

Assessment of Malnutrition in Punjabi Urban Males According to Body Mass Index (BMI) and Weight for Height Criteria

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INTRODUCTION

An adequate diet is very essential for a perfectly healthy child as his growth and development are guaranteed. Further, it is of paramount importance for the development of a healthy adult having optimal working capacity and normal reproduction. The positive health effects of food, the hazards of excess and the basis of unusual response or demand for specific foods are some of the problems of nutrition which persist. A marked shift in the structure of diet have been observed which indicates that world is moving towards the higher fatty western diet which is promoting obesity epidemic (Kim et al., 2000; Monteiro et al., 1995).

Malnutrition is a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients such as vitamins or minerals. Insufficient diet results into Protein-Energy Malnutrition (PEM) and micronutrient disorders whereas overnutrition results in obesity. Undernutrition and starvation lead to wasting of muscles and marked loss of adipose tissue. The state of malnutrition being clinically manifested or detected only by biochemical, anthropometric or physiological tests (Jelliffe, 1966).

The food intake and socio-economic status of the family undoubtedly influenced the nutritional status assessment of a population. The rapid changes in the structure of diet and activity in particular are linked with increased income. Urbanized people consume diets distinctly different from those of the people living in rural areas. In many populations a positive correlation has been found between stature and income (Steckel and Haurin, 1994; Popkin, 2001).

Weight for height index (Person's weight compared to his/her own height) is an important indicator which distinguishes acute malnutrition from chronic malnutrition and is also known to be partially age independent in nature. The body building of an individual can be more accurately assessed through this index (Bhalla, 2002).

Body Mass Index (BMI) also known as the

Quetlet's Index (Weight/Height^2) is considered to be the best variable for the anthropometric evaluation in nutritional and the general health screening. On the basis of this index the relative proportion of normal undernourished and obese people can be assessed (WHO, 1995). It is also found that lower values of BMI are associated with obesity and cardiac disorders (Freedman, 2000; Kopelman, 2000). Keeping this importance of height and weight in mind, a survey of large sample of 1044 young Punjabi urban males of 12 to 20 years have been undertaken with a view to assessing malnutrition according to Body Mass Index (BMI) and weight for height in this population.

MATERIAL AND METHODS

A sample of 1044 male subjects in age range from 12 to 20 years living in urbanized areas of Punjab were selected during October, 2000. All apparently healthy and normal males were measured for height and weight following the standard techniques given by Tanner et al. (1969).

The criteria used for finding the prevalence of malnutrition in the present population has been given by Jelliffe (1966). Body Mass Index (BMI) has been calculated as:

$$\text{BMI} = \text{Weight(kg)/Height}^2(\text{m}).$$

RESULTS

Table 1 provides information about Body Mass Index (BMI) in Punjabi urban males and its grading according to WHO (1995) criteria. Maximum number of individuals i.e. 397 (38.02%) lies in the normal range of BMI. This is followed by 322 individuals (30.84%) who lie in the Grade-3-Thinness of BMI. A total of 170 individual (16.28%) were in Grade-1-Thinness and 141 in Grade-2-Thinness. Grade 1 overweight category included only 14 subjects (1.34%).

Table 2 represents number and percentage distribution of BMI according to age. The 12 year

Table 1: Incidence of persons according WHO criteria

BMI	Grade	Number of subjects	Percent-age distribution
< 16	Grade 3 Thinness	322	30.84
16-16.99	Grade 2 Thinness	141	13.50
17-18.49	Grade 1 Thinness	170	16.28
18.5-24.99	Normal	397	38.02
25-29.99	Grade 1 overweight	14	1.34
30-39.99	Grade 2 overweight	-	-
> 40	Grade 3 overweight	-	-

age group had all the 126 individuals (100%) with a BMI of < 20 compared to only one individual (0.82%) from the 20 years age group. The frequency of individuals having BMI < 20 decreases gradually as the age increases. Maximum number of individuals from 20 years age groups i.e. 120 (99.17%) ranged between BMI 20 - 24.99 compared to only 7 individuals from the 13 years age group in the same BMI range. Apparently no individual except from 15, 19 and 20 years had a BMI between 25 - 29.99. The 15 year age group included only a single subject, 19 year age group had 9 subjects and the 20 year age group had 5 individuals each. No individual in the present study had BMI greater than 30.

Table 3 represents the frequency of malnutrition in Punjabi urban males according to weight for height using the criteria given by Jelliffe (1966). The highest frequency of normal individual has been recorded in 13 year age group i.e. 139 (71.28%). This is followed by subjects in the age ranges of 20, 14, 15, 19, 16, 12, 18 and 17 years i.e. 121 (100%), 103 (69.12%), 102 (68%), 94 (100%), 70 (61.40%), 54 (42.85%), 46 (97.87%), 28 (58.33%). Only 21.55% of all males were below 90% of the mean value, 5.70% were below 80% and 0.28% were below 70% respectively. No individuals were found below 60%. The frequency of malnutrition seems to decrease with increase in age in Punjabi urban males, but the pattern is not uniform. The possibility of small sample size in few age groups and the errors creeping in during sampling (sampling error) cannot be ruled out. These are some of the factors which might be working in the irregularities observed in the frequency of malnutrition with advancing age.

DISCUSSION

Results of the present study elucidate that about 38.02% of the present population is placed

Table 2: Number and percentage distribution of BMI according to age

Age (years)	BMI < 20		BMI 20 - 24.99		BMI 25 - 29.99		BMI > 30	
	N	%	N	%	N	%	N	%
12	126	100	0	-	-	-	-	-
13	188	96.4	7	3.5	-	-	-	-
14	142	95.3	7	4.6	-	-	-	-
15	124	82.6	25	16.6	1	0.6	-	-
16	102	89.4	12	10.5	-	-	-	-
17	40	83.3	8	16.6	-	-	-	-
18	10	21.2	37	78.7	-	-	-	-
19	8	8.5	77	81.9	9	9.5	-	-
20	1	0.8	115	95.0	5	4.1	-	-

Table 3: Frequency of malnutrition in Punjabi Urban Males according to weight for height criteria

Age (years)	N	Normal		< 90%		< 80%		< 70%		< 60%	
		n	%	n	%	n	%	n	%	n	%
12	126	54	42.85	61	48.41	11	8.73	0	0.00	0	0.00
13	195	139	71.28	43	22.05	12	6.15	1	0.51	0	0.00
14	149	103	69.12	32	21.47	13	8.72	1	0.67	0	0.00
15	150	102	68.00	38	25.33	10	6.66	0	0.00	0	0.00
16	114	70	61.40	33	28.94	10	8.77	1	0.87	0	0.00
17	48	28	58.33	17	35.41	3	6.25	0	0.00	0	0.00
18	47	46	97.87	1	2.12	0	0.00	0	0.00	0	0.00
19	94	94	100	0	0.00	0	0.00	0	0.00	0	0.00
20	121	121	100	0	0.00	0	0.00	0	0.00	0	0.00
Total	1044	757	72.50	225	21.55	59	5.70	3	0.28	0	0.00

within the normal standards of BMI as given by WHO (1995). The findings indicate that very small amount of Punjabi urban males are well within the defined limits of BMI which may be termed as healthy. About 60.62% of the population is found to be underweight and only 1.34% of the population is considered to be overweight.

On the basis of BMI, chronic energy deficiency (CED) have been defined as the degrees of underweight for a given height and cut offs at 18.5, 17 and 16.0 have been recommended for defining mild, moderate and severe chronic energy deficiency, respectively (Ferro-Luzzi et al., 1992 and James et al., 1988). In present population only 30.84% of the subjects were falling in severe CED whereas 13.50% in moderate CED and 16.28% in mild CED. On the other hand, the BMI values below 25 have been attributed to undernutrition and are termed as malnourished. Whereas values above 25 indicates the overnutrition (overweight and obesity). The present sample has relatively greater tendency to be on the underweight side in comparison to be on the overweight side. According to Freedman (2000) and Kopelman (2000) lower values of BMI are associated with morbidity and also increases the expectancy of health risks. Higher values of child's or adolescent's BMI increases the probability of overweight or obesity in adulthood (Guo et al., 2002).

Frequency of malnutrition in Punjabi urban males decreases with the advancement of age. This may be due to increasing consumption of western diet in urbanized areas. Large increase in the consumption of fat and added sugar in the diet marked a great dietary change. Total cereal intake and fiber are loosing from the diet. Increase in amount of high fat in the diet and low activity pattern are responsible for this change (Popkin, 2001).

KEY WORDS Malnutrition. Punjabi Urban Males. Body Mass Index. Weight for Height.

ABSTRACT A total of 1044 Punjabi urban males were investigated during October 2000 for the assessment of malnutrition using BMI and weight for height index. Following WHO criteria for BMI, 60.62% of the males are found to be underweight, 38.02% are within normal ranges and only 1.34% are overweight. Frequency of malnutrition in the present sample is decreasing with increasing age according to weight for height criteria given by Jelliffe.

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