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Research on nutritional status, physical fitness profile and assessment of knowledge and practices of hockey and tennis players of urban Vadodara

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Abstract
Sports nutrition is a specialization field involving application of nutrition knowledge to a practical daily eating plan focused on providing the fuel for physical activity, facilitating the repair and rebuilding process following hard physical work, and optimizing athletic performance in competitive events, while also promoting overall health and wellness[1]. Good food choices can also promote adaptations to the training stimulus. Each athlete must therefore identify key nutritional goals, in terms of the requirement for energy, protein, carbohydrate, fat and all of the vitamins and minerals that are essential for health and performance.

Keywords: nutrition, carbohydrate, fat, protein, vitamins, minerals, physical activity, fitness, body composition, performance

Introduction

India is experiencing a rapid health transition with large and rising burdens of chronic diseases, which are estimated to account for 53% of all deaths and 44% of disability-adjusted life-years (DALYs) lost in 2005. Studies have shown that mortality to be three times less in the fit people than in the least fit. The fitness benefits of physical activity are well established and there is increasing recognition of the importance of fitness as a key modulator of chronic disease.

Physical activity can be performed by many ways and one of them is “sports”. "Sport" comes from the Old French *desport* meaning "leisure", with the oldest definition in English from around 1300 being "anything humans find amusing or entertaining".

Hundreds of sports exist, from those requiring only two participants, through to those with hundreds of simultaneous participants, either in teams or competing as individuals. Different sports require different levels of training sessions and a balanced diet to have an overall good fitness status. An adequate intake of food stuff is a fundamental to the maintenance of health and survival of the individual [2]. For achieving quality health (desirable body weight and composition specific to the event) and peak performance, it is essential to focus on the task of how an active person or athlete would go about learning what and how much to eat.

Keeping in mind the above mentioned points, rationale of the study was

- Proper diet has the potential to enhance any athlete’s performance regardless of body size or type of activity.
- Proper attention to selection of foods and selection of nutrition supplements keeping in mind athlete’s energy needs, body composition, age, gender, etc enhances sports performance.

Following were the specific objectives of the study

- To assess the socio-economic status of the athletes.
- To assess the nutritional status of selected athletes.
- To assess the body composition and fitness level of study subjects.
- To assess the nutrient intake in the athletes.
- To assess the morbidity and injury profile.
- To assess nutrition awareness among trainers and athletes

Materials and Methods

The present study was planned with an aim to generate a database on nutritional status, body composition and fitness level and nutrition awareness of selected athletes of urban Vadodara.

In order to achieve the objectives of the study, information of athletes of both the sex regarding socio economic profile, anthropometric (height, weight, BMI), dietary pattern (24 hour dietary recall and food frequency checklist), fitness test determining muscle strength, muscle endurance and cardio respiratory fitness and reported morbidity profile (major/minor disease with regard to sports) was collected. Information was collected on knowledge and practices regarding nutrition, general, physiological and social aspects.

Sample Selection

The study was conducted in urban Vadodara city of Gujarat state. A list of sports associations of urban Vadodara was made. President of the association was contacted. On willingness and eligibility subjects, they were enrolled in the study as per the inclusion and exclusion criteria given below. All the subjects were selected purposively. Data on current knowledge and practices, socioeconomic and demographic variables, anthropometry, dietary profile, morbidity and injury profile, fitness test of the participants was collected at the base line.

Inclusion Criteria

- Subjects involved in sports activity from last 1 to 4 years.
- Athletes above age 14 years
- Subjects who are willing to participate

Exclusion criteria

- Athletes suffering from any disease condition
- Differently abled
- Pregnant and lactating female athletes
- Athletes under any drug treatment
- Athletes who are taking training from < 1 year and > 4 years

Athletes and their types

An athlete refers to any individual who is regularly active, ranging from the fitness enthusiast to the competitive amateur or professional. Athletes are basically classified in to two categories: 1. Endurance athletes are those who are engaged in continuous activity lasting between 30 minutes and 4 hours. Ultra endurance are referred as the sub group of endurance athletes who are engaged in extremely long bouts of continuous activity lasting for more than 4 hours example swimming, long distance race, rowing, etc. 2. Power/Strength athletes are those involved in the explosive track and field events, weight lifting, wrestling, etc. These athletes' success in the sports is dependent primarily on demonstration of brute strength or relatively short bursts (< 1.5 minutes) of near maximal muscle force production.

Table 1: Classification of Sports and Games According to Energy Expenditure (ILSI, 2007)

group	Event
Group 1	Power events of higher weight category (80 kg and above): weight lifting, boxing, wrestling, judo, throwing events
Group 2	endurance events: marathon, long distance running, walking, road cycling, rowing middle and long distance swimming
Group 3	team events, athletics and power events of middle weight category (65kg): hockey, football, volley ball, basketball, tennis, sprints, jumpers, boxing wrestling, judo, weight lifting and swimming
Group 4	events of light weight category: gymnastics, table tennis, yatching, boxing, wrestiling, weight lifting and judo
Group 5	skill games : shooting, archery and equestrain

Table 2: Average Body Weight and Energy Expenditure Levels Assumed and Allowance Suggested (National Institute of Nutrition)

Group	Body Weight (Kg)	Energy Allowances		Calories Ratio
		Kcal/Kg/day	Kcal/day	CHO : PRO : FAT
Group 1	85	70	6000	55 : 15: 30
Group 2	65	80	5200	60 : 15 : 25*
Group 3	65	70	4500	60 : 15 : 25
				64 : 15 : 24*
Group 4	60	60	3600	65 : 15 : 20
Group 5	60	50	3000	55 : 15 : 30

*= Glycogen loading

Observations, results and discussions

Phase I: Situational analysis of the sports associations

In this phase, survey on all registered and non-registered sports organizations was done. Survey started from visit to Sports Authority of Gujarat, Kuber Bhavan and Narmada Bhavan of Vadodara. List of authorized and registered sports organizations was taken with official permission letter, consent form and study design. Based on the availability of maximum players from various sports, two sports i.e. hockey and tennis were selected purposively. The data available on list of organizations surveyed is presented in table 3

Table 3: List of organizations surveyed and number of players enrolled

Sr. No	Name of the organization surveyed	Number of Players
1.	Baroda Swimming Association	9
2.	Baroda Hockey Association (Dhanraj Pillai Academy)	55
3.	Baroda Tennis Association (Bal Bhavan)	20
4.	Baroda Badminton Association	19
5.	Baroda Kabaddi Association	Players not available as per inclusion criteria
6.	Baroda Cycling Association	Players not available as per inclusion criteria
7.	Baroda Skating Association	Age group < 10 years
8.	Baroda Athletic Association	10
9.	Hind Vijay Gymkhana	Only carom sport is practiced
10.	Polo Club	Players not available as per inclusion criteria
11.	Navrachana Sports Academy	Players not available as per inclusion criteria
12.	Baroda High School (Danteshwar & ONGC)	15
13.	Physical Education Department, MSU	10
14.	Sama Sports Complex	Hockey and tennis is not practiced
15.	Baroda Tennis Players Association	Players not available as per inclusion criteria

The target group being hockey and tennis, only two associations were coaching them. Out of it, 75 subjects were enrolled in the study as per the inclusion and exclusion criteria and consent.

Phase II: Situational analysis of selected athletes

1. Socio-economic profile

For calculating socio-economic [3]

2. Nutritional status assessment

A. Anthropometric measurements – Height, weight, BMI (For the athletes > 18 years) and for the athletes < 18 years, WHO anthroplus growth charts i.e. BMI for age z- scores were used [4]

B. Body composition and blood pressure–Karada Scan and Sphygmomanoter [5] was used respectively.

3. Diet profile

A. 24 hour dietary recall method
B. Food frequency related to calcium, protein, iron and Vitamin C intake
C. General diet pattern

4. Injury profile

Major illnesses related to organ systems and minor illnesses related to sports

5. Fitness test Profile

A. Cardio respiratory endurance test – Step test [6]
B. Flexibility test – Sit and reach test [7]
C. Muscular strength test – Ab Crunches [7]
D. Muscular endurance test – Pushups [7]

The mean age of male hockey athletes was 15.4±2.14 years which were much similar to the male tennis athletes i.e. 15.23±2.68 years. Moreover similarity of the mean age was found between female hockey and tennis players also i.e. 14.09±0.09 and 14±0.57 respectively. Amount of time spend in specific sports activity in a day by male hockey players was 3.83±1.72 hours and 2.23±1.67 hours by tennis players while comparatively less time was spend by female hockey players i.e. 2.19±1.03 hours and tennis i.e. 2.07±1.36 hours.

Mean weight of male hockey players was 48.15±9.94 kg and that of tennis players was 50.30±12.97 kg. Female tennis players had comparatively more weight than hockey i.e. 51.67±3.60 and 45.34±7.84 respectively. The average fat percent in male hockey players was 20.15 ± 3.87 while in tennis players it was 22.2 ± 4.80. Average fat in female hockey players is 21.6 ± 4.87 while in tennis players it is 23.15 ± 2.39 with 49 % in normal category. Significant difference ($p \leq 0.001$) was found in skeletal mass levels in the leg region of male players and female players. Over all in all age group and gender, iron intake was not fulfilled whereas calcium RDA was met.

Protein consumption was less then recommended hence calorie distribution was unbalanced and fat was fulfilling the requirement. Majority of the players of hockey and tennis irrespective of gender consumed adequate (3-4) meals in a day**.** Consumption of fluid intake was found less when compared with the sports guidelines.

Signs and symptoms of female athlete triad syndrome were also observed which showed that highest number of symptom observed in all the female players was depression, weight loss, loss of appetite and fatigue. Major illness data showed that none of the illnesses with regard to lung, kidney, heart, liver, etc were found. Fitness profile test results depicted that hockey male players could perform better muscular endurance as compared to cardio endurance and overall.

Phase III: Knowledge and practice assessment

Dietary behaviors may hinder health status and athletic performance. With this objective knowledge based data related to sports was collected on various aspects like, general, nutrition, physiological and social aspects. This include knowledge on various nutrients and their functions, Body mass index, body composition, importance of nutrition in sports, body weight.

Table 4: Overall mean scores of knowledge and practice based aspects

Overall	Hockey		Tennis		t test
	Mean±SD	%n	Mean±SD	%n	
Knowledge based total score					-0.23^{NS}
▪ Poor	0±0	0(0)	0±0	0(0)	
▪ Fair	0±0	0(0)	0±0	0(0)	
▪ Good	34±2.82	100(2)	34.66±3.21	100(3)	
Total	34±2.82	100(2)	34.66±3.21	100(3)	
Practice based total score					-0.21^{NS}
▪ Poor	0±0	0(0)	0±0	0(0)	
▪ Fair	0±0	0(0)	0±0	0(0)	
▪ Good	16±0	100(2)	16.33±2.08	100(3)	
Total	16±0	100(2)	16.33±2.08	100(3)	
Knowledge and Practice Score					-0.24^{NS}
▪ Fair	0±0	0(0)	0±0	0(0)	
▪ Poor	0±0	0(0)	0±0	0(0)	
▪ Good	50±2.82	100(2)	51±5.19	100(3)	
Total	50±2.82	100(2)	51±5.19	100(3)	

All the trainers had good knowledge and practices regarding all the aspects. It was depicted that mean total score was seen higher i.e. 51±5.19 in tennis trainers than in hockey trainers 50±2.82. No significant difference was found in knowledge and practices based questions as well as in total mean scores.

Highlights of phase III

In overall scoring of athletes, significant difference ($p \leq 0.05$) was found in knowledge category score of boys and practice category score of girls ($p \leq 0.001$).

Highest score in knowledge category was reported by male tennis players i.e. 27.9±3.3. While in practice category score, highest mean score was reported by female players practicing tennis i.e. 15±2.44. Male tennis players were found to have highest overall score i.e. 41.69±4.73 which was found to be in good category.

In nutrition aspect of practice category score, highest score reported was 15.3±1.98 by male tennis players. In overall practice, highest mean score was reported by female players practicing tennis i.e. 15±2.44. Male tennis players were found to have highest overall score i.e. 41.69±4.73. Significant difference ($p \leq 0.05$) was found in overall scores between male players in which tennis players were found to have good knowledge and practices than hockey.

Thus, inspite good knowledge and practices among trainers

it could be observed that with regard to nutrition and physiological aspect, players were found fair in their knowledge and practice. There would not be any communication and counseling may be with these aspects among trainers and players. This suggests frequent reinforcement among trainers and demand of imparting education to players.

Future recommendations

Present study clearly indicates interplay of diet, body composition, fitness profile and sports injuries in overall performance of an athlete. From the conclusions of the present study, following recommendations can be given:

- More intense database of the diet, nutritional status, disease and fitness profile of players with different age and gender is required.
- Trainers should provide knowledge on nutrition and physiological aspects to athletes.
- A need to emphasize on sports injuries and its immediate treatment in the field.
- Need to encourage proper physical activity training which improves cardio endurance, muscular endurance and muscular strength with the impact on their sports performance.
- A need to check on hydration status of athletes.
- Athletes should be given encouragement to know the vital role of nutrition in sports and basic knowledge on nutrients and their role in sports.

Summary and conclusion

An athlete's dietary regimen places a vital part in accomplishing his/her goals because it allows the athlete to reach his/her maximum performance. This illustrates how an athlete should apply the necessary nutrition in order to benefit from training and to maximize his/her capability during exercise and activity. Thus, every sport type of physical activity varies in its appropriate diet which benefits the athlete.

Scientific knowledge of sports nutrition in India is scarce and the information available from various international sources on energy requirement cannot be applied to Indian athletes since they are too generalized and ethnic specific. So there is high need of nutrition health education for better performance and also to maintain optimum nutritional status

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