

Body Mass Index in Young and Old Punjabi Females

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INTRODUCTION

The Body Mass Index (BMI) with its universal usage has emerged as an important indicator of health and nutritional status among human subjects at different age levels. Though it quite accurately reflects the amounts of fat stores in adults of European descent, yet its reliability in other populations which may differ in body composition is questionable (WHO, 1995). BMI to some extent also reflects the minimum metabolic mass per unit height towards its higher range. The humans generally put on weight usually as a result of fat gain and women do so more than men (Rosebaum et al., 1985; Singal and Sidhu, 1981; Berdasco, 1994; Stini, 1996). But weight gain can be checked as Williamson and Pamuk (1993) have indicated that remaining physically active is associated with the prevention of age related weight gain. Even if the BMI is similar, the young adults possess lower proportions of their body mass as fat as compared to that of the middle aged and old persons. Deurenberg et al. (1991) noticed that at a uniform BMI of 30, the percentage of fat at 20 and 60 years was 30% and 40% in Dutch men and 40% and 50% in Dutch women respectively.

Taking a cue from the studies indicating an increase in BMI with advancing age and also that it has different implications at different ages during the adult years of life, an attempt has been made to assess the change in BMI in Punjabi females from younger (20-25 years) to older (50-60 years) age groups. The BMI has been classified according to the WHO (1995) criteria to judge thin and overweight females. Its possible association with fatfold at triceps has also been attempted.

MATERIAL AND METHOD

The sample for the present study has been drawn from the Punjabi population of Patiala district aged 20-25 years and 50-60 years. In all 300 subjects (150 each for both the groups) belonging to middle socio-economic group were

investigated during 1997. Standard anthropometric techniques as given by Lohman et al. (1988) were employed while measuring the subjects for their height, weight, triceps skinfold, waist and hip circumference. Using these measurements, Body Mass Index (BMI) which is weight (kg.) / height (m)² and a ratio of waist to hip circumference were calculated. Out of a total sample of 300, individuals with matched range of BMI (22-24.99) from the two groups were selected; the younger age group of 20-25 years and the older age group of 50-60 years included 49 and 28 subjects, respectively in this BMI range.

A comparison of these two groups has been attempted mainly for triceps skinfold, waist and hip circumference and its ratio in order to find out the morphological implications for the similar BMI values.

RESULTS

The mean BMI of the young sample (20-25 yrs) is 20.68 ± 1.98 as compared to 26.64 ± 2.11 of the old sample (50-60 yrs) of Punjabi females. Because of the skewed nature of this frequency distribution of BMI, mean values were also obtained after log transformation which were 20.58 ± 1.10 for young and 26.54 ± 1.08 for old females.

The distribution of young (20-25 yrs) and old (50-60 yrs) Punjabi females according to BMI classes of 2-unit intervals has been shown in table 1. The young sample exhibits the maximum frequency (32%) in the BMI class of 22.00 to 23.99. The BMI range in the young sample stretches from 16.00 upto 25.99. On the other hand, the old sample has the highest frequency in the BMI class of 26.00-27.99 and the BMI range of this sample is between 20.00 and 33.99.

The WHO (1995) criteria of BMI has been used to classify the subjects in their normal and overweight categories which is shown in table 2. The young sample has 82.67% of the subjects in the normal range of BMI, 14.00% in Grade 1 Thinness and only 2.67% in Grade 2 Thinness. Only very small fraction (0.67%) of the young

Table 1: Frequency distribution of Punjabi females of 20-25 years age and 50-60 years age groups according to BMI Classes

BMI Groups	20-25 yr		50-60 yr	
	N	%	N	%
16.00-17.99	14	9.33	0	-
18.00-19.99	41	27.33	0	-
20.00-21.99	44	29.33	2	1.33
22.00-23.99	48	32.00	9	6.00
24.00-25.99	3	2.00	47	31.33
26.00-27.99	0	-	60	40.00
28.00-29.99	0	-	22	14.67
30.00-31.99	0	-	8	5.33
32.00-33.99	0	-	2	1.33
Total	150	99.99	150	99.99

sample can be designated as Grade 1 overweight. The older sample, on the other hand, has only 20.00% of the subjects in the normal range, whereas 73.33% are in Grade 1 overweight and 6.67% in Grade 2 overweight categories.

Table 2: Distribution of Punjabi females according to WHO Classification and BMI

BMI Range	Classification*	20-25 yr		50-60 yr	
		N	%	N	%
16.00-16.99	Grade 2 Thinness	4	2.67	0	0.00
17.00-18.49	Grade 1 Thinness	21	14.00	0	0.00
18.50-24.99	Normal Range	124	82.67	30	20.00
25.00-29.99	Grade 1 overweight	1	0.67	110	73.33
30.00-39.99	Grade 2 Overweight	0	0.00	10	6.67
Total		150	100.01	150	100.00

*WHO (1995)

Age-matched comparisons of present sample with the British sample of Rosenbaum et al. (1985) for underweight, overweight and obesity categories consequent to BMI have been depicted in table 3. According to this study, a BMI of 20.00 or below has been designated as underweight. The present young sample has 36.67% of women as underweight as compared to only 4.20% of the British women in frequency distribution in each category. It can be concluded that the present sample undergoes dramatic qualitative changes from underweight and normal at age 20-25 yrs to

Table 3: A comparison of BMI of Punjabi females with British females

BMI Range	Present Study 20-25 yr		Rosenbaum et al. (1985) 20-24 yr		Present Study 50-60 yr		Rosenbaum et al. (1985) 50-59 yr	
	N	%	N	%	N	%	N	%
20.00 or below (underweight)	55	36.67	23	4.20	0	0.00	15	1.50
Above 25.00 (overweight)	1	0.67	21	3.83	110	73.33	92	9.25
Above 30 (obesity)	0	0.00	5	0.91	10	6.67	28	2.81

overweight and obese at 50-60 yrs as judged from BMI in comparison to the British sample.

There was an overlap of some subjects of young and old women of the present study in the BMI range of 22.00 to 24.99. This BMI range was used for a comparison of some body measurements in young and old females and the results have been given in table 4. The older group has exhibited significantly larger values of triceps skinfold, waist and hip circumference and waist/hip ratio than the younger group. The differences between the two groups for different measurements have been expressed as z-scores in terms of the SD of the younger group.

The waist circumference in the old group of females has grown by a z-score of 5.05 over their young counterparts, followed by waist to hip circumference ratio, triceps skinfold and hip circumference.

Table 4: Comparison of body measurements of young and old Punjabi females for matched BMI classes (22-24.99)

Parameter	Young (20-25 yr) (N=49)			Old (50-60 yr) (N=28)			t-value	z-score
	Mean	S.D.	S.E.M.	Mean	S.D.	S.E.M.		
Height (cm)	162.35	5.79	0.82	160.23	6.00	1.13	1.51	0.37
Weight (kg)	60.02	4.28	0.61	62.32	5.04	0.95	2.03*	0.54
Triceps (mm)	18.67	1.64	0.23	23.52	2.24	0.42	10.12*	2.96
Waist girth (cm)	65.09	2.80	0.40	79.22	6.10	1.15	11.60*	5.05
Hip girth (cm)	92.83	3.68	0.52	101.06	6.99	1.32	5.80*	2.24
Waist/Hip ratio	0.70	0.02	0.003	0.78	0.04	0.008	9.36*	4.0

*p < 0.05

The coefficient of correlation (r) between triceps skinfold and BMI yielded a value of -0.16 for the young group and 0.31 for the old group. This indicates an increase of triceps fatfold with an increase in BMI to some extent in old females.

DISCUSSION

The comparisons of body measurements of young and old sample of the present study for matched BMI (22-24.99) had reflected the qualitative changes occurring in the indicators of body mass between the two groups. The old sample has undergone changes in their body in such a way that they had accumulated huge amount of fat over abdomen and hips and also over the triceps muscle as compared to their young counterparts. The localization of fat and accumulation of tissues in the abdominal region in the old group of females is of paramount importance because of its health consequences. It may be noticed that all these females were designated as normal according to the WHO classification of the BMI. The situation of the rest of the 80% of females of older group who are in grade 1 and grade 2 overweight categories would be even worse. This is likely to emerge as a serious epidemiological problem.

The urban life style in Bombay, India has been promoting obesity as reported by Dhurandhar and Kulkarni (1992). The linkage between overweight (higher BMI) and morbidity/mortality especially related to CHD, stroke, hypertension, gall stones etc. has been well documented and substantiated the world over (WHO, 1995; Osler, 1987; Lindsted et al., 1991; Sjöström, 1992; Kuskowska-Wolk and Bergström, 1993). Not only does the higher but lower BMI also increase the expectancy of health risk as revealed by a study on 1.7 million sample in Norway (Waller, 1984, 1988). A typical U-shaped curve expresses the relationship between BMI and all cause mortality, people on both ends i.e. below a BMI of 19 and a BMI of 31 and higher seem to be most vulnerable and are susceptible to the process of pruning by nature (Waller, 1984).

Increase in body mass coupled with osteoporosis during old age has a higher tendency of bone fractures (Stini et al., 1994; Stini, 1996). The individuals who are relatively inactive are

more likely to gain weight and thus carry a higher risk than those who frequently engage in physical activity. WHO (1997) estimated the life time risks for osteoporosis fractures in women between 30 and 40 per cent. On a global level the number of hip fractures could rise about four-fold from 1.7 million in 1990 to 6.3 million by 2050, a frightening figure indeed.

The findings of the present study which have revealed not only raised BMI in the old sample over their young counterparts but concentration of fat over abdomen and centrally increased body girths also are clear pointers towards health risks, in the elderly. Further weight gain must be avoided and intervention for weight reduction must depend on individual's other risk factors.

KEY WORDS BMI. Thin. Overweight. Punjabi Female.

ABSTRACT BMI comparisons between two groups of young (20-25 years) and old (50-60 years) Punjabi females have been made from a sample of 300 subjects (150 of each group) investigated during 1997. The mean of BMI of young and old females is 20.68 and 26.64, respectively. According to the WHO criteria, practically, no subject is in overweight category in young sample compared to 80% of the old sample being overweight. The waist circumference in the old group of females has grown by a z-score of 5.05 over their young counterparts, followed by waist to hip ratio, triceps skinfold and hip circumference. Health implication of a higher BMI and intervention for weight reduction and avoidance of weight gain have been discussed.

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