

Assessment of Nutritional Status, Nutritional Knowledge and Impact of Nutrition Education among Selected Sports Persons of Coimbatore District

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Abstract: ***Background:** Nutrition plays an important role for attaining high level of achievement in sports and athletics, besides other factors such as motivation, skill, techniques, commitment, physical fitness and training. Studies suggest that athletes lack knowledge of nutrition, healthy food choices, components of a well-balanced diet, and the implications of nutrition on performance. **Objectives:** The aim of this study was to improve the science based knowledge of the role of nutrition in sports among those involved in athletic performance. **Methods:** One hundred sports persons (20-35 yrs) were selected through the purposive random sampling method from two different colleges situated in Coimbatore district, Tamilnadu, India. Athlete's nutritional status was assessed by gathering information on the Anthropometry, Biochemical parameters, Dietary intake and imparting Education. All the selected samples completed the well structured, standardized and pretested interview schedule. Nutrition education was imparted to the participants at the end of the study. The collected data were statistically analyzed. **Results:** The results of the anthropometric measurement showed that majority (55 percent) of the selected sports persons were underweight. The hemoglobin levels showed that about 60% of selected sports person were anemic. There exists an inadequacy in dietary intake of important nutrients. The study showed the sports person lack nutrition knowledge. Nutrition education improved their mean awareness score from 7.75±3.52 to 15.35±4.43. **Conclusion:** The findings of the present study indicate that nutritional status of selected sports persons in Coimbatore district was poor. There exists a dietary inadequacy of both macro and micronutrients. Nutrition education has definitely improved the nutritional knowledge of the selected sports person.*

Keywords: Sports person, nutritional status, nutritional knowledge, dietary practices, nutrition education.

1. Introduction

Nutrition is an important component of any physical fitness program. The main dietary goal for active individuals is to obtain adequate nutrition to optimize health and fitness or sports performance. [1] This is not only important to help to improve performance but also to promote healthy dietary practices in the long term [2]

Over the past 20 years, researchers have documented the benefits of nutrition related to exercise performance. In a joint position statement, the American College of Sports Medicine, American Dietetic Association, and Dietitians of Canada reported that "physical activity, athletic performance, and recovery from exercise are enhanced by optimal nutrition." [3]

A reasonable strength and condition program and a well balance diet must be presented as a sensible alternative to a riskier, shortcut mindset[4].

Young athletes have more nutritional needs because of physical activity and physical development. Optimal athletic performance results from a combination of factors including training, body composition, and nutrition. [5]

Nutrition plays an important role for attaining high level of

achievement in sports and athletics. Physical fitness and training are very much depended on nutritional status of sports personnel. Diet significantly influences the performance of athletes. [6]

There is strong evidence that appropriate selection of nutrients, timing of intake and proper supplement choice are associated with optimal health and exercise performance[7]

Regular physical activity (PA) can alter the requirements for some micronutrients[8]. This makes it important to choose foods carefully, taking into account the quality and quantity of macronutrient intakes, since requirements can vary depending on the type of exercise performed [9].

2. Objectives

The purpose of this study was to assess the nutritional status of sports person highlighting their nutritional knowledge and special dietary practices. The participants were educated on importance of nutrition on performance.

3. Materials and Methods

3.1 Participants

The participants of the study were 100 sportspersons aged between 20-35 years selected through the purposive random sampling method. The sports person was selected based on their willingness to participate in the study. With due consent from the management authorities the survey was conducted. The entry criterion for participants was that sportsperson needed to be between the ages of 20-35 years old.

3.2 Development of tool

Interview schedule was designed to elicit information from all sportsperson on their socioeconomic background, personal habits, details regarding sports profile and nutritional profile. Nutritional profile included the data about the anthropometric measurement, bio-chemical assessment (n=20 males) and dietary assessment. Precise information on food consumption pattern of sports person was gathered through 24 hour dietary recall method. The intake of macro nutrients and micro nutrient viz., carbohydrate, protein, fat, fiber, iron, calcium, thiamin, riboflavin, niacin and vitamin C was computed using the values given in the Nutritive Value of the Indian Foods. Besides, details regarding the special dietary practices followed by sportspersons were also included along with basic dietary habits. The pilot survey was completed among sportsperson (n=20) of same age. Suggestions from the experts and feedback from the pilot study were considered, and appropriate corrections were made. The developed interview schedule was coded and used for evaluation.

3.3 Nutrition Education

Nutrition education programme was carried out for sports person, consisting of one hour contact class. The contact class included power point presentation. Pamphlets were also distributed at the end of the programme. The sports people were evaluated before and after the nutrition intervention programme using a check list.

3.4 Data Collection and Analysis

Each athlete was given the schedule to complete using as much time as necessary to answer all the questions. The survey was conducted during the break hours without disturbing the routine. Specific verbal instructions were provided wherever necessary. The data was consolidated, tabulated and statistically analyzed using mean value, standard deviation and t test.

4. Results

4.1 Demographic Information

Results pertaining to the demographic information of the selected sportsperson are given in Table 1

Table 1: Demographic Information of the Selected Sports

		Person N=100
S. No	Particulars	Per Cent of Sports person
1	Gender	
	Male	88
	Female	12
2	Age (yrs)	
	20-24 Yrs	52
	25-30 Yrs	38
	30-35 Yrs	10
3	Religion	
	Hindu	77
	Christian	12
	Muslim	01
4	Family Type	
	Nuclear	54
	Joint	46
5	Personal Habits	
	Smoking	20
	Tobacco	17
	Alcoholism	03
	None	60

The results showed that 88 percent of selected sports person were males. The remaining 12 percent of subject were females. Of the selected sports person, the majority of sports person (52 percent) belonged to 20-24 years, while 38 percent were within 25-30 years of age and the ten percent were between 30-35 years. The major religious category among the selected sports person was Hindus (77 per cent), 12 percent were Christians and one per cent belonged to Muslim community. The family type of the subject showed 54 percent sports person hailed from nuclear family background, while 46 percent from joint family system. It is heartwarming to note that about 60% of the selected sports person did not have the habit of smoking or tobacco or alcohol or steroid while 20 percent of sports person had the habit of smoking. About 17 percent of sports person had the habit of consuming alcohol and a few of them were using tobacco. It is interesting to note that nobody was using steroid.

4.2 Nutritional Assessment

Physical fitness and training are very much dependent on nutritional status of sports personnel[10]. The foundation of an effective nutrition care plan for active individuals should integrate assessments of psychosocial, biochemical, nutritional and physical status factors[11]. The nutritional assessment was carried out in the study for the selected sports person. Tables 2 and 3 show the anthropometric measurements.

4.2.1 Anthropometric Measurements

Table 2: Anthropometric Measurement of the Selected Sports Person
N=100

S. No	Particulars	Height(cm)		Weight(kg)	
		Mean±SD	Std*	Mean±SD	Std**
1	Male (n=88)	168.9±7.72	177	58.1±5.6	60
2	Female (n=12)	156±11.7	164	45±8.1	55

* NCHS/ICMR standards 2004⁵⁵

**ICMR, 2010

Body weight is the most widely used and sensitive and simplest reproducible anthropometric measurement for the evaluation of nutritional status of individuals. It indicates the body mass and is a composite of all body constituents like water, mineral, fat, protein and bone. It reflects more recent nutrition than does height. Height is affected only by long-term nutritional deprivation; it is considered an index of chronic or long duration malnutrition. The mean height (168.9 cm ±7.72) and weight (58.1kg ±5.6) of the selected male sports persons (Table 2) was less than the standards and same trend was observed among the selected female sports person.

Table 3: BMI , MAC and CC of the Selected Sports person
N=100

S No	Particulars	Per cent of Sports person (%)
1	BMI	
	Under weight	55
	Normal	36
	Overweight	07
2	Mid Arm Circumference (MAC in cm)	
	20-24.9	22
	25-29.9	77
3	Chest Circumference (CC in cm)	
	70-79	16
	80-89	57
	90-99	23
	100-109	04

BMI is a relative body weight assessment and widely accepted tool in determining obesity[12]. The BMI value shows that majority of the selected sports persons were underweight. Also, majority (77 percent) of the selected players had MAC ranging between 25- 29.9 cms and about 57 per cent had a chest circumference ranging between 80-89cms.

4.2.2 Blood Hemoglobin Levels

Table 4: Hemoglobin Level for the Selected Male Sports person
N=20

S No	Hemoglobin Status	Per cent(%) of Sports person
1	Below Normal	60
2	Normal	40

Normal Value= 17 g%(RDA, 2010)

Athletes are dispersed along spectrums between health and dysfunctions[13].Athletes may be iron deficient due to poor dietary intake, significant or obligatory blood loss, or deficiency via increased need secondary to intense physical activity. Athletes who are found to be anemic secondary to iron deficiency do benefit and show improved performance with appropriate iron supplementation[14]. The results of present study (Table 4) indicate about 60 percent of sports person were anemic and 40 percent had the normal level of hemoglobin. The finding of the present study goes in accordance with the observations made by Beard and Tobin[15] who stated the prevalence of iron deficiency anemia is likely to be higher in athletic populations and

groups. In anemic individuals, iron deficiency often not only decreases athletic performance but also impairs immune function and leads to other physiologic dysfunction.

4.2.3 Dietary Practices

Table 5: Dietary Habits of Selected Sports person
N=100

S No	Particulars	Per cent (%) of Sports person
1	Diet	
	Vegetarian	15
	Non-vegetarian	80
2	Daily Meal Pattern	
	Twice	52
	Thrice	25
	More than thrice	8
	Twice with snacks	10
3	Skipping of Meals	
	No	35
	Yes	65
	• Breakfast	15
	• Lunch	26
4	Preference for Junk Foods	
	Fried Foods	26
	Bakery items	54
	Chat Items	7
	Others	13

From the results (Table 5) it is clear that majority of the sports person (80%) were non-vegetarians, 15 percent of the selected sports person were vegetarians and the rest of the subject were ova-vegetarian. The daily meal pattern of the selected subject showed that 52 percent of sports person took two meals per day, 25 percent three meals per day, 8 percent more than three meals a day. While 10 percent of sports person had the habit of taking two meals with snacks, 5 percent sports person consumed three meals with snack.

Kumudini[16] noted that 85 per cent of sports women were consuming vegetarian diet and 10 per cent were consuming mixed type of diet and only 5 per cent sports women were consuming non vegetarian diet. Regarding meal pattern it was noted that an overwhelming majority of sports women (85%) were following 3 times meal pattern only 10 per cent sports women were following 4 times meal pattern whereas only 5 per cent sports women were following 2 times meal pattern conclusively it may be say that majority of sports women accustomed to vegetarian food and following 3 times meal pattern.

It appears from the existing (albeit limited) body of research that increased meal frequency may not play a significant role in weight loss/gain when under-reporting, restrained eating, and exercise are accounted for in the statistical analyses. Furthermore, most, but not all of the existing research, fails to support the effectiveness of increased meal frequency on the thermic effect of food, resting metabolic rate, and total energy expenditure [17].

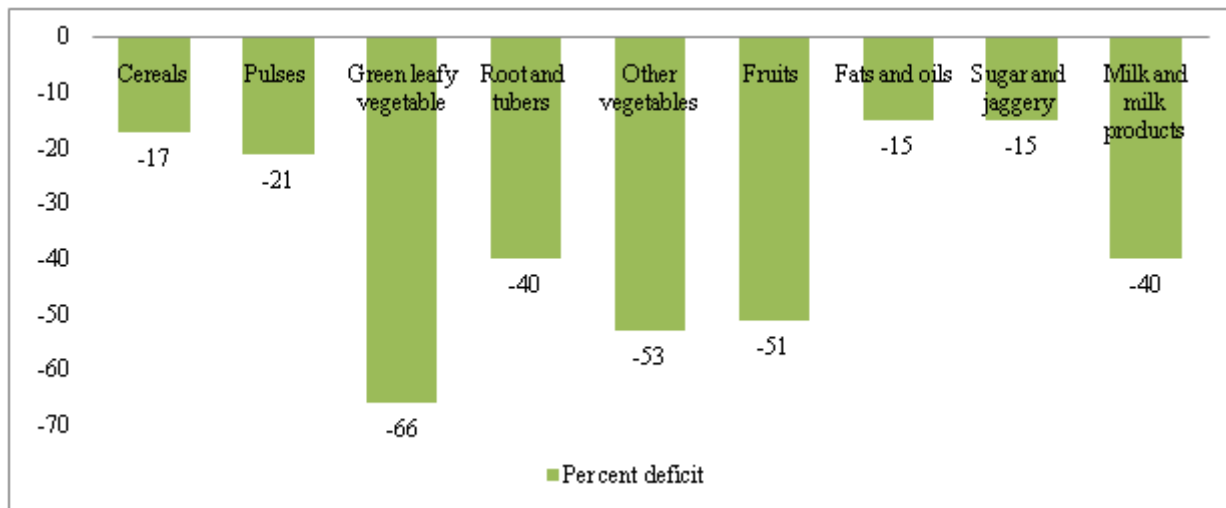
Majority (65%) of the sports person had the habit of skipping meals. Of this 15 percent skipped breakfast, 26 percent

lunch, 24 percent dinner. All the selected sports person had the habit of eating junk foods. Convenience and taste create a center of attention towards junk foods. Sports Persons are not exceptions in this case. Majority (54%) of the samples consumed bakery items and about 26 percent sports person preferred fried foods. Less healthy food choices are made by adolescents who miss breakfast at least once a week compared with those who have breakfast every day. It has also been noted that there is a higher frequency of snack consumption in both healthy as well as unhealthy dietary

behaviour and lifestyle patterns[18].

4.2.4 Food and Nutrient Intake

Good nutrition requires adequate caloric and nutrient intake in order sustain positive energy availability. Adequate nutrition has been proven to increase overall performance and may give athletes a competitive edge[19]. The details regarding the mean food intake of the selected sports person is given in Figure 1.



*ICMR, RDA (2010)

Figure 1: Percent Deficit Food Intake of the Selected Sports person

The mean food intake sports person is given in the Figure 1. The cereal intake was deficit by 17 per cent, pulses by 21 per cent, the green leafy vegetables by 65 per cent, root and tubers by 40 per cent, other vegetable by 53 per cent, fruit

consumption by 51 per cent. Fat and oil intake was deficit by 15 per cent, sugar and jaggery by 15 per cent and milk and milk product was deficit by 40 per cent.

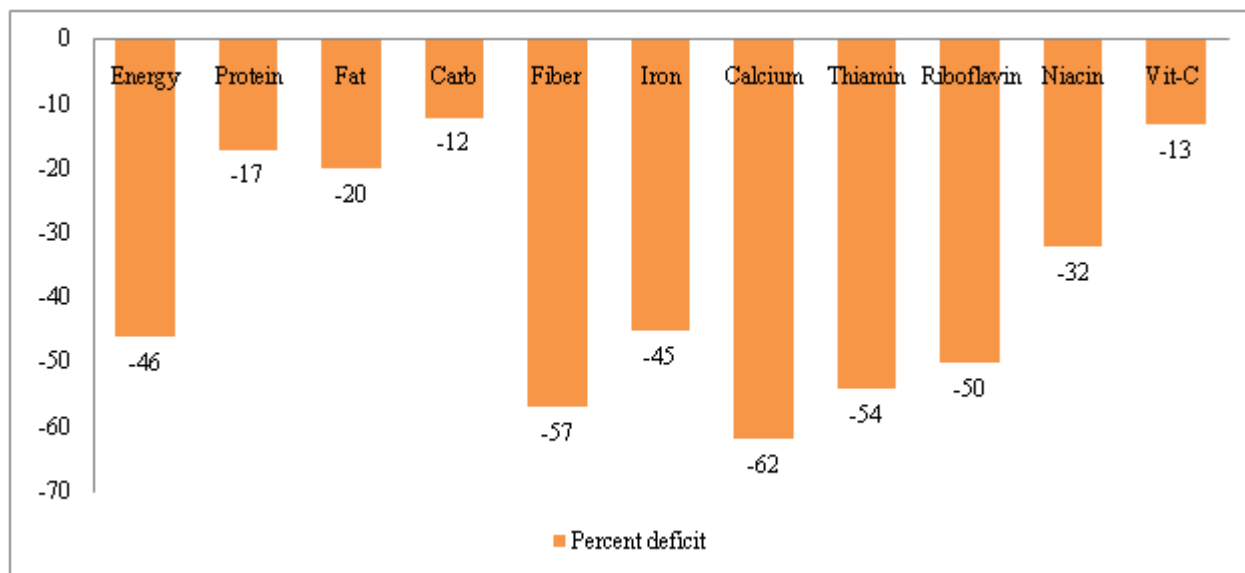


Figure 2: Per cent Deficit Nutrient Intake of the Selected Sports Person

*ICMR , RDA (2010)

The energy intake was deficit by 46 per cent, carbohydrate by 17 per cent, the protein intake by 20 per cent, fat by 20 per cent and fiber by 57 per cent. Minerals like iron consumption was deficit by 45 per cent and calcium

consumption by 62 per cent, niacin consumption by 32 per cent, and vitamin C consumption by 13 per cent. The mean intake of all the nutrients was less than the RDA. The female collegiate swimmers demonstrated fair nutritional knowledge

while demonstrating a lack of application of their knowledge to their current dietary habits. About 90% of the sports person did not meet the RDA for all the macronutrients (proteins, carbohydrates, or fats), and many were outside of normal ranges for calcium, iron, and zinc consumption [20].

4.2.5 Dietary Practices Pertaining to Sports Activities

Table 6: Dietary Practice of the Selected Sports person
N=100

S. No.	Particulars	Per cent(%) of Sports person
1	Carbohydrate loading before event	
	Always	22
	Occasionally	35
	Rarely	43
2	Restriction of Fat Intake	
	Always	22
	Occasionally	41
	Rarely	37
3	Water Intake Per day	
	6-8 glasses	18
	8-10 glasses	23
	>10 glasses	59
4	Consumption of Sports Drink	
	Always	3
	Occasionally	2
	Rarely	95
5	Electrolyte consumption	
	Always	36
	Occasionally	2
	Rarely	62
6	Mode of Consumption of electrolyte	
	Mixed with water	36
	Mixed with soda	1
	Powder Form	1
7	Ergogenic aid	
	Yes	11
	No	89

Table 6 shows the dietary practice of the sports person. Only 22 per cent of the selected sportsperson had the habit of carbohydrate loading before the event, while 35 per cent followed it occasionally and 43 percent rarely followed carbohydrate loading. Twenty two per cent of the sports person restricted fat intake always while 37 per cent did not restrict. Fifty-nine percent of sports person consumed more than ten glasses of water per day, 23 percent consumed 8-10 glasses and 18 per cent consumed 6-8 glasses/day. It was surprising to note that 95 percent of sports person did not consume the sports drink. The data regarding electrolyte consumption shows that 36 percent of sports person always consumed electrolytes while two percent were consuming occasionally. On analyzing the mode of consumption of electrolyte, most of the sports person consumed with water while 2 percent mixed with soda and in powdered form. It was heartening to note that 89 per cent of the sports person did not consume any ergogenic aid.

4.3 Sports Profile

Table 7: Sports Profile of the Selected Sports person
N=100

S No	Particulars	Per Cent of Sports person
1	Type of Sport Involved	
	Athletic Event	11
	Group event	89
	Cricket	14
	Foot ball	14
	Hockey	13
	Kho-kho	3
	Kabady	13
	Hand ball	5
	Basket ball	9
	Volley ball	18
2	No of Years Engaged in Sports	
	< 5 Yrs	25
	5-10Yrs	52
	>10Yrs	23
3	Duration of Practice	
	Up to 1 hr	39
	1-2 hrs	15
	2-3 hrs	46
4	Practice Session	
	Only Morning	5
	Only Evening	4
	Both Morning and Evening	91
5	Meritorious Achievement	
	College level	15
	Inter university level	35
	District Level	20
	State Level	7
	National Level	3
6	Serious Injury while playing	
	Yes	17
	No	83

The Table 7 shows majority (89%) of sports person were involved in group event, in which 18 per cent of sports person were volley ball players, 14 per cent each were involved in foot ball and cricket and 13 per cent each in hockey and kabadi. Three and five percent of sports person were playing kho-kho and hand ball respectively. Majority (52%) of the selected sports person were involved in sports for the past 5-10 years and 46 percent practiced for 2-3 hours a day. Ninety one percent of sports person practiced both in the morning and evening session. Thirty five of the sports people were inter university level achievers and three percent national level achievers. Majority (83%) of the sports person did not have serious injury while playing.

4.4 Nutrition Education

Table 8: Impact of Nutrition Education on the Nutrition knowledge of Selected Sports person
N=20

Score before education Mean ±SD	Score after education Mean ±SD	't' Value	Significance
7.75±3.52	15.35±4.43	4.2	**

** Significant at one percent level

Athletes received most of their nutritional knowledge from parents, coaches, and peers, yet many athletes' knowledge bases were lacking and incorrect[21] [22]. This lack of

accurate information may lead to an increased chance of athletes developing one or more aspects of the female athlete triad due to poor food choices and the resultant nutritional inadequacies mentioned previously [20].

Table 8 shows the information about nutrition knowledge of selected sports person. Mean score before nutrition education was 7.75 ± 3.52 while after imparting the nutrition education, the mean score increased to be 15.35 ± 4.43 . Statistical t test showed that there was a significant difference in the nutritional knowledge of sports person before and after education.

5. Discussion

5.1 Demographic Information

The decision to participate in sports is affected by a wide range of demographic and socio economic factors. Statistics shows that female sports do not carry the same weight as male sports. Of the 100 sports person included in the present study, only 12 per cent were females.

Not surprisingly, sports participation tends to be lower among older people and higher among younger people. The data of this study suggests that a proportion of young people reduce activity levels around mid twenties to late thirties.

India is one of the most religiously diverse nations in the world and religion still plays a central and definite role in the life of many of its people. Despite its secular nature, Hindus outnumbered other religions.

Participation in sports and recreation varies by household type. Sports person from nuclear family are more likely to participate in sports activities than joint family.

Habits like smoking, tobacco and alcoholism tend to produce both short term and long term effect on sports performance. About 60 per cent of the selected sports person were aware of it and did not have these habits.

5.2 Nutritional Assessment

5.2.1 Anthropometric Measurement

The mean height and weight of both male and female sports person was significantly lower than NCHS as evident from the table. This shows that the intake of nutritious food during their growth period has been inadequate. Previous researches with the BMI standards among athletes indicate 32 percent of the athletes were overweight; 17 percent were obese. Twenty-five percent of adult males and 73 percent of adult females had a high risk waist circumference. Athletes at high risk for obesity-related diseases were referred to their primary physician for follow up [23]. In concordance with the above study, both male and female participants had mean height and weight lower than NCHS standards. In contrary to the above study, the more than half of the selected sports person were underweight.

5.2.2 Blood Hemoglobin Levels

Hemoglobin is used by the red blood cells to deliver oxygen and remove carbon di oxide from an athletes' exercising

muscle. The biological significance of O₂ transport by Hb is well-illustrated by anemia where decreased Hb also decreases exercise performance despite a compensatory increase in cardiac output [24] [25]. In the present study majority (60 per cent) were anemic. Several investigators have proposed mechanisms by which iron balance could be affected by intense physical exercise [26] [27] [28] [29]. Explanations include increased gastrointestinal blood loss after running and hematuria as a result of erythrocyte rupture within the foot during running. The possibility of increased red cell turnover in athletes is supported by the ferrokinetic measurements conducted by Ehn [30] et al who demonstrated that the whole-body loss of radioactive iron occurred $\approx 20\%$ faster in female athletes than in nonathletes, and both were faster than that in adult men.

5.2.3 Dietary Practices

Results about fast food consumption revealed that 25.49% of the participants ate fast food only once a day and 4.58% of the participants did not eat in the past seven days. These numbers are surprising considering the prevalence of fast food in today's world. Eating fast food only one time in a week is not a poor choice when considering that some fast food choices may actually be healthy [31].

Buergel's [32] study indicated that only 41 per cent eat breakfast, while Hickson [33] study indicated that only 19 per cent of his sportsmen ate breakfast compared with the present study where 85 per cent sports person consumed breakfast.

One study indicated that 77.5% of participants ate junk food daily and the majority consumed junk food several times a day [34]. In the present study, almost all participants had preference for junk foods and 54 per cent preferred bakery items. The data is not surprising considering the prevalence of fast food in today's world.

5.2.4 Food and Nutrient Intake

Results of the present study shows that the selected participants are not getting recommended servings of GLV, other vegetables and fruits which strongly reflects on the deficiency of mineral and fiber intake.

Other research by Ousley-Pahnke et al [22], Hawley et al [35] and Barbara et al [20] demonstrated energy deficits present among female swimmers which may be followed by a decrease in performance. Hassapidou et al [36] asserts that the presence of this unbalanced diet leads to sub-maximal performance in the female swimmer. Deficit energy intake accompanied with unbalanced intake of nutrients will definitely have an impact on the performance of the participants of the study.

Calcium is a very important mineral needed for strong healthy bones. Besides, it helps in muscle contraction and relaxation, blood clotting and neuro transmission. Some athletes see their cramps disappear by boosting their diet with foods rich in calcium [37]. Inadequate intake of calcium can be big health risk for participants of the present study now and in the future.

Iron is another critical micro mineral which can impose sports anemia affecting performance. Iron deficiency anemia will slow even the fittest and best conditioned endurance athlete[37]. For men and women who engage in regular, endurance exercise there is a greater loss of iron. In addition, decreased iron stores have been documented in athletes because iron has a shorter half life in these individuals. A conservative estimate is that athletes need 30% more iron than individuals who do not exercise [38].

Previous studies indicate that more than 50% of female swimmers do not meet the recommended dietary allowance (RDA) for iron or calcium[39] [40]. Nutrient intake of elite athletes is a critical determinant of their performance and ability to compete. The nutrient intake shows significant variation with respect to sports discipline and body weight. The nutrient intake of the sportsmen was well comparable with RDA expect for protein and iron[31] in contrary to the present study where there was a deficit intake of almost all nutrients.

5.2.5 Diet Practices pertaining to sports activity

In the present study only 22 per cent of participants had the habit of carbohydrate loading before event. Increased dietary carbohydrate intake can result in enhanced endurance exercise performance by increasing muscle glycogen stores[41], but may not in all instances as displayed by Burke et al. [42].

While only 22 per cent restricted their fat intake in the present study, reviews suggest that if an athlete eats an increase in fat and does not consume adequate carbohydrates, the fat cannot be easily used as energy in the body and protein will be used, resulting in muscle breakdown. [43]

Fluid loss during strenuous, long duration exercise is commonplace and can result in thermal stress, impaired cognition and cardiovascular function, accelerated fatigue, and impaired exercise performance[7], [44]. Recommendations for fluid intake before, during, and following exercise are well described [45] [46] and are typically followed by most athletes seeking enhanced physical performance. Abiding by such recommendations appears particularly important when exercising in hot and humid environmental conditions, where fluid loss may be high[47]. Good hydration trend was observed among the selected participants.

It is saddening to note that consumption of any type of sports drink is uncommon among the selected participants. However, before looking in for supplements for a boost, a smart sports diet and a sound training program should be in place[37].

Apart, electrolyte consumption was very rare among the selected sports person. Electrolyte supplementation improves taste, stimulate thirst response and minimize dehydration [48].

Ergogenic aids (from the Greek, ergon, meaning work) are ingested to enhance energy utilization in athletes. In recent years there has been an increase in youth participating in

competitive sports and, as a consequence, a concomitant increase in the usage of performance enhancing substances. Ergogenic aid usage could influence, or its efficiency could be influenced, during this period of rapid growth and sexual maturation, and by the marked hormonal fluctuations. Ephedra alkaloids; pain relief medications, diuretics, anabolic steroids and protein hormones are among the ergogenic aids used by young athletes[49]. In contrast, majority (89 per cent) of the selected sports persons in the present study did not consume any ergogenic aids.

Consuming adequate food and fluid before, during, and after exercise can help maintain blood glucose during exercise, maximize exercise performance, and improve recovery time. Athletes should be well-hydrated before beginning to exercise; athletes should also drink enough fluid during and after exercise to balance fluid losses. Consumption of sport drinks containing carbohydrates and electrolytes during exercise will provide fuel for the muscles, help maintain blood glucose and the thirst mechanism, and decrease the risk of dehydration or hyponatremia[50].

Awareness need to be created among the sports person to improve electrolyte consumption and ergogenic aid consumption.

5.3 Sports Profile

Volley ball is the event played by majority of the selected subjects. Having its origin in United States back in 1895, the sport was officially included in the program for the 1964 Summer Olympics. It is a sport played all over India, both in rural as well as urban India. It is a popular recreation sport. India is ranked 5th in Asia, and 27th in the world. Doing well in the youth and junior levels, India came in second in the 2003 World Youth Championships. Currently, a major problem for the sport is the lack of sponsors. The Indian senior men's team is currently ranked 30th in the world.

Cricket and football are the group events played by majority of participants next to volley ball. Cricket was first played in southern England in the 16th century. By the end of the 18th century, it had developed to be the national sport of England. The expansion of the British Empire led to cricket being played overseas and is one of a commonly played game in India. Football is India's second most popular sport, next to the game of cricket. India's current top domestic league, I-League, was formed in 2007 in an attempt to professionalize domestic football. The 2017 FIFA U-17 World Cup is scheduled to take place in India.

Although hockey being the national game of India, very few people show interest when compared to other games. Indian hockey has lost a bit of identity as a national sport although it is considered to be an intrinsic part of the culture of a nation. Indian Hockey Federation has to search for the new talent and should work on them to make them good players so that they can compete in big events like Olympics. Kabbadi originated from Tamil Nadu and is played in various parts of India like Karnataka, Andhra Pradesh, Punjab and Maharashtra. Since kabbadi is a local game, some of the selected sports person is involved in this game

Basket ball, hand ball and kho kho were also played by few of the selected participants. Nearly half of the selected participants were involved in the sports for 5 – 10 years and practiced 2 – 3 hrs a day. However, meritorious achievement data showed only a few sports person succeeded in state and national level competitions. The availability of infrastructure, proper coaches, motivation and financial support were the reasons to help and support the sports people in their respective field and achieve their goals.

5.4 Nutrition Education

Athletes, coaches, athletic trainers (ATs), strength and conditioning specialists (SCSs) have busy schedules; therefore, an expert in nutrition (eg, an RD (Registered Dietitian), if available) needs to develop a working relationship with the athletic staff and provide education and counseling about food and nutrition [51]. Overall, participants had just below-average nutrition knowledge for all domains. The findings regarding the overall nutrition knowledge of ATs are similar to those of previous investigations [39] [52] [53]. A short – term nutritional education program can significantly improve supplementations knowledge [54]. In accordance with the above study, the participants of the present study showed a significant improvement in the nutritional knowledge after a short term nutrition education programme.

6. Conclusion

The participants of the present study had a below average nutritional status. The reason may be poor nutritional knowledge which is reflected in their nutrient intake. Nutrition education has definitely created awareness among the selected sports person which would in long run help improve their nutritional status.

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References

- [1] Berning JR. Nutrition for Exercise and Sports Performance. Krause's Food. In: Mahan KL, Escott-Stump S, editors. Nutrition and Diet Therapy. 10th ed. Saunders Company; 2000; p. 535.
- [2] Jonnalagadda SS, Rosenbloom CA, Skinner R. Dietary practices, attitudes, and physiological status of collegiate freshman football players. *J Strength Cond Res.* 2001;15:507–13.[PubMed]
- [3] American College of Sports Medicine, American Dietetic Association, Dietitians of Canada. Nutrition and athletic performance: joint position statement. *Med Sci Sports Exerc.*2009;41(3):709–731. [PubMed]
- [4] Weber. Validity of self-reported dietary intake at school meals by American Indian children; the pathways study. *J Am Diet Assoc.*2004 ;101:746–752. [PubMed]
- [5] Daneshvar P, Hariri M, Ghiasvand R, Askari G, Darvishi L, Iraj B, et al. Dietary behaviors and nutritional assessment of young male isfahani wrestlers. *Int J Prev Med.*2013; Apr;4(Suppl 1):S48-52.
- [6] Burke, L.M. Practical issues in nutrition for athletes. *Journal of Sports Science.* 2001; 13: s83-s90.
- [7] Rodriguez NR, Di Marco NM, Langley S, American Dietetic Association, Dietitians of Canada, American College of Sports Medicine: American College of Sports Medicine position stand. Nutrition and athletic performance. *Med Sci Sports Exerc* , 2009; 41:709-731.
- [8] Woolf K, Manore MM. B-vitamins and exercise: does exercise alter requirements? *Int J Sport Nutr Exerc Metab.*2006; 16(5):453-484. PubMed Abstract
- [9] Rousseau AS, Robin S, Roussel AM, Ducros V, Margaritis I. Plasma homocysteine is related to folate intake but not training status. *Nutr Metab Cardiovasc Dis* 2005, 15:125-133. PubMed
- [10] Beals KA, Manore MM. Nutritional status of female athletes with subclinical eating disorders. *J Am Diet Assoc.*1998;98:419–25.[PubMed]
- [11] Storlie J. Nutrition assessment of athletes: A model for integrating nutrition and physical performance indicators. *Int J Sport Nutr.*1991 ; 1: 192-204.
- [12] William C. Etchison, Elizabeth A. Bloodgood, Cholly P. Minton, Nancy J. Thompson, Mary Ann Collins, Stephen C. Hunter, et al. Body Mass Index and Percentage of Body Fat as Indicators for Obesity in an Adolescent Athletic Population Sports Health: A Multidisciplinary Approach 2011;3:249-252
- [13] Beals KA, Manore MM. Disorders of the female athlete triad among college athletes. *Int J Sports Nutr Exerc Metab.*2002;12:281–293. [PubMed] [Ref list]
- [14] Rodenberg RE and Gustafson S . Iron as an ergogenic aid: ironclad evidence. *Current Sports Medicine Reports* .2007;6(4):258-64.
- [15] Beard J and Tobin B,(2000), “Iron status and exercise” , *Am J Clin Nutr.* Vol. 72, No. 2, Pp 594s-597s
- [16] Kumudini RD .Nutritional status of sports women. *Indian Streams Research Journal.* 2011;1(V)1-4
- [17] Paul M La Bounty, Bill I Campbell, Jacob Wilson, Elfege Galvan, John Berardi, Susan M Kleiner, et al. International Society of Sports Nutrition position stand: meal frequency” *Journal of the International Society of Sports Nutrition.* 2011; 8:4
- [18] Hartmann C, Siegrist M, van der Horst K: Snack frequency: associations with healthy and unhealthy food choices. *Public Health Nutr* 2012, 16:1-10
- [19] Berning JR, Steen SN. Nutrition for Sport and Exercise. 2nd ed. Gaithersburg, Maryland, Aspen Publishers.1998 [Ref list]
- [20] Barbara J. Hoogenboom, Jennifer Morris and Katharine Schaefer. Nutritional Knowledge and Eating Behaviors of Female, Collegiate Swimmers, *North American Journal of sports physicaltherapy* . 2009; 4(3):139 – 148.
- [21] Rust DM. The female athlete triad: Disordered eating, amenorrhea, and osteoporosis. *The Clearing House.* 2002;75:301–305. [Ref list]
- [22] Ousley-Pahnke L, Black DR, Gretebeck RJ. Dietary intake and energy expenditure of female collegiate swimmers during decreased training prior to competition. *J Am Dietetic Assn.*2001;101:351–254. [PubMed]
- [23] Cotugna N, Vickery CE. Community health and nutrition screening for Special Olympics athletes. *Journal of Community Health.*2003; 28(6):451-7.
- [24] Ledingham I. M. . Factors influencing oxygen availability. *J. Clin. Pathol. Suppl.* 1977; (R. Coll. Pathol.) 11, 1–6.10.1136/jcp.s3-11.1.1 [PubMed] [Cross Ref]
- [25] Carroll S. B. The Making of the Fittest. New York, NY: Norton. 2007. [PubMed] [Cross Ref]
- [26] Siegel AJ, Hennekens CH, Solomon HS, Van Boeckel BV.

- Exercise-related hematuria: findings in a group of marathon runners. JAMA 1979;241:391-2. CrossRefMedline
- [27] Stewart JG, Ahlquist DA, McGill DB, Ilstrup DM, Schwartz S, Owen RA. Gastrointestinal blood loss and anemia in runners. Ann Intern Med 1984;100:843-5.
- [28] Brune M, Magnusson B, Persson H, Hallberg L. Iron losses in sweat. Am J Clin Nutr 1986;43:438-43.
- [29] Tobin B, Beard JL. Iron and exercise. In: Wolinsky I, Driskell JA, eds. CRC handbook of sports nutrition: vitamins and trace minerals. Boca Raton, FL: CRC Press, 1996 :137-56.
- [30] Ehn L, Carlmark B, Hoglund S. Iron status in athletes involved in intense physical activity. Med Sci Sports Exerc 1980;12:61-4. Medline
- [31] Nazni P and Vimala S. Nutrition Knowledge, Attitude and Practice of College Sportsmen, Asian J Sports Med. 2010; 1(2): 93-100
- [32] Buergel NS, Bergman EA. Students consuming snack, lunches devote more time to eating than those consuming school lunches. J Am Diet Assoc. 2002;102:1283-6. [PubMed]
- [33] Hickson JF, Duke MA, Risser WL, et al. Nutritional intake from food sources of high school foot ball athletes. J Am Diet Assoc. 1987;87:1656-9. [PubMed]
- [34] Frary CD, John Son RK, Wang MQ. Children and adolescents choices of food and beverages high in added sugars are associated with intakes of key nutrients and food groups. J Adolesc Health. 2001;28:16-25. [PubMed]
- [35] Hawley JA, Williams MM. Dietary intakes of age-group swimmers. Br J Sports Med. 1991;25 :154-158. [PubMed]
- [36] Hassapidou MN, Valasiadou V, Tzioumakis L, Vrantza P. Nutrient intake and anthropometric characteristics of adolescent Greek swimmers. Nutrition and Dietetics: 2002; 59:38-42.
- [37] Eberle SG. Endurance Sports Nutrition, IInd Edn. Champaign: Human Kinetics Publishers: 2007 P. 102,127-128
- [38] Arora SL and Gopapalni S. Sports Nutrition. 1st Edn. New Delhi: Cyber tech Publications; 2011 P 82.
- [39] Shifflett B, Timm C, Kahanov L. Understanding of athletes' nutritional needs among athletes, coaches, and athletic trainers. Res Q Exerc Sport. 2002;73(3):357-362. [PubMed]
- [40] Braun WA, Flynn MG, Carl DL, et al. Iron status and resting immune function in female collegiate swimmers. Int J Sport Nutr Exerc Metab. 2000;10:425-433 [PubMed]
- [41] Tarnopolsky M: Females and males: Should nutritional recommendations be gender specific?, Sportmedizin und Sporttraumatologie, 2003;51:39-46.
- [42] Burke LM, Hawley JA, Schabort EJ, St Clair Gibson A, et al. Carbohydrate loading failed to improve 100-km cycling performance in a placebo-controlled trial. J Appl Physiol .2000; 88:1284-90. PubMed
- [43] Wolinsky I. Nutrition in Exercise and Sport. 3rd ed. Boca Raton, Florida, CRC Press; 1998
- [44] Von Duvillard SP, Arciero PJ, Tietjen-Smith T, Alford K. Sports drinks, exercise training, and competition. Curr Sports Med Rep, (2008) ;7(4):202-8. PubMed
- [45] Sawka MN, Burke LM, Eichner ER, Maughan RJ, Montain SJ, Stachenfeld NS. Exercise and fluid replacement. Med Sci Sports Exerc 2007, 39(2):377-90. PubMed.
- [46] Von Duvillard SP, Braun WA, Markofski M, Beneke R, Leithäuser R: Fluids and hydration in prolonged endurance performance. Nutrition, 2004 ;20(7-8):651-6. PubMed
- [47] Convertino VA, Armstrong LE, Coyle EF, Mack GW, Sawka MN, Senay LC Jr, Sherman WM: Exercise and fluid replacement. Med Sci Sports Exerc 1996, 28(1):i-vii. PubMed
- [48] Coyle. Fluid and fuel intake during exercise, JI of Sp Sci. 2004;39 – 55.
- [49] Nemet D and Eliakim A . Banned performance enhancing ergogenic aids in children and adolescent athletes. Journal of Harefuah. 2007;146(10):794-9, 812.
- [50] Joint Position Statement: nutrition and athletic performance. American College of Sports Medicine, American Dietetic Association, and Dietitians of Canada. Medicine and Science in Sports and Exercise 2000;32(12):2130-45.
- [51] Burns RD, Schiller MR, Merrick MA, Wolf KN. Intercollegiate student athlete use of nutritional supplements and the role of athletic trainers and dietitians in nutrition counseling. J Am Diet Assoc. 2004;104(2):246-249. [PubMed].
- [52] Graves KL, Farthing MC, Smith SA, Turchi JM. Nutrition training, attitudes, knowledge, recommendations, responsibility, and resource utilization of high school coaches and trainers. J Am Diet Assoc. 1991;91(3):321-324. [PubMed] [Ref list]
- [53] Toni M. Torres-McGehee, Kelly L. Pritchett and Mike Sibilia. Sports Nutrition Knowledge Among Collegiate Athletes, Coaches, Athletic Trainers, and Strength and Conditioning Specialists, J Athl Train. 2012; 47 (2):205 – 211
- [54] Little JC, Perry DR, Volpe SL. Effect of nutrition supplement knowledge among high school students from a low-income community. J Comm Health. 2002;27:433-50. [PubMed]
- [55] NCHS / ICMR Standards. In: Nutrient Requirements & Recommended Dietary Allowances For Indians, Printed at NIN, Hyderabad.; 2004:7-9.

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