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Impact of food and nutrition security on the selected team games of high school players of Dharwad City, Karnataka

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Abstract

The present study was undertaken to study the impact of food and nutrition security on performance of competitive sports activities among high school players of Dharwad, city, Karnataka. The data was collected under three headings like general background information of the selected sports personnel, baseline information of the selected team games like kabaddi and football for male players. Players were divided in to three groups as control, experimental 1 and experimental 2. All the groups were assessed for physical measurements, physical performance, nutrient intake, nutrition knowledge and practice before the intervention. Experimental 1 and 2 groups received nutrition education for 12 contact hours. Real match was arranged between control and experimental group to evaluate the field performance. Later only one experimental group was supplemented with carbohydrate rich snack (Carbohydrate-72 g) three days before the competition. On the day of competition experimental group received a carbohydrate (6.75%) electrolyte beverage before, during and after the competition. Physical performance was evaluated using AAHPERD physical fitness test.

The findings of impact of nutrition education revealed that overall nutrition knowledge level increased significantly by 26% in male players whereas practice was improved only 10% respectively. The knowledge improvement was better that of practice. The food consumption pattern and food intake significantly improved and increased due to nutrition intervention. Carbohydrate intake after the nutrition education was above 65% in both the players. This was further improved due to carbohydrate supplementation to 70%, which was significantly more that control group. The physical performance results revealed significant improvement in the selected fitness tests like strength, agility and endurance. There was significant improvement in the game performance as evaluated by coaches in all the experimental groups than in control groups and experimental groups had won the match. Self-evaluation by players showed intervention program was useful for their sports performance. The study concluded that nutrition education and carbohydrate supplementation improved the food and nutrition security in turn sports performance of selected team game players.

Keywords: sports performance, food security, experimental group, physical performance

Introduction

Sports are a worldwide phenomenon today. In no period of the world history sports were so popular, organized and important as today. Over the last twenty years, a revolution has occurred in the attitude of people towards sports activities and interest in the competitive sports is mainly directed towards performance. There are numerous federations, which organize sports competition every year from lower level to international level^[1]

The crucial factors that influence athletic performance are physique and physical fitness. Nutrition has a key role to play in determining the physique of a person. Optimal body dimensions are one of the most important pre-requisites of physical fitness and performance^[2]. Body composition reflects the overall nutritional status of an individual^[3]. Nutrition plays an important role in attaining a high level of achievement in sport and athletes, besides other factors like motivation, skill, techniques, commitment, physical fitness and training^[4]

There are no studies available on team games with respect to nutrition education and carbohydrate supplementation, hence the present study is undertaken to study the food and enhance their quality of life.

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Nutrition security of sports personnel and the intervention programme which included nutrition education and carbohydrate supplementation is proposed to improve their nutrition knowledge, practice and sports performance with the following objectives.

- To assess the dietary habits and food security of school children who have represented the school in various sports.
- To assess the food and nutrition security of selected sports personnel.

Material and Methods

Methodology adopted in the present study is discussed under the following headings.

Selection of the Schools and Subjects

The selected urban area namely Dharwad city, is located in the middle region of Karnataka, situated in southern part of India. Dharwad city was selected as the area for research work, as it is the official place of the investigator. Out of 25 schools, eight schools were selected randomly, representing 32 % of the schools to obtain representative samples of the schools. Permission to carry on the research work was taken from the Principals and Physical Education Teachers.

- Formulation of Questionnaire and Checklist
- Baseline Information
- AAHPERD Physical Fitness Tests to assess Physical performance
- Intervention study
- Carbohydrate Loading

Anthropometric measurements

Anthropometric measurements were selected as they are very good indicators of nutritional status or nutrition security. Various measurements like height, weight, mid arm circumference, chest circumference, triceps and biceps (skin fold thickness) were selected and used, as per the guidelines of [5]. The details of the measurements are given below.

AAHPERD Physical Fitness Tests to assess Physical Performance

Physical fitness tests indicate performance of the subjects AAHPERD (American Alliance Health Physical Education Recreation and Dance), [6]. They are widely used in the assessment of sports performance. In the present study five components of physical fitness tests were included. They are speed, strength, agility, flexibility and endurance.

Results and Discussion

The major objective of the present study is to assess the food and nutrition security of school children who are engaged in various sports, to conduct nutrition intervention programme to empower the selected sports personnel with knowledge, practice, nutrition security by education and carbohydrate supplementation and finally to evaluate the impact of nutrition intervention programme on knowledge, practice, food and nutrition security and their impact on physical and field performance. The collected data is discussed under different headings as given below.

Food Security of Selected Sports Personnel

Food intake of selected male sports personnel (per day)

Table 1 depicts the food intake of selected male personnel. There is significant difference in the intake food by both the sports players. The adequacy of cereals in male players was

71%, adequacy of pulses was 53%. Intake of other vegetables and roots and tubers was better than green leafy vegetables. Intake of fats and oils and sugar was exceeded the requirements whereas fruit and milk consumption was less than the recommended dietary allowances.

Table 1: Food Intake of Selected Male Sports Personnel (g/day)

Foods (g)	RDA	Male n=87 (Football & Kabaddi)	
		Intake	% Adequacy
Cereals	420	300±80	71
Pulses	60	32±8	53
Green leafy vegetables	100	45±5	45
Other vegetables	100	52±4	52
Roots and tubers	100	50±9	50
Fruits	100	36±8	36
Milk (ml)	500	300±75	60
Fats and oil	25	42±7	168
Sugar	30	80±20	266
Meat, fish, egg	80	70±20	87

T test results significant at ** 0.01 level.

Nutrition Security of Selected Sports Personnel (per day)

The nutrient intake of different foods of the subjects was calculated from the data obtained by 24 hr diet recall method using ready reckoner as specified in design of the study. Table 2 reveals nutrient intake of male sports personnel. There is significant difference in the intake of calories, protein, and calcium between both the players. The percent adequacy was calculated in comparison with RDA for Adolescents, as RDA for adolescent's athletes is not available.

Table 2: Nutrient Intake of Selected Sports Personnel (per day)

Nutrient	RDA#	Male (n=87)	%Adequacy
Calories (Kcal)	2450	1790 ± 323	73
Protein (g)	70	50 ± 8	71
Fat (g)	22	40 ± 7	181
Carbohydrate (g)	-	230± 35	NA
Iron (mg)	41	10± 2	24
Calcium (mg)	600	386± 66	64

#Compared with RDA for Adolescents. t test results significant at ** 0.01 level.

Overall Physical Performance of Male Players

Table 3 shows the mean of physical parameters of male players. The speed performance of male players was 8.25±0.15 sec. lesser the time taken in seconds better the performance. Performance in speed is better in male [7], studied developmental effects on reaction time. As age increased reaction time increased, with boys having more rapid speed.

Strength performance of male players was 38.99±9.64 cms. Strength differences between the two games are commonly observed. In prepubescent strength performance sex role exceptions are believed to be very influential [8]. The mean flexibility performance of male players was 7.23±4.78. Studies [9] have shown that flexibility increase until early adolescence. Research study by [10] reported that the decline begins around 10 years of age for males and 12 years of age for females. Evidence also shows that older adults have less flexibility than younger adults and girls are more flexible than boys [11, 12, 9].

Agility performance of male players was found to be 11.09±0.81. Reference [13] studied in primary grade children

found a moderately high positive correlation between physical growth and agility performance in boys. A study by [14] noted that both boys and girls increase in agility performance up to 14 years of age, after which girls seem to decline, which boys rapidly gain in agility performance.

The mean endurance performance of male players was 902±120 There was no difference between both the players in endurance performance. As ref [15] compared males who exercised at a heart rate of 75% to 85% of maximum with total distance run held equal. They concluded that the average female expect relative improvement in aerobic power similar to that of male. Reference [16] reported that trained experienced female runners were similar to that of trained male runners in endurance performance.

Of the five tests conducted i.e speed, strength, flexibility, agility and endurance. The AAHPERD physical fitness status given by [17] revealed that both the players fitness performance was at 50th (strength and endurance), 30th percentile (speed) and 25th percentile (flexibility and agility).

Table 3: Physical Performance of Male Team Game Players

Motor components	Male (n=81) (Football & Kabaddi)
Speed (sec)	8.25+0.15
Strength (cms)	38.99+9.64
Flexibility (cms)	7.23+4.78
Agility (sec)	11.09+0.81
Endurance (mts)	902+120.58

T test results significant at ** 0.01 level, * 0.05 level

Impact of carbohydrate supplementation on performance

The impact of carbohydrate supplementation on male players revealed that, among 5 tests conducted i.e., speed, strength, flexibility agility and endurance, strength, agility and endurance showed highly significant improvement ($P \leq 0.01$) whereas speed and flexibility did not show any improvement in performance on carbohydrate supplementation. Muscle size apparently has very little influence on flexibility so in the present study speed is high intensity and short duration activity; hence there was no improvement after supplementation. The result indicates that speed and flexibility performance does not depend on carbohydrate loading whereas energy dependent performance parameters found are strength, agility and endurance.

The performance of repeated strength before carbohydrate supplementation of male players was 40.0 to 47.15cm in experimental group. There is significant improvement in strength after carbohydrate supplementation by 7.15 cms. The agility performance of male players after carbohydrate supplementation significantly improved from 11.1 to 9.75sec in male. The endurance performance of experimental group improved significantly after carbohydrate supplementation in both the players from 911 to 1266 in male

Summary and Conclusion

Based on the results of the intervention study, the food and nutrition security of sports personnel could be improved with appropriate intervention programmes. In the present study, nutrition education as an intervention did improved in the choice of dietary habits, food intake and nutrient intake before during and after the events. Carbohydrate serves as the fuel source for working muscle for most sports. Carbohydrate supplementation no doubt improved selected physical parameters and field match performance among team game players.

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