

# Asian Resonance

## Assessment of Physical Fitness of Young Boys (20-25 years) in Relation with Diet

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#### Abstract

Sixty college going young boys were selected for this study. The nutritional status and Physical fitness of the subjects was assessed by standard methods. Average intake of energy, protein, carbohydrate and fat was 95.50 percent, 107.1 percent, 76.77 percent and 574.80 percent of RDA respectively. Consumption of fats and oils, milk and milk products, fruits and sugar were found to be higher than the recommendations. Physical fitness assessment revealed that 36.66% subjects were in superior category of cardio respiratory endurance, 26.66 percent in excellent category of muscular strength, 41.60 percent in fair category of flexibility and in very poor category of abdominal muscular endurance (83.33%). Physical fitness when assessed in relation to diet revealed significant positive correlation between muscular endurance and energy, carbohydrate and protein intake whereas muscular strength was significantly correlated with carbohydrate intake only. It concludes that physical fitness and diet are strongly associated.

**Keywords:** Fitness, Young Boys, Step- Up, Endurance, Diet.

#### Introduction

Physical growth is one of the most sensitive and reliable indicator of health and nutritional status in human population. Nutrition is the process of energy gain and it is essential to perform normal life activities. The assessment of nutritional status is useful for understanding the health status of population and regional policy planning (Srinivas et al 2013). Physical fitness is a set of attributes that people have or achieve. Being physically fit has been defined as the ability without undue fatigue and with ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies, but it is modifiable through exercise and training with individual intra-variability. The most frequently cited components fall into two groups: one related to health and the other related to skills. The health related components are cardio-respiratory fitness (CRF), which reflects the capacity of the respiratory and cardiovascular system to bear prolonged exercise; muscular strength, an essential component for daily life ; flexibility as the component that relates to the range of motion available at the joint and the ability of appropriate amplitude of movement; and for lost body composition. Each of these components varies with age and gender. Boys show better performances in all the components (except flexibility) than girls, which might be related to the rapid increase in muscle mass (Malina et al., 2008).

#### Cardiovascular Endurance

This is the ability of the body to deliver oxygen and nutrients to tissue and remove waste over sustained period of time. Cardio respiratory fitness is strong and independent predictors of cardiovascular mortality in men and women. The risk of premature death is estimated to be 25% to 50% lower for those who are fit compared with those who are unfit. (Ekelund, 2008).

#### Muscular Strength and Endurance

Muscular strength deals with the ability of the muscle to exert force for a brief time period, while muscular endurance is the ability of a muscle or group of muscles to sustain repeated contractions or continue to apply force against an inert object.

#### Flexibility

It denotes the ability to move joints and use muscle through their full range of motion.

## Body composition

It refers to the make up of body in terms of lean mass (muscle, bone, tissues and organs) and fat mass.

## Aim of Study

Fitness assessment is an important part of identifying current level of physical fitness, strength and weakness of body. It identifies the possible areas of health risk of non communicable diseases like diabetes, hypertension, obesity and CVDs. Regular physical activity is associated with the lower morbidity and mortality rates from cardiovascular disease, diabetes, cancer and osteoporosis. Physical fitness assessment aids in developing personalised programme of exercise to improve fitness level and also provides information about the effectiveness of health programme for improvement or maintenance of physical health. Apart from diet, exercise / physical activity plays an important role in maintaining health and fitness levels.

## Materials and Methods

The present study was carried out within the municipal limits of Udaipur city, (Raj.). Sixty students were selected randomly using lottery method. Structured interview schedule (questionnaire) was developed keeping in view the information to be collected for the study.

Information regarding health habits, physical performance, nutritional profile, anthropometric measurements like height, weight and body mass index, dietary intake of the subjects were collected. Height of the subjects was measured with the help of anthropometric rod, body weight was measured using bathroom scale.

24 hours recall method was used to assess dietary intake for three consecutive days. Average nutrient composition of the diet consumed was calculated for each food items by using food composition tables. (Gopalan et al, 1989) and results were compared with the dietary recommendations suggested by ICMR 1998.

## Assessment of Physical Fitness

Five components of physical fitness viz. cardiorespiratory endurance, abdominal muscular endurance, upper body muscular endurance and flexibility were assessed using standard fitness tests like Bench press, curl-ups, 3 min, push up test (CIAR, 2002). The data were statistically analyzed as per the objectives of the study.

## Results

### Background Information

Results revealed that cent per cent subjects were Hindu and majority of them (58.3%) were vegetarian and belonged to joint family. It was found that 5 percent subjects were in the habit of smoking and 1.6 percent subjects were consuming alcohol. Seventy percent subjects were doing exercise, majority of them (45.23%) were doing muscular exercise and 28.5% subjects were doing cardiac and muscular exercises.

## Nutritional Profile

### Anthropometric Measurement

Height of the subjects ranged from 162 cm to 192 cm with a mean value of  $174.93 \pm 0.77$  cm and body weight ranged from 39 kg to 94.9 kg with a mean weight of  $67.64 \pm 1.53$  Kg. Results revealed that majority of the subjects were in the normal category according to BMI classification (WHO/IOTF 2000), 13.33 percent subjects were underweight, 23.3% overweight and 10% and 5% in first and second grade obese category.

### Dietary Survey

Consumption of cereals among the subjects ranged from 90g to 440g per day with a mean intake of  $251.766 \pm 13.72$  g/day which was 59.94 percent to the balanced diet (420g/day).

Mean intake of pulses was  $54.166 \pm 4.28$  g/day, which was 90.27 percent of balanced diet (60g/day) and ranged between 20g to 135g per day (NIN, 1998). Consumption of green leafy vegetables ranged between 30g to 150g per day with a mean intake of  $23.83 \pm 5.58$  g per day which was 23.83 percent of balanced diet (100g/day) given by ICMR, 1989. The intake of roots and tuber ranged from 100g to 300g/day with a mean intake of  $119 \pm 19.72$  g per day. Consumption of other vegetables ranged between 100g to 250g/day with the mean intake of other vegetables by the subjects of  $66.5 \pm 8.79$  g/day which was 66.5 percent of suggested quantity of 100g/day. Fruit intake by the subjects ranged between 100g to 200g/day with a mean intake of  $183.91 \pm 43.74$  g/day which was 83.91 percent higher than the recommendation (100g/day). Milk consumption was found to be  $481.75 \pm 40.14$  ml/day which ranged between 100 ml to 1600 ml/day, which is 160.58 percent of balanced diet (300 ml/day). Consumption of fats ranged between 15g to 188g/day with the mean intake of  $60.81 \pm 5.38$  g/day which is 304.05 percent of balanced diet (20g/day). The mean intake of sugar and jaggery by the subjects was  $24.18 \pm 2.39$  g/day, which is 96.7 percent of the balanced diet (25g/day).

The findings revealed that diets of subjects were higher in fat, calcium,  $\beta$  carotene and vitamin C when compared to respective recommended values, adequate in energy, protein, thiamin and riboflavin whereas extremely low in fiber and iron and inadequate in niacin.

### Physical Fitness

Results revealed that average subjects performed good level of cardiorespiratory endurance ( $46.99 \pm 3.12$ ) very poor in abdominal ( $30.6 \pm 2.47$ ) and upper body ( $20.88 \pm 1.54$ ) muscular endurance, excellent in muscular strength ( $1.33 \pm 0.07$ ) and in fair ( $27.45 \pm 0.92$ ) category of flexibility.

### Relation between Diet and Physical fitness

Results of correlation between physical fitness and diet indicate that cardiorespiratory endurance was positively correlated with carbohydrate, protein and fat, but negatively correlated with energy. There was positive significant correlation of abdominal muscular endurance with energy, carbohydrate and protein while negatively correlated with fat intake, upper body muscular

endurance was positively correlated with energy, carbohydrate and fat intake and significantly positive correlated ( $P < 0.05$ ) with protein intake. There were significant positive correlation of muscular strength with carbohydrate intake but non significant positive correlation with energy and protein and negatively correlated with fat intake. Flexibility was found to be positively correlated with energy, carbohydrate and protein but negatively correlated with fat intake. It was concluded that with increase in fat intake the muscular and flexibility fitness decrease, while energy intake has strong non significant correlation ( $P < 0.05$ ) with muscular strength and muscular endurance. No correlation between upper body muscular endurance and fat intake was found.

The average intake of calcium, vitamin A, thiamine and ascorbic acid were adequate while that of niacin was marginally inadequate. The inadequate intake of protein, iron, folic acid and vitamin B12 could be linked to high prevalence rate of anemia as these are the elements required for hemoglobin formation. Bains and Mann (2000), Prabhakaran (2003), Bains et al (2003), Kumari and Singh (2003) and Shekhar (2004) also reported lower intake of these nutrients.

As body fat increases the flexibility and muscular endurance decreases. Body fat is positively correlated with BMI. Fat intake has positive correlation with BMI, while negative relationship with flexibility and muscular endurance. Vaara et al 2012 reported that BM and body fat correlated negatively with muscular endurance.

### Conclusion

The study concluded that physical fitness and diet are strongly associated. Physical fitness and diet indicate that cardiorespiratory endurance was positively correlated with carbohydrate, protein and fat, but negatively correlated with energy. There was positive significant correlation of abdominal muscular endurance with energy, carbohydrate and protein while negatively correlated with fat intake. Flexibility and muscular endurance are associated with body fat. As body fat increases the flexibility and muscular endurance decreases. Muscular endurance and muscular strength can be improved by increasing protein intake and lowering the fat and energy intake in the diet. It is suggested that people should indulge in physical activities to improve the physical fitness.

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**Table 1 : Daily Intake of Food (Mean ± SE) by Subjects**

Food Groups	Balanced diet (g)	Intake	% to BD
Cereals	420	251.76 ± 13.72	59.94
Pulses	60	54.16 ± 4.28	90.27
Leafy vegetables	100	23.83 ± 5.58	23.83
Roots & tubers	200	119 ± 19.72	59.50
Other vegetables	100	66.50 ± 8.79	66.50
Fruits	100	183.91 ± 43.74	183.91
Milk & milk products	300 ml	481.75 ± 40.14	160.58
Sugars	25	24.18 ± 2.39	96.70
Fats and oils	20	60.81 ± 5.38	304.05

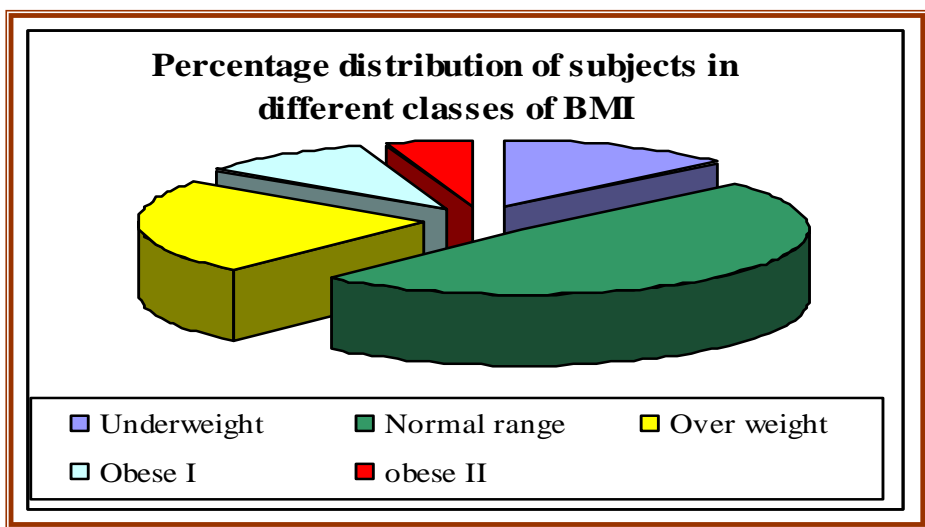
**BD – Balanced diet suggested by NIN, 1998**

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**Table 2 : Mean Daily Intake of Nutrients by Subjects**

Food groups	RDA	Intake	% to RDA
Energy (kcal)	2425	2318.81±114.6	95.5
Protein (g)	60	64.26±2.68	107.1
Fat (g)	20	74.96±15.54	374.8
Carbohydrates (g)	394.06	302.55±15.30	76.77
Fiber (g)	20	8.48±0.52g	42.4
Calcium (mg)	400	1282.98±368.96	320.5
Iron (mg)	28	18.38±0.82	65.64
B carotene (µ g)	2400	3759.73±581.89	156.62
Thiamin (mg)	1.2	1.69±0.7	131
Riboflavin (mg)	1.4	1.45±0.09	103.5
Niacin (mg)	16	12.99±0.64	81.18
Vitamin C (mg)	40	105.51±14.35	263.77

RDA – Recommended Dietary Allowance Suggested by ICMR, 1989

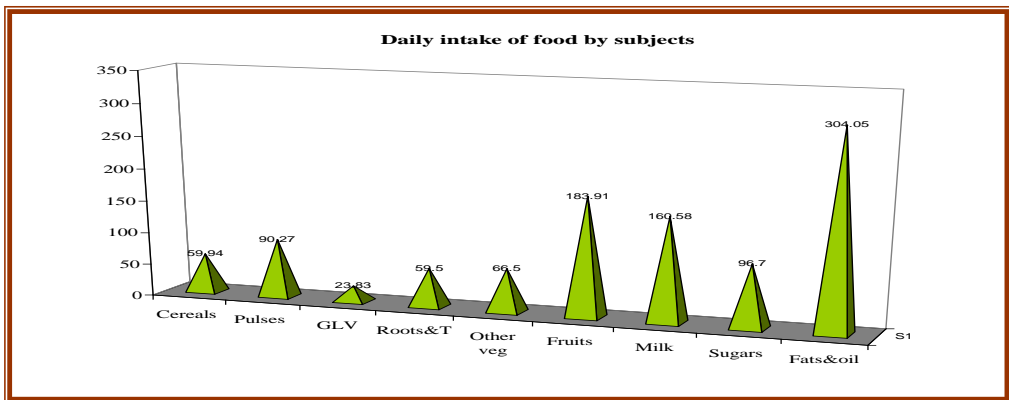


**Fig. 1. Distribution of subjects on the basis of BMI**

**Table 3 : Correlation Between Physical Fitness and Nutrient Intake**

Components of Physical Fitness	Nutrients			
	Energy	Carbohydrate	Protein	Fat
Cardiorespiratory endurance	-0.019	0.021	0.121	0.073
Muscular endurance (abdominal)	0.254*	0.283*	0.285*	-0.045
Muscular endurance (upper body)	0.197	0.215	0.316*	0.005
Muscular strength	0.212	0.305*	0.186	-0.139
Flexibility	0.113	0.121	0.129	-0.105

\*Significant at 5% level.



**Fig. 2. Intake of food groups by the subjects**