

# Food habits, nutritional profile and physical fitness of physical education students

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**■ ABSTRACT**

The nutritional status of sports persons plays an important role in attaining a high level of achievement in sports. Poor sports performance could be partly due to poor physique and unsatisfactory physical fitness resulting from undernourishment. The present study documented the food habits, nutritional profile and physical fitness of thirty male sports persons (21-23 years) studying in a physical education college in Dharwad city. The subjects consumed some special foods regularly, which they thought would help to improve health and performance in sports. *Idli* was the most preferred pre-event food followed by fruits and biscuits. Glucose was consumed by majority of the sports persons during the event. Whereas, glucose and biscuits were the widely consumed post-event foods. Heavy meal, fried and spicy foods were avoided before the event. The mean height and weight of the subjects were 173.53 cm and 65.31 kg, respectively. While, the mean body fat and hemoglobin contents were 19.25 per cent and 12.41 g/dl, respectively. The mean consumption of all the foods was lower than the suggested dietary allowance except for pulses. The intake of nutrients was far less than the recommendations among the subjects indicating nutritional deficiency.

**■ Key Words :** Nutritional status, Sports persons, Nutrient intake, Anthropometry

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Today, sports has become one of the most challenging and competitive profession in the world. Sports involve national sentiments and pride. With advancement of many training centers and encouraging support from the government, sport as a profession is gaining importance. Concerning sports performance, it is commonly recognized that besides, genetics and physical training, the nutritional status of an athlete substantially determines his or her potential to excel in sports (Burke *et al.*, 2001).

The position statement of the American Dietetic Association, Dietitians of Canada, and the American College of Sports Medicine reveals that physical activity, athletic performance, and recovery from exercise are enhanced by optimal nutrition (Anonymous, 2009). Proper nutrition helps

athletes at all levels to prevent injury, enhance recovery from exercise, achieve and maintain optimal body weight, improve daily training workouts, and maintain overall good health. In countries like India where malnutrition is a major health problem, poor sports performance could be partly due to poor physique and unsatisfactory physical fitness resulting from undernourishment (Lusaski, 2004).

In India, the sports performance is not optimum compared with other countries. One of the several reasons is lack of sound sports nutrition principles. Any dietary deficiency that adversely affects the health of the individual is likely to impair an individual's physical performance and thus nutrition and well being assume a vital role in the field of sports. To meet the extremely high nutritional demands

the sports persons must be supplied with adequate nutrients. Hence, the present study was undertaken to document the food habits and assess the nutritional profile and physical fitness of the sports persons in a physical education college in Dharwad city.

## METHODOLOGY

The male student athletes (N=30) from Shri K.G. Nadiger College of Physical Education, Dharwad, Karnataka were selected for the study. The subjects were regularly and actively taking part in various sports activities. All of them were taking the hostel diet. The data regarding general and sports related information and dietary habits was collected by personal interview method using a questionnaire. The nutritional status of subjects was assessed by nutritional anthropometry (Jelliffe, 1966), diet survey (by 24 hours dietary recall method) and haemoglobin estimation (Varley, 1976). Skin fold thickness at four sites *viz.*, tricep, bicep, suprailliac and subscapular were measured using Harpenden calipers. The body fat per cent was computed using skin fold thickness measurements of the subjects (Mahan and Escott-Stump, 2008). The nutrient intake of the subjects was computed using Annapurna VAR 3 software using the dietary recall. The per cent food and nutrient adequacy of the subjects were compared with the suggested balanced diet and recommended daily allowance for athletes (Satyanarayan *et al.*, 1985). AAHPERD (American Alliance for Health, Physical Education, Recreation and Dance) physical fitness tests were used for the assessment of physical fitness (AAHPERD, 1980). The speed (50 m dash), agility (10m x 6 shuttle run), strength (vertical jump), flexibility (forward bend and reach), endurance (time to exhaustion on a motorized tread mill) and cardio-respiratory fitness (Harvard step test) components were determined.

## OBSERVATIONS AND DISCUSSION

The general information of the subjects is presented in Table 1. Majority (70%) of the subjects were in the age group of 21 to 23 years, while 30 per cent were in 24 to 26 years age group. All the subjects had completed graduation and were studying B.P.Ed. course. The data on food habit shows that the 73.33 per cent of the subjects were non-vegetarians while remaining 26.67 per cent were eggerians. Majority (66.67%) of the subjects were actively participating in sports for the last 3 to 6 years. Only ten per cent of the subjects took active part in sports for more than six years. Remaining 23.33 per cent of subjects were involved in sports for the last 1 to 3 years.

With regard to level of participation in sports, only 3.33 per cent of subjects participated in state level competition. The district and university level of participations were observed in 40 and 30 per cent of subjects, respectively. All

| Particulars                                | Category       | Frequency | Per cent |
|--|----------------|-----------|----------|
| Age (years)                                | 21-23          | 21        | 70.00    |
|  | 24-26          | 9         | 30.00    |
| Food habit                                 | Eggerian       | 8         | 26.67    |
|  | Non vegetarian | 22        | 73.33    |
| Duration of active participation in sports | 1-3 years      | 7         | 23.33    |
|  | 3-6 years      | 20        | 66.67    |
|  | >6 years       | 3         | 10.00    |
| Level of participation                     | State          | 1         | 3.33     |
|  | District       | 12        | 40.00    |
|  | University     | 9         | 30.00    |
|  | College        | 8         | 26.67    |

the subjects exercised for six days in a week. They spent five hours (2.5hr each in morning and evening) for exercise every day.

The subjects consumed some special foods regularly, which they thought would help to improve health and performance in sports (Table 2). The consumption of soaked bengalgram regularly was observed in 53.33 per cent of subjects. This was followed by dates (50 %), egg (50%), raisins (46.67 %), milk (43.33 %) and ghee (13.33 %). Almonds, cashew and health drinks were consumed by only 10.00 per cent each of subjects.

| Foods              | Frequency | Per cent |
|--------------------|-----------|----------|
| Soaked Bengal gram | 16        | 53.33    |
| Dates              | 15        | 50.00    |
| Almonds            | 3         | 10.00    |
| Cashew             | 3         | 10.00    |
| Raisins            | 14        | 46.67    |
| Egg                | 15        | 50.00    |
| Ghee               | 4         | 13.33    |
| Milk               | 13        | 43.33    |
| Health drinks      | 3         | 10.00    |

Table 3 depicts various foods consumed and avoided before, during and after the event by the subjects. Highest per cent (60 %) of subjects consumed *idli* before the event. This was followed by fruit (40 %), biscuit (26.67 %), fruit juice (6.67 %) and milk (3.33 %). During the event glucose was consumed by 73.33 per cent of subjects. Among the various foods consumed after the event, majority of the subjects (56.67 %) consumed glucose. This was followed by biscuit (50 %), coconut water (30 %), chocolate (20 %) and fruit (16.67 %). The consumption of fruit juice and *lassi* were low (10 % each).

The table also reveals that before the event heavy meal



was avoided by 96.67 per cent of subjects. The fried and spicy foods are avoided before the event by 56.67 and 46.67 per cent of subjects, respectively. The non vegetarian food is avoided by 26.67 per cent of subjects. During the event 16.67 per cent of subjects avoided glucose. Immediately after the event, heavy meal is avoided by 86.67 per cent of subjects, while the carbonated beverage was avoided by 36.67 per cent of subjects.

The anthropometric measurements and haemoglobin status of the subjects are depicted in Table 4. The mean height of the subjects was 173.53 cm with a range of 160 to 190 cm. The weight of the subjects ranged between 58.00 to 73.00 kg with a mean of 65.31 kg. The mean height and weight of the subjects were higher than the national average for Indians of similar age group as per the NNMB report (Anonymous, 2007). The chest and mid upper arm circumference of the subjects were 86.70 and 27.81 cm. The mean values for waist and hip circumference were 78.92 and 87.72 cm. The body fat of the subjects was recorded to be 19.25 per cent. The subjects had a mean haemoglobin content of 12.41 g per dl.

The mean intake and adequacy of foods by the subjects is presented in Table 5. The consumption of foods was lower than the suggested dietary allowance except for pulses, which had an adequacy of 139.30 per cent. The food adequacy was more than 70 per cent for fat (95.36 %), cereals (81.95 %) and roots and tubers (73.65 %). The food adequacies were less than 50.00 per cent for other vegetables (44.98 %), egg (38.12 %), sugar (34.33 %) and fruits (34.79%). The adequacy for milk (14.02 %), meat (9.94 %) and green leafy vegetables (6.07 %) were very low.

The mean intake and adequacy of nutrients is presented in Table 6. The mean intake of nutrients was less than the recommendations for sports persons. The per cent adequacy for energy was 70.02 with a corresponding intake of 3025 Kcal. The adequacies of protein, fat and carbohydrate were 54.17, 68.81 and 73.20 per cent, respectively. Among the vitamins, the per cent adequacy was more than 50.00 per cent only for thiamine (65.71 %) and folic acid (52.57 %). The niacin adequacy was 43.65 per cent. While, the adequacy for vitamin A (28.45 %), riboflavin (32.86 %) and vitamin C (26.92 %) was less than one third the requirement. The intake of calcium (507.64 mg) and iron (22.08 mg) were meeting nearly one third the recommendations. The subjects consumed 9.19 mg of zinc in their diet. The food and nutrient intake of the subjects was much less than the recommendations. This was because of the fact that the diet provided in the hostel was not adequate.

Chandrasekaran and Eswaran (2000) have reported higher energy intake of 4732-4793 Kcal/day in state and national level male services athletes. The nutrient intake was very low in adolescent football players (1945 Kcal energy and 68 g protein) and sprinters (2140 Kcal energy and 70 g protein) as reported by Chaterjee *et al.* (2005). Similar trend of inadequate nutrient consumption in sports persons have been reported by Kavitha *et al.* (2001). Jose and Chandrasekhar (2009) have reported the energy intake of 3514-3960 Kcal and protein intake of 91.4-108.1 g in sports men from colleges.

Table 7 reveals the components of physical fitness of the subjects. The mean strength of the study subjects was

| Table 3 : Foods consumed and avoided before, during and after the event by the subjects (n=30) |                |          |                      |           |          |
|--|----------------|----------|----------------------|-----------|----------|
| Foods  | Foods consumed |          | Foods avoided        |           |          |
|  | Frequency      | Per cent | Foods                | Frequency | Per cent |
| <b>Before the event</b>  |                |          |                      |           |          |
| Idli   | 18             | 60.00    | Heavy meal           | 29        | 96.67    |
| Milk   | 1              | 3.33     | Fried foods          | 17        | 56.67    |
| Biscuit  | 8              | 26.67    | Non vegetarian foods | 8         | 26.67    |
| Fruit  | 12             | 40.00    | Spicy foods          | 14        | 46.67    |
| Fruit juice  | 2              | 6.67     |                      |           |          |
| <b>During the event</b>  |                |          |                      |           |          |
| Glucose  | 22             | 73.33    | Glucose              | 5         | 16.67    |
| Fruit juice  | 1              | 3.33     |                      |           |          |
| <b>After the event</b>   |                |          |                      |           |          |
| Glucose  | 17             | 56.67    | Heavy meal           | 26        | 86.67    |
| Fruit  | 5              | 16.67    | Carbonated beverage  | 11        | 36.67    |
| Fruit juice  | 3              | 10.00    |                      |           |          |
| Lassi/milk shake   | 3              | 10.00    |                      |           |          |
| Biscuit  | 15             | 50.00    |                      |           |          |
| Chocolate  | 6              | 20.00    |                      |           |          |
| Coconut water  | 9              | 30.00    |                      |           |          |

**Table 4 : Anthropometric measurements and hemoglobin status of the subjects (n=30)**

| Parameters               | Values        |
|--------------------------|---------------|
| Height (cm)              | 173.53 + 8.85 |
| Weight (kg)              | 65.31 + 4.49  |
| BMI (kg/m <sup>2</sup> ) | 21.56 + 1.15  |
| Chest circumference (cm) | 86.70 + 3.50  |
| MUAC (cm)                | 27.81 + 1.86  |
| Waist circumference (cm) | 78.92 + 2.61  |
| Hip circumference (cm)   | 87.72 + 2.21  |
| Waist:hip ratio          | 0.90 + 0.04   |
| Body fat (%)             | 19.25 + 2.27  |
| Haemoglobin (g/dl)       | 12.41 + 0.71  |

MUAC – Mid upper arm circumference

**Table 5 : Food intake and adequacy of the subjects (n=30)**

| Foods (g)              | SBD# | Intake         | Adequacy (%) |
|------------------------|------|----------------|--------------|
| Cereals                | 550  | 450.75 ± 25.84 | 81.95        |
| Pulses                 | 40   | 55.72 ± 4.07   | 139.3        |
| Green leafy vegetables | 150  | 9.11 ± 0.90    | 6.07         |
| Roots and tubers       | 150  | 110.48 ± 13.56 | 73.65        |
| Other vegetables       | 200  | 89.96 ± 8.59   | 44.98        |
| Fruits                 | 150  | 52.18 ± 6.23   | 34.79        |
| Milk (ml)              | 750  | 105.16 ± 48.68 | 14.02        |
| Fat                    | 50   | 47.68 ± 27.46  | 95.36        |
| Sugars                 | 80   | 27.46 ± 3.88   | 34.33        |
| Meat                   | 250  | 24.86 ± 2.76   | 9.94         |
| Egg                    | 100  | 38.12 ± 4.16   | 38.12        |
| Nuts and oilseeds      | NA   | 11.95 ± 1.23   | -            |

NA- Not available.

# - SBD suggested balanced diet by Satyanarayana *et al.* (1985)

43.78 cm. with reference to the speed the subjects took on an average 7.24 seconds to run 50m. The subjects recorded a mean flexibility of 6.94 cm with forward bend and reach test. They had an average agility of 17.50 seconds. The mean endurance capacity of the subjects was 30.65 minutes. While the mean cardiac efficiency score of the subjects was 76.33. Similarly findings were obtained by Priyadharshini and Mathew (2012).

### Conclusion :

The study reveals that the subjects consumed special foods which they believed would help them in maintaining fitness and better performance. They consumed and avoided particular foods before, during and after the sporting event. Though they had ideal BMI, their body fat content was higher than that desired for sports persons. They had marginal and very less food intake (except pulses) compared to suggested balanced diet, which was in association with low nutrient adequacy. These findings indicate that there is a great need

**Table 6 : Nutrient intake and adequacy of the subjects (n=30)**

| Nutrients        | RDA#      | Intake           | Adequacy (%) |
|------------------|-----------|------------------|--------------|
| Energy (Kcal)    | 4320      | 3025.00 ± 116.92 | 70.02        |
| Protein (g)      | 130-150   | 75.84 ± 7.59     | 54.17        |
| Fat (g)          | 105-160   | 91.17 ± 7.30     | 68.81        |
| Carbohydrate (g) | 600-700   | 475.78 ± 17.59   | 73.20        |
| Vitamin A (µg)   | 1000-2000 | 426.78 ± 23.86   | 28.45        |
| Thiamine (mg)    | 3-4       | 2.30 ± 0.17      | 65.71        |
| Riboflavin (mg)  | 3-4       | 1.15 ± 0.13      | 32.86        |
| Niacin (mg)      | 40-50     | 19.64 ± 1.72     | 43.64        |
| Folic acid (µg)  | 400       | 210.29 ± 13.88   | 52.57        |
| Vitamin C (mg)   | 100-200   | 40.38 ± 5.32     | 26.92        |
| Calcium (mg)     | 1000-2000 | 507.64 ± 20.31   | 33.84        |
| Iron (mg)        | 50-75     | 22.08 ± 1.51     | 35.33        |
| Zinc (mg)        | NA        | 9.19 ± 0.36      | -            |

# Satyanarayana *et al.* (1985)

**Table 7 : Physical fitness components of the subjects**

| Components               | Fitness value |
|--------------------------|---------------|
| Strength (cm)            | 43.78 ± 2.12  |
| Speed (second)           | 7.24 ± 0.56   |
| Flexibility (cm)         | 6.94 ± 1.25   |
| Agility (second)         | 17.50 ± 0.96  |
| Endurance (min)          | 30.65 ± 4.10  |
| Cardiac efficiency Score | 76.33 ± 3.38  |

to improve the dietary habits of sports persons. The lower adequacy for nutrients, both macro and micro, may be a great hurdle to achieve the full potential of sports persons. A great deal of nutritional input is required to improve their sports performance.

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