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## Nutritional status of male university level Indian team game players

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### Abstract

The present study was undertaken to assess nutritional status of male players of four team games (Volleyball, Handball, Hockey and Basketball) and to evaluate their body composition and some related physiological parameters. The total sample consisted of forty players selected from different colleges of University of Delhi. A questionnaire was designed to elicit general information and anthropometric measurements taken included measurement of body weight, height, waist circumference, hip circumference and BMI & WHR were calculated. Body Composition was measured using Bioelectrical Impedance Body Composition analyzer. Among physiological variables resting pulse rate, blood pressure, hemoglobin and serum ferritin levels were assessed. Nutrient intake analysis was done using 3-day's dietary record method (two working days and one holiday). Standard descriptive statistics (mean  $\pm$  standard deviation), and Pearson's correlation coefficients ( $r$ ) were applied and level of probability used to indicate statistical significance was  $p < 0.05$ . It was evident from the analysis of physical characteristics of players that their mean body weight was  $67.45 \pm 9.78$  kg and mean height was  $174.45 \pm 6.02$  cm with mean BMI value of  $22.11 \pm 2.67$  which according to BMI classification was normal, however, distribution according to BMI classification showed 27.5% in overweight category. Nutrient analysis revealed mean energy intake as  $2905.74 \pm 743.65$  kcal and mean protein intake as  $88.09 \pm 25.66$  gm/d. Fat intake was  $105.82 \pm 32.05$  gm/d and was contributing to almost 33% of the total calories. The calcium, iron and folic acid intake were adequate in the diet of these players. Body composition data showed mean Fat Free Mass (FFM) as  $53.97 \pm 6.16$  kg and mean Body Fat Percent (BF%) as  $19.85 \pm 4.28$ , which was much higher than the desired BF% for team game players (6-12%). Mean systolic blood pressure (SBP)  $127.17 \pm 11.71$  mmHg which was slightly higher than the normal for this age group, however, mean diastolic blood pressures (DBP) of these players was normal at  $80.85 \pm 8.30$  mmHg. It was found that a majority (65%) of the players had high SBP and 45% of players with higher DBP. The SBP and DBP of male team game players were found to be positively and significantly correlated with weight, body mass index and total body fat.

**Keywords:** Nutritional status, body composition, body fat percent, fat free mass, blood pressure

### Introduction

Dietary habits and nutritional intake is paramount in determining the body composition and various physiological parameters of athletes which in turn may influence the training capacities and performance in sports (Venkata *et al.* 2004) <sup>[15]</sup>. Timely interventions in diet of sportsperson along with a proper conditioning programme is crucial for better prospects in sports without compromising on health parameters. The positive effects of training on all components of physical fitness appear only when the nutritional intake is adequate to keep body composition and physiological status at optimum levels (Siddhu, 2002) <sup>[14]</sup>. Nutritional strategies will influence performance by affecting body composition, physical fitness and physiological parameters of these players therefore, it is important for sports persons to go for such nutritional strategies that not only improve their performance but also preserve and promote health in the growing years of their life. Mostly Indian sports persons rely on miracle foods or try to find shortcuts. It requires a long term planning of diet providing desired amount of energy, right proportions of carbohydrates, proteins and fats and including rich sources of all other micronutrients to avoid any clinical manifestations of nutritional deficiencies that may affect their sports performance.

The dietary requirements of sports persons are dependent upon their gender and body weight besides the demand of the sport according to its intensity, duration and frequency.

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During training period, the requirements for energy and macronutrients increase and must be met regularly in order to maintain optimum body composition, consistent supply of fuel for the game, recovery of muscle glycogen stores, and repair of wear and tear of muscle tissues. In athletes when intake of vitamins and minerals is lower than recommended, functional impairments may occur.

Thus, nutritional status is a critical determinant of athletic performance. Nogueira and Costa (2004) [9] in their study on Brazilian triathletes revealed that the number of meals and intake of some food groups were insufficient during training, resulting in inadequate intake of carbohydrate and some micronutrients and concluded that athletes need help to achieve their sports-related nutrition goals, especially during intense training. Team games like handball, volleyball, basketball and hockey have specific physical demands. The basic pre-requisites of these players are to maximize speed, agility and power, and from nutritional stand point, have higher energy demands (60-70 kcal/kg body weight; Satyanarayan, 1991) [13]. It is imperative for a player to match his calorie intake with the energy expenditure during the pre-season, during the season and off season otherwise, it has effects on altering their body composition levels (ILSI-India, NIN, SAI, 2007) [4]. Carbohydrate, specifically muscle glycogen, is the preferred fuel for high power outputs and glycogen store depletion in hard exercise causes early fatigue (Wolinsky, 1998) [17]. Salt, potassium, and magnesium are lost in high amounts in the sweat. Iron loss in sweat may contribute to the iron deficiency. Protein is catabolized and amino acids are oxidized during physical exercise (ILSI-India, NIN, SAI, 2007) [4]. Not eating enough while actively participating in sports can cause adverse effects like breakdown of muscles, fatigue and suboptimal performance. Extreme calorie restriction can cause serious problems like fractures and injuries while playing.

In Indian sports persons studies have indicated lower than recommended nutritional intakes not only in female players but also in male sports persons (Bains and Mann 2000; Salarkia *et al.* 2004; Koley and Sharma 2013; Sangeetha and Ramaswamy (2014) carried out a study on one hundred college level sports persons (20-35 yrs; 88 male and 12 females) in Coimbatore and showed that majority (55 percent) of the selected sportspersons were underweight, about 60% of them were anemic and there existed inadequacy in dietary intake of important nutrients. Nande *et al.* (2009) [8] conducted a study on male and female state level players of different sports disciplines and found that irrespective of gender and sports, mean intakes of thiamine, riboflavin, folic acid, calcium and phosphorus were less than their respective recommended dietary allowances (RDAs).

The relative contribution of the macronutrients to the energy consumption should make up 55 to 70% carbohydrates, 10 to 15% protein, and 25 to 30% fat (ICMR, 1985; Wolinsky, 1998; Colombani and Mannhart, 2000) [17]. However, studies consistently report higher contribution of energy from fat in the diets of athletes particularly in power sports like wrestling, boxing, weight lifting etc (Priti and Siddhu 1998, There is no doubt that fat provides essential elements for the cell membranes and is essential for the absorption of fat-soluble vitamins but fat should account for 25-30% of total energy intake. Higher than recommended fat intake especially higher intake of saturated fats may have deleterious effects on health.

## Objectives of the study

The purpose of this study was to evaluate the nutritional profile of male inter college level team game players and to assess any relationships in nutritional status with body composition and some physiological parameters.

## Methods and materials

### Sample Selection

The total sample comprised of purposively selected 40 male team game players of Delhi University colleges in the age range of 18 to 22 years from team games viz. Basketball, Volleyball, Handball and Hockey and those players were taken for the study who had played their respective game for at least three consecutive years.

### Data Collection

General information was elicited using a questionnaire, anthropometric profile was assessed by taking body weight using electronic weighing scale; Height using anthropometric rod and computing Body Mass Index (BMI). Body Composition components were measured using bioelectrical impedance based body composition analyzer (Bodystat). Resting Pulse rate was measured on radial artery for one minute and blood pressure was taken using sphygmomanometer and stethoscope. Hemoglobin and Serum Ferritin levels were assessed in a Pathological laboratory. For the purpose of nutrient intake analysis 3-Day's recording of diet (two working days and one holiday) was done and nutrient analysis computer software (DIETCAL) was used to arrive at total day's nutrient intake.

### Statistical Analysis

Statistical analysis was done using SPSS (Statistical Package for Social Science) version 22.0. Standard descriptive statistics (mean  $\pm$  standard deviation) for the variables studied were calculated, percentages were computed and correlations were evaluated using Pearson's correlation coefficient (r). The level of probability used to indicate statistical significance taken at  $p < 0.05$ .

## Results

The anthropometric and body composition profile of subjects is presented in table 1 and it shows mean body weight of team game male players as  $67.45 \pm 9.8$  kg, mean height as  $174.5 \pm 6.0$  cm, computed BMI as  $22.1 \pm 2.7$  and mean Waist to hip ratio (WHR) value as  $0.88 \pm 0.1$ . Table 1 also depicts mean Fat Free Mass (FFM) as  $53.97 \pm 6.2$  kg and mean Body Fat Percent (BF%) as  $19.85 \pm 4.3$  of the subjects.

**Table 1:** Anthropometric and body composition Profile of Subjects (n=40)

Anthropometric and body composition variables	Mean $\pm$ S.D (Range)
Weight (kg)	67.5 $\pm$ 9.8 (48.1-86.9)
Height(cm)	174.5 $\pm$ 6.0 (159-189.5)
Body mass index (kg/m <sup>2</sup> )	22.1 $\pm$ 2.7 (16.80-29.0)
Waist-hip ratio	0.88 $\pm$ 0.1 (0.79-0.99)
Fat free mass (kg)	53.97 $\pm$ 6.2 (40.4-66.5)
Body fat (%)	19.85 $\pm$ 4.3 (10.7-27.8)

Table 2 shows that mean systolic blood pressure (SBP) was 127.17±11.7 mmHg which was slightly higher than the normal for this age group and mean diastolic blood pressures (DBP) of these players was normal at 80.85±8.30 mmHg.

Mean Resting pulse rate was 70.20±7.4 b/min which was normal. Mean haemoglobin and mean serum ferritin levels were also normal at 14.84±0.88 gm/dl and 59.16±39.67 ng/dl respectively.

**Table 2:** Physiological Profile of Subjects (n=40)

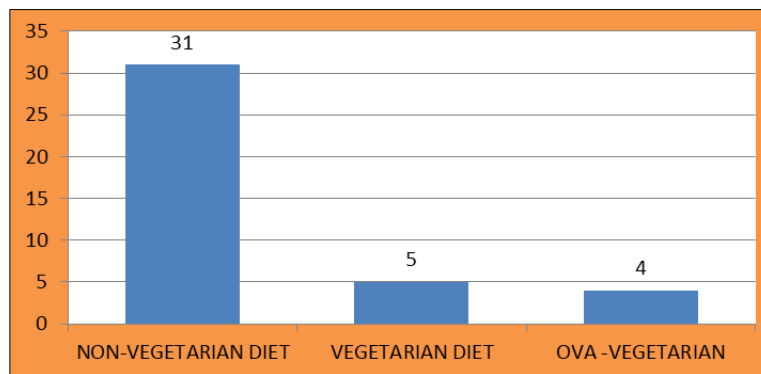
Physiological Variables	Mean ± S.D (Range)
Systolic blood pressure(mmHg)	127.17±11.7 (110-164)
Diastolic blood pressure(mmHg)	80.85±8.30 (62-110)
Resting pulse rate (b/min)	70.20±7.49 (56-85)
Haemoglobin (gm/dl)	14.84±0.88 (12.6-17)
Serum ferritin (ng/ml)	59.16±39.67 (12.0-216.10)

The distribution of subjects according to normal values for systolic and diastolic blood pressures (table 3) showed a majority (65%) of the players with high systolic blood

pressure and 45% of players with higher diastolic blood pressure.

**Table 3:** Distribution of subjects according Blood Pressure Standards (n=40)

SBP Standards	Total (n=40)	DBP Standards	Total (n=40)
Below Normal (<120mmHg)	10(25%)	Below Normal (<80mmHg)	16(40%)
Normal (120mmHg)	4(10%)	Normal (80mmHg)	6(15%)
Above Normal (>120mmHg)	26(65%)	Above Normal (>80mmHg)	18(45%)



**Fig 1:** Type of diet consumed by male team game players

In the present study, Only 5 (13%) players were vegetarians and rest of the players were non-vegetarian or ova-

vegetarians (Fig 1). Table 4 shows the nutrient intake data of male team game players.

**Table 4:** Nutrient Profile of the Subjects (n=40)

Nutrients	Mean ± S.D (Range)
Energy(Kcal)	2905.74±743.65 (1471-5269.90)
Carbohydrate (gm)	374.86±98.29 (191.02-617.74)
Protein(gm)	88.09±25.66 (40-161.62)
Fat(gm)	105.82±32.05 (54.62-206.64)
Fibre(gm)	9.59±2.85 (2.14-18.37)
Calcium (gm)	1408.10±937.5 (448.42-4617.22)
Iron(mg)	23.09±6.14 (7.15-33.89)
Vitamin C(mg)	67.65±54.07 (8.70-316.35)
Folic Acid(µg)	266.75±108.85 (101.16-551.23)

Mean energy intake of players was 2905.74±743.65 kcal, mean protein intake was 88.09±25.66 gm/d and fat intake in male athletes was 105.82±32.05 gm/d. The calcium intake 1408.10±937.52 mg/d, mean iron intake 23.09±6.14 mg, mean Vitamin C intake was 67.65±54.07 mg/d and folic acid intake was 266.75±108.85 µg.

**Discussion**

In the present study, mean body weight of team game male players was 67.5±9.8 kg and mean height was 174.5±6.0 cm. Ghobadi *et al.* (2013) [2] have reported Asian Handball players having mean height of 185.30±5.62, mean weight 87.70±9.47 and mean BMI of 25.52±2.34 which are higher than the weight and height indices of present study players.

Mean BMI value of present study players was 22.11±2.67 which according to BMI classification was normal (WHO, 2000). BMI classification placed around half (52.5%) of these players in the normal category and 27.5% in overweight category. Underweight and obese category also had 10% of total players respectively. Mean Waist to hip ratio (WHR) value for all groups was 0.88±0.06 which was normal as cut-offs suggest WHR above 0.90 in males pose high health risks (WHO 2011) [16].

Body composition monitoring can serve as an important tool in athletes as it could be modified by diet and training thus, can help in planning nutritional strategies and training load (Ramos-Campo *et al.* 2014) [10]. According to Jeukendrup and Gleeson (2010) [5] the optimum BF% for male team

game players is 6-12%. In the present study, the body fat % was much higher ( $19.85 \pm 4.28$ ) than the desired percentage (table 2).

Nutrient data revealed mean energy intake of players as  $2905.74 \pm 743.65$  kcal (table 4) which was slightly higher than the RDA for Indian moderate worker men (2730 kcal/d; ICMR, 2010) [3]. These were team game players and the energy intake recommended for this group is 60-70 kcal/kg Body Weight as suggested by ICMR (1985). However, players should equalize their energy intake with energy expenditure and if weight is maintained at this energy intake level then they should stick to this level and alter it only if training becomes more intense and frequent and weight fluctuates. Mean BMI of the players of all games was normal (Table-3) but 10% of the players were falling in underweight category of BMI classification also. They need to increase energy intake as negative energy balance for long term may affect the physical fitness levels and sports performance. It was found that mean protein intake ( $88.09 \pm 25.66$  gm/d) was higher than RDA which is 1g/kg body weight or 60 g/d. For sports persons the intake is recommended between 1.5-2.0g/kg BW, considering these amounts, the protein intake was adequate for present study male athletes. As majority of the male players in this study were non-vegetarians or ova-vegetarians, consumption of good quality protein is possible. Fat intake in male athletes was relatively higher ( $105.82 \pm 32.05$  gm/d) and was contributing to almost 33% of the total calories. Too much stress of fats is common in Indian athletes which may affect health in the later years of life. In the present study the SBP and DBP have been found to be higher than normal in 65% and 45% of the players respectively and SBP and DBP values of these players were also positively and significantly correlated with weight, body mass index and total body fat

In the present study, mean carbohydrate intake by male athletes was  $374.86 \pm 98.29$  gm/d and was contributing to almost 53% of energy intake. The players need to put more emphasis on carbohydrate rich foods as compared to fat sources. The calcium intake was adequate for all the athletes. Higher consumption of dietary calcium was coming from higher milk consumption in these players. The iron intake was also above RDA which was also reflected in their normal mean haemoglobin levels. Mean Vitamin C intake ( $67.65 \pm 54.07$  mg/d) and folic acid ( $266.75 \pm 108.85$  µg) were also higher than RDA. Higher intake of vitamins and minerals will take into account the increased needs of athletes during training period. Fiber intake was much lower than recommended.

Thus, the assessment of nutritional intake of male team game athletes revealed that intake of energy, protein, calcium, iron and folic acid were adequate in their diets. The major concern was high intake of fat (33en%) and lower intake of fiber which can have adverse implications on health. Therefore, increasing the consumption of complex carbohydrates, vegetables and fruits and reducing the consumption of too much of saturated and trans fatty acids should be advocated to these male athletes.

### Conclusion

The findings of the present study pointed towards the need of counseling the university level team game athletes about the importance of dietary modifications required during training along with right training methods to improve their body composition levels; thereby improving their sports performance without compromising on health issues.

### References

1. Bains Kiran, Mann SK. Physical fitness in relation to energy and iron status of female college students. *Food and Nutrition Bulletin* 2000;21:3.
2. Ghobadi H, Rajabi H, Farzad B, Bayati M, Jeffreys I. Anthropometry of World-Class Elite Handball Players According to the Playing Position: Reports From Men's Handball World Championship J Hum Kinet 2013;39:213-20.
3. ICMR. Recommended dietary intakes for Indian sports men and women, 2010.
4. ILSI-India (International Life Sciences Institute-India), National Institute of Nutrition, Sports Authority of India. Nutrition and Hydration Guidelines for Excellence in Sports Performance. A Joint Report, 2007.
5. Jeukendrup Asker, Michael Gleeson. Normal ranges of body weight and body fat. *Sports Nutrition*, Second Edition Human Kinetics, 2010.
6. Koley Shyamal, Sharma Mehak. Assessment of Nutritional Practices of Indian Female Athletes. *Anthropologist* 2013;15(3):323-327.
7. Nande P, Mudafale V, Vali S. Micronutrient Status of Male & Female Players Engaged in Different Sports Disciplines. *Journal of Exercise Science and Physiotherapy* 2009;5(1):1-13.
8. Nogueira JA, Da Costa TH. Nutrient intake and eating habits of triathletes on a Brazilian diet. *Int J Sport Nutr. Exerc. Metab* 2004;14(6):684-97.
9. Ramos-Campo DJ, Martínez-Sánchez F, Esteban-García P, Rubio-Arias JA, Bores CA, Clemente-Suarez VJ *et al.* Body composition features in different playing position of professional team indoor players: basketball, handball and futsal. *Int. J Morphol* 2014;32(4):1316-1324.
10. Salarkia Nahid, Masoud Kimiagar, Azadeh Aminpour. Food Intake, Body Composition and Endurance Capacity of National Basketball Team Players In I.R. of Iran *Medical Journal of The Islamic Republic of Iran* 2004;18:1;1383.
11. Sangeetha Mahalakshmi K, Lalitha Ramaswamy. Assessment of Nutritional Status, Nutritional Knowledge and Impact of Nutrition Education among Selected Sports Persons of Coimbatore District K. *International Journal of Science and Research (IJSR) ISSN (Online)* 2014;3:11:2319-7064.
12. Satyanarayan K. *Sports nutrition: Put back the pep.* Nutrition, 1991.
13. Siddhu A. Issues related to long term nutritional management of sports subjects-Indian context. *Food and Nutrition Update*, 2002, 148-168.
14. Venkata RY, Surya KMVL, Sudhakar RS, Balakrishna N. Effect of changes in body composition profile on  $VO_2$ max and maximal work performance in athletes. *Journal of Exercise Physiology* 2004;7:34-39.
15. WHO. 2011. [http://whqlibdoc.who.int/publications/2011/9789241501491\\_eng.pdf](http://whqlibdoc.who.int/publications/2011/9789241501491_eng.pdf)
16. Wolinsky I. *Nutrition in exercise and sport.* CRC Press. Third edition, 1998.