<b>Residents of participants</b>							
Urban	77	53 (69)	24 (31)	53 (69)	24 (31)	53 (69)	24 (31)
Rural	79	39 (49)	40 (51)	46 (58)	33 (42)	39 (49)	40 (51)

Note: Up to pre secondary: < 10th Standard; Secondary and Above:  $\geq$  10th Standard; Unskilled occupation: not professionally trained; Skilled occupation: trained for occupation; Non-Home Maker: Working/Self-employed/ Any occupation.

The correlation analysis was conducted to test the association between knowledge and attitude, attitude and practice and knowledge and practice. A mild positive significant correlation ( $r=.230$ ) between knowledge and practice scores was observed ( $P=0.004$ ), which indicated better nutrition knowledge and translation of the knowledge to better nutrition practices.

Univariate and multivariate analyses were performed to identify the determinants of nutrition KAP scores. Univariate analyses showed that knowledge scores were associated with the education status of the mother ( $P=<0.001$ ), the Father ( $P=0.01$ ) and the urban residence of the participants ( $P=0.006$ ). On the other hand, the nutritional attitude scores were found to be associated with participants' education status ( $P=0.006$ ). Further, the urban residence of participants ( $P=<0.001$ ), and mother's education status ( $P=0.03$ ) were associated with the practice scores of participants.

The age and gender-adjusted multivariate model showed that the higher educational status of the participant's mother was associated with knowledge ( $P=0.01$ ), however, practice scores were associated with the mother's lower educational status ( $P=0.02$ ). (Table 4).

**Table 4.** Determinants of KAP among participants.

Outcome variables	Predictors	Univariate Analysis		Multivariate Analysis*	
		$\beta$ (95% CI)	P Value	$\beta$ (95% CI)	P Value
Knowledge	Mother's Education				
	No formal education	1		1	
	Educated	1.16(0.57, 1.76)	<0.001**	1.07(0.24, 1.90)	0.01***
	Father's Education				
	No formal education	1		1	
	Educated	0.89(0.21, 1.56)	0.01**	0.19(-0.90, 0.94)	0.96
	Residence				
	Urban	1		1	
	Rural	0.75(0.21, 1.29)	0.006**	0.50(-0.02, 1.03)	0.06
Attitude	Father's occupation				
	Unskilled occupation	1		1	
	Skilled occupation	-0.71(-1.26, -0.16)	0.01	-0.54(-1.12, 0.03)	0.06
	Father's education				
	No formal education	1		1	
	Educated	-0.76(-1.40, -0.11)	0.02	-0.26(-1.20, 0.67)	0.57
	Mothers Education				
	No formal education	1		1	
	Educated	-0.79(-1.36, -0.21)	0.008	-0.38(-1.23, 0.46)	0.37
Practice	Participant's education				
	Up to presecondary	1		1	
	Secondary and above	0.74(0.22, 1.26)	0.006**	0.64(-0.04, 1.32)	0.06
	Residence				
	Urban	1		1	
	Rural	0.94(0.47, 1.41)	<0.001**	0.79(0.29, 1.29)	0.002***
	Mother's education				
	No formal education	1		1	
	Educated	0.60(0.04, 1.15)	0.03**	0.60(0.06, 1.13)	0.09***
	Years of Playing	-0.11(-0.22, -0.00)	0.04	-0.09(-0.21, 0.02)	0.13

Note: \*Adjusted for Age and Gender; \*\*Significant result from univariate analysis; \*\*\*Significant result from multivariate analysis; CI = Confidence Interval; Unskilled occupation: not professionally trained; Skilled occupation: trained for occupation; Up to presecondary: < 10th Standard; Secondary and Above: ≥ 10th Standard.

#### 4. DISCUSSION

The present study investigated KAP of sports nutrition among adolescent Kabaddi players and its association with various socio-demographic variables. The results from the present study provide insights to improve KAP of sports nutrition among adolescent players. The important findings of the present study include: 1) Coaches were the primary and the major source of nutrition information to the players; 2) Female players had significantly higher nutrition knowledge and practice scores compared to their male counterparts; 3) The knowledge scores had a significant positive correlation with that of nutrition practice; and 4) A higher education status of the player's mothers predicted nutrition knowledge while mothers with no formal education status, and urban residence predicted the nutrition practice after adjusting for potential confounders.

In the present study, most players received nutritional information from their coaches. Similar results have been reported from earlier studies on Australian and American college athletes ([Devlin & Belski, 2015](#); [Shifflett, Timm, & Kahanov, 2002](#)). However, the nutrition knowledge of coaches needs to be ensured in such scenarios. A UK-study reported poor nutrition knowledge of coaches which limited the provision of appropriate nutrition-related insights to the trainee athletes ([Cockburn et al., 2014](#)). Further, an American study that assessed the nutrition knowledge of coaches reported low knowledge scores (i.e., 55%), which was below the cut off considered for adequate nutritional knowledge (i.e.,  $\geq 75\%$ ) ([Torres-McGehee et al., 2012](#)). The study underscored the need for sports specific nutrition education of the coaches to enhance nutrition knowledge, and healthy eating practices of athletes of players. These findings are important in the context of Indian players primarily because there is no

mandatory sports specific nutrition education for either coaches or players. Further, little opportunities exist to address these underlying sociodemographic variables that influence their nutrition knowledge and practices.

Interestingly, this study reported significantly better nutrition knowledge and practices among female adolescent athletes compared to the male adolescent athletes. The available literature indicated mixed results. While Iranian and Malaysian studies showed similar findings, Bangladeshi study reported contrary outcomes to the present study (Jainie et al., 2021; Naeeni et al., 2014; Sultana, 2021). Additionally, a few studies reported inconclusive results, and did not show any significant difference in nutrition knowledge across genders even after a nutrition education intervention programme (Burkhart, 2010; Ogunsile & Ogundele, 2016). Studies from Iran (on junior school students) and Malaysia (on adolescents) reported higher nutrition knowledge and healthy eating practices among females compared to males (Jainie et al., 2021; Naeeni et al., 2014) however, Malaysian male adolescents practiced healthy food choices (Jainie et al., 2021). Conversely, a Bangladesh study reported higher nutrition knowledge scores among male adolescent athletes than their female counterparts (Sultana, 2021). Finally, a systematic review supported that higher nutrition knowledge among females compared to males, however, underscored the need for studies with larger sample size, well described population of athletes and matched controls to establish the findings (Heaney et al., 2011). Collectively, the above studies indicate a higher nutrition knowledge among adolescent females while males had healthy food choices and eating patterns.

The present study reported a positive relationship between healthy nutrition knowledge and practices among Kabaddi players. A systematic review of Trakman et al., support our findings that adequate nutrition knowledge is a modifiable determinant of dietary behavior and could impact the athletic performance (Trakman, Forsyth, Devlin, & Belski, 2016). Therefore, ensuring appropriate nutrition practices may mediate the association between nutritional knowledge of the players and sports performance.

The sociodemographic factors influence the knowledge, attitude, and practice of nutrition in adolescent players. However, until recently much information was unavailable regarding the determinants of player's KAP of sport nutrition. The present study attempted to identify the determinants of KAP of sports nutrition and found that mother's education status had a direct influence on nutrition knowledge while an inverse association with player's nutrition practice. A few studies reported that maternal education attainment was an important determinant of the practice of healthy and traditional dietary pattern (with low consumption of junk and fast foods) among children (Emmett, Jones, & Northstone, 2015). However, in the present study the inverse association between mother's education and player's nutrition practice could be attributed to a higher maternal education status that enabled a gainful employment. The employed mother had lesser time for food preparation and nutrition care of adolescent players at home. Further, the lesser time for food preparation often could increase the use of unhealthy foods, and hence the nutrition practice, despite their higher nutrition knowledge (Reed, Habicht, & Niameogo, 1996).

Apart from the mother's education status, urban residential status determined the player's nutrition practice scores. Evidence regarding differences in dietary habits and food choices exists between rural and urban settings. Halim and colleagues have reported that the urban adolescents drank more milk (at least once a week) but had less consumption of vegetables compared to rural adolescents (Jainie et al., 2021). The rural adolescents have shown low calcium intake, as evidenced by an earlier literature (Najah, Suzailiana, & Rahimi, 2021). Similarly, another study showed that nutritional practice, food choices and consumption of different food groups were better among urban adolescents than that of the rural adolescents (Naeeni et al., 2014). Conversely, unlike for nutrition knowledge and practice, the sociodemographic variables were not associated with nutritional attitude. The players may have been merely following the nutritional instructions of coaches for the improvement of their performance without being cognizant of its implications and mechanisms.

Strength of the present study is the elaborate, yet specific assessment of knowledge, attitude, and practice of sports nutrition among adolescent Indian Kabaddi players. There is limited information available on the nutrition KAP of Kabaddi players. A smaller sample size of the study limits the generalization of the results; however, the

present study was on group of participants of sport-specific players from nationally representative teams, so the present study provides valuable insights. Further, large scale sports specific studies in this area may provide more insights.

## **5. CONCLUSION**

The present study indicated the need for nutrition education to instill healthy eating practices in athletes and coaches, and insights on the potential impact of sociodemographic factors on nutrition knowledge and practice. Mandatory nutrition education for coaches and young athletes may not only translate to positive nutrition practices but also would influence their development as adults and improve their sports performance.

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