

Fitness assessment in relation to nutritional profile of urban adult girls

■ RENU PALIWAL, SHASHI JAIN AND RICHA SONI

Received : 01.02.2012; Revised : 01.03.2012; Accepted : 16.03.2012

■ ABSTRACT

The health and nutritional status of the population of nation is an important indicator of the development of the country. In lieu of the above, rational a need was felt to evaluate the fitness of the adult girls in relation to nutritional status. The study was conducted on 63 adult girls falling within the age range of 18-25 years. The nutritional status was assessed by measuring weight (kg), height (cm), BMI, and body composition. Physical fitness of the selected girls was assessed through 3 minute step up test. The mean height, weight and BMI of the subjects was 157.73 ± 0.58 cm, 51.09 ± 1.10 kg and 20.44 ± 0.46 kg/m², respectively. Mean fat per cent was 23.54 ± 0.98 . It was observed that 41.2 per cent of the subjects were normal, 11.04 per cent of the subjects were either overweight or obese and remaining were falling below normal category. The correlation test was performed between BMI and fat per cent, here the correlation analysis showed that the fat mass has strong correlation with BMI ($r= 0.83$). The lesser the fat mass, the lower the BMI. The correlation test was also performed between BMI and recovery index ($r=0.067$) and recovery index and fat per cent ($r= 0.026$) which did not find any significant correlation that may be because the girl selected for the study were falling under the normal BMI category and very few girls were falling under obese grade I category. So, if a person has a high BMI but involved in regular cardiac exercise, sports etc., he will be more cardio-respiratory fit than those who have normal BMI but not cardio-respiratory active.

■ **Key Words** : Fitness assessment, Nutritional status, physical fitness, Body mass index

■ **How to cite this paper** : Paliwal, Renu, Jain, Shashi and Soni, Richa (2012). Fitness assessment in relation to nutritional profile of urban adult girls. *Internat. J. Phy. Edu.*, **5** (1) : 49-52.

See end of the article for authors' affiliations

Correspondence to :

RENU PALIWAL

College of Home Science,
Maharana Pratap University of
Agriculture and Technology,
UDAIPUR (RAJASTHAN) INDIA
Email: renu8543@gmail.com

Adequate nutrition, a fundamental corner stone of any individual's health, is especially critical for women because inadequate nutrition not only affects women's health but also the health of their children. Mortality rates, micronutrient deficiency and malnutrition status are some of the important indicators that can be used to assess the health status of the country. Nutritional status is state of body in relation to the consumption and utilization of the nutrients. Nutritional status is the balance between the intake of nutrient by an organism and the expenditure of these in the process of growth, reproduction and health maintenance. Nutritional status can be measured for individuals and for populations.

Body composition refers to the body's relative amount of fat and lean body mass (organs, bones and muscles) and is

one of the five components of physical fitness. Good body composition is best gained through proper diet and exercise. Example of poor body compositions are underdeveloped musculature and excessive body fat. Body composition is the basic reflection of nutritional status throughout the human life cycle. Its ideal maintenance during the early growth and maintenance years as well as through the adult years is primary health goal.

Malnutrition denotes impairment of health arising either from deficiency or excess or imbalance of nutrients in the body. It is an ecological problem and is the end result of multiple overlapping and interactive factors- physical, biological, and cultural environment and economic.

Adequate nutrition, a fundamental cornerstone of any

individual's health, is especially critical for women because inadequate nutrition wreaks havoc not only on women's own health but also on the health of their children. Children of malnourished women are more likely to face cognitive impairment, short stature, lower resistance to infection and a higher risk of disease and death throughout their lives.

Addressing women's malnutrition has a range of positive effects because healthy women can fulfill their multiple roles *i.e.* generating income, ensuring their family's nutrition and having healthy children, more effectively and thereby help advance country's socio-economic development. This brief discusses the importance of improving women's nutrition and suggests policy options for achieving positive change.

In view of national growth and development, it becomes essential to maintain physical power of our population at an optimal level. For this purpose, the requirement is to work out ways to help population to improve personal and family nutrition in face of economic hand grip. In the line of the above rational, a need is felt to evaluate the physical performance of the population in relation to nutritional status. Therefore the study was conducted on 63 adults girls to assess the nutritional status and find out the body composition of urban adults girls and to analyze the relation between nutritional and fitness.

■ METHODOLOGY

The study was conducted on young adult girls studying at College of Home Science, Udaipur. Subjects for the study were purposively selected to maintain the uniform environment while assessing the fitness. At the same time, a homogenous group was needed with willingness and cooperation to participate in the study. The students were contacted during their class hours and the purpose of the study explained to them. All the students approached investigators to participate

were included in the study. The study was conducted in the laboratory of Department of Foods and Nutrition to assess the nutritional status, body composition and physical fitness.

Nutritional status was assessed by anthropometric measurements. Weight and height were taken using standardized techniques. Body mass index (BMI) was calculated for each girl by weight (kg)/height (cm²) (WHO,1999).

Assessment of body composition :

Body composition was analyzed using body composition analyzer (Tanita). It gave the complete picture of body compartments.

Assessment of physical fitness :

Physical fitness of selected girls was assessed by step up test. The test consisted of stepping up and down from the 12 inch stool to floor, 30 times a minute for three minutes. Heart rate monitor was used for recording heart rate values thrice during the step up test. The subjects were asked to wear the heart rate monitor belt around the chest and tighten it.

■ OBSERVATIONS AND DISCUSSION

Body weight is the composite of body water, lean tissue, adipose tissue and bone. The proportion of water, lean mass and fat changes with age and is band by diet and exercise. A person with sedentary lifestyle may have a high proportion of fat, while an athlete of the same height and weight has a highly developed musculature and a much less fat.

Information pertaining to age, height, weight BMI, BMR, fat per cent, fat mass, fat free mass, total body water and total body fat per cent are given in Table 1 and described below. The mean age of the subjects was 20.4 years, height 157.73 cm, weight 51.09 kg and BMI 20.44 kg/m². The study group

Table 1 : Nutritional profile of subjects				
Parameters (n=63)	Mean	± S.D.	S.E.	Range
Age(yrs)	20.4	2.04	0.25	18 - 25
Height (cm)	157.73	4.64	0.58	143 - 167
Weight (kg)	51.09	8.77	1.10	33.6 - 74.4
BMI (kg/m ²)	20.44	3.69	0.46	16.4 - 31
BMR (kcal)	1212	96.08	12.11	985 - 1456
Fat (%)	23.54	7.84	0.98	6.9 - 41.6
Fat mass (kg)	13.04	7.72	0.97	2.9 - 30.6
FFM (kg)	37.82	2.92	0.36	29.6 - 44.9
TBW (kg)	27.74	2.09	0.26	21.7 - 33.1
TBF (%)	24.66	0.96	0.121	21 - 25
TBW (%)	55.32	6.46	0.81	41.52 - 68.82

had 23.54 ± 7.84 per cent fat and 55.32 ± 6.46 per cent water. The mean body fat per cent was 28.38 ± 0.87 which indicated that the subjects had higher body fat per cent than the recommended value. Total body water of the subjects ranged 24.2 to 33.9 kg. According to Fahey *et al.* (2005) it is the fact that as the fat per cent increases in the body, the total body water decreases.

It is evident from Table 2 that 17.4 per cent of adult females were below 16 per cent fat where as 31.7 per cent were between 16 to 24 per cent and 50.7 per cent were above 24 per cent fat. It was observed that 50 per cent of females had lower fat than normal which in turn showed lower energy storage in the body.

Body mass index :

It was observed that 41.2 per cent subjects were normal,

47.4 per cent were suffering from different grades of malnutrition and 11.34 per cent were overweight (Table 3).

Assessment of fitness :

Physical fitness of selected females was assessed by step up test, data showed that majority of the subjects (38.09%) had poor recovery or poor cardio -vascular endurance, 34.92 per cent fall under category of average cardio-vascular endurance. Only 3.17 and 4.76 per cent subjects were under the category of very good and excellent cardio-vascular endurance, respectively (Table 5). Recovery index of the subjects was assessed using criteria given by Anderson and Johnson, 1988 (Table 4).

The correlation test was performed between BMI and fat per cent, BMI and fat mass ($r=0.878$). Here, the correlation analysis showed that the fat mass has strong correlation with

Table 2: Distribution of subjects by percentage of fat

Fat %	Percentage of subjects	Mean	± S.D.	S.E.	Range
<16	17.4 (11)	12.11	2.53	0.76	6.9 – 14.5
16 - 24	31.7 (20)	19.67	2.24	0.50	16.2 – 23.8
>24	50.7 (32)	29.9	4.42	0.78	24.4 - 41

Table 3 : Distribution of subjects on the basis of BMI

BMI class (kg/m ²)	Percentage of subjects	Mean	± S.D.	S.E.	Range
15.0 – 17.0	19 (12)	16.33	0.45	0.13	15.1 – 16.8
17.0-18.5	12.6 (8)	17.0	0.440	0.15	17.1-18.5
18.5-20.0	15.8 (10)	19.27	0.54	0.17	18.6-19.9
20.0-25.0	41.2 (26)	21.35	1.08	0.21	20.1-24.1
25.0-30.0	6.34 (4)	27.22	6.77	3.36	26.1-28.1
>30.0	4.7 (3)	30.93	0.11	0.06	30.8-31

Table 4 : Categories of fitness assessment

Recovery	Category
60 or less	Poor
61 to 70	Average
71 to 80	Good
81 to 90	Very good
> 91	Excellent

Table 5 : Assessment of fitness in relation to recovery

Recovery category	Percentage of subjects	Before activity	After activity	After rest	Count	Recovery
Poor	38.09 (24)	97.33±2.98	168.79±2.70	115.37±2.71	76.34±3.17	53.25±6.01
Average	34.92 (22)	100.80±2.63	179.04±2.13	112.85±2.19	76.47±4.06	66.19±0.65
Good	20.63 (13)	102.69±5.59	183.07±2.55	108.15±2.47	86±2.45	75.23±0.96
Very good	3.17 (2)	97±1.0	186±0	105±0	87.5±3.76	81±0
Excellent	4.76 (3)	101.66± 4.2	188.66±2.73	96.66±2.66	82±2.0	92±0.57

BMI ($r = 0.83$). The lesser the fat mass, the lower the BMI.

The correlation test was also performed between BMI and recovery index ($r=0.067$) and between the fat per cent ($r=0.026$). The correlation test for BMI and recovery index ($r=0.067$) and recovery index and fat per cent ($r=0.026$) did not find any significant correlation which may be because the girl selected for the study were falling under the normal BMI category and very few girls were falling under obese grade I category. Another reason for not getting any conclusive result may be the fact that there were certain cardio-vascular adaptations with fitness training and routine exercise and stroke volume increases with lower heart rate. So, if a person has a high BMI but involved in regular cardiac exercise, sports etc., she will be more cardio-respiratory fit than those who have normal BMI but not cardio-respiratory active.

The body mass index (BMI) is an index of weight adjusted for height. It is one of the useful tools for diagnosing obesity or malnutrition; however, such diagnosis should take into account a person's age, gender, fitness, and ethnicity. Hattiwale *et al.* (2008) conducted a study to evaluate the BMI and physical fitness index (PFI) of healthy subjects consisting of early part and late part of youth of north interior Karnataka, and also to find out the influence of BMI on PFI in same subjects as such study in this area is least done by competent researchers. Twenty five young, healthy adults belonging to age group of 17-21 years were selected as group I and fifteen young healthy adults belonging to age group of 29-40 were selected as group II subjects in this study. The present study reveals that physical anthropometric parameters were found to be within the expected range of normal in both group I and group II subjects of north interior Karnataka which reflects the adequate nutrition, socio-economic status and normal life style of these individuals. In this study, no correlation was found between BMI and PFI score and a positive correlation was observed between BMI and waist hip ratio in both the age groups.

Widhalm *et al.* (2001) conducted a study to test the relation between BMI and body fat per cent and a total of 204 obese children and adolescents (105 boys and 99 girls) aged 6-17 years. BMI and PBF were observed to be positively correlated (overall: $r = 0.65$, $P < 0.0001$) both in boys ($r = 0.63$, $P < 0.0001$) and girls ($r = 0.68$, $P < 0.0001$). BMI was also correlated with age (overall: $r = 0.43$, $P < 0.0001$; boys: $r = 0.33$, $P < 0.0006$; girls: $r = 0.54$, $P < 0.0001$). However, the association

between PBF and age was not significant (overall: $r = 0.10$, $P = 0.154$; boys: $r = 0.01$, $P = 0.894$; girls: $r = 0.19$, $P = 0.061$). From the results authors concluded that BMI might be a useful parameter for epidemiological studies.

Hussey *et al.* (2007) also got similar result by their study, conducted to investigate the relation between physical activity and cardio-respiratory fitness. Similar were the findings reported by Klentrou *et al.* (2003).

Authors' affiliations:

SHASHI JAIN AND RICHA SONI, College of Home Science, Maharana Pratap University of Agriculture and Technology, UDAIPUR (RAJASTHAN) INDIA

■ REFERENCES

- Anderson, G. and Johnson (1988). The digest book of physical fitness.
- Hattiwale, H.M., Maniyar, S.A., Das, K.K. and Dhundasi, S.A. (2008). Role of body mass index on physical fitness index in two different age groups of healthy young males from north interior Karnataka, India. *Al Ameen J. Medical Sci.*, 1(1):50-54.
- Hussey, J., Bell, C., Bennett, K., Dwyer, J.O' and Gormley, J. (2007). Relationship between the intensity of physical activity, inactivity, cardio-respiratory fitness and body composition in 7-10-year-old Dublin children. *British J. Sports Medicine*, 41(5): 311-316.
- Klentrou, P., Hay, J., Plyley, M. (2003). Habitual physical activity levels and health outcomes of Ontario youth. *European J. Appl. Physiol.*, 89(5): 460-465.
- Sadhan, B., Koley, S. and Sandhu, J.S. (2007). Relationship between cardio-respiratory fitness, body composition and blood pressure in Punjabi Collegiate Population. *J. Human Ecol.*, 22(3):215-219.
- Widhalm, K., Schönegger, K., Huemer, C. and Auterith, A. (2001). Does the BMI reflect body fat in obese children and adolescents? A study using the TOBEC method. *Internat.J. Obesity*, 25 (2): 279-285.

■ WEBLIOGRAPHY

- www.amazon.com.
- WHO, 1999. www.who.in.
