

Body Mass Index: The functional significance of cut-of-value in reproductive age group women belonging to Varanasi city

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In developing countries the nutritional status of women of reproductive age group is far from satisfactory. Since, childhood to adulthood it is a long-term chronic nutritional deprivation results in poor body size of the mother. If anthropometric measurements are recorded over a period of time, they reflect the patterns of growth and development and how individuals deviate from the average at various ages in body size, build and nutritional status. This study was conducted on women belonging to afferent society and used indicator of BMI viz., previous WHO Criteria for all and Asia Pacific Criteria gave a functional significance of cut off value to assessed the accurate status of women in their living society. The objective of the study was to assess the nutritional status of the subjects on the basis of their anthropometric measurements and second was to compare between Previous WHO Criteria and Proposed Asian Criteria for BMI. The study was conducted in four selected wards of Varanasi city, with the aim of delineating nutritional status as per BMI of urban women. The desired sample size for this cross-sectional study was of 310 women of reproduction age groups (*i.e.* 15 to 49 years) were considered as study subjects. Multistage random sampling was followed in the present investigation. By using previous WHO Criteria and Proposed Asian Criteria 36.77 per cent and 29.03 per cent subjects were characterized as normal, respectively in prevalence of obesity was 1.29 per cent and 7.42 per cent using previous WHO criteria and Proposed Asian Criteria, respectively.

Key Words : Nutritional status, Reproductive age group, Previous WHO criteria, Proposed Asian Criteria, Body Mass Index

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INTRODUCTION

Anthropometry predominates over other methods of nutritional assessment is still considered the most practical and useful means for the assessment of nutritional status of the population. For a long time we used to refer WHO criteria for evaluation of BMI. However, after several years result showed that it was right for the developed countries. In India, women were noticed to be worst suffers *i.e.* 57.1 per cent suffering from CED (BMI < 18.5) while per cent of normal and obese females were 36.3 and 6.6, respectively.

The women nutrition database comprised of approximately 1500 records, from 340 studies considered; four

indicators of PEM of adult women viz., height, weight, and BMI and arm circumference. Each study was coded by five different sub grouping that included the following: Physiological status (pregnant, non-pregnant, and lactating), age (usually reproductive age women, although adolescents and elderly women were also reported) location (urban, rural) country group/region. Parity and income group (low, middle, high). The main problem related to the analysis of each outcome indicators was the varying cut-offs used different surveys. These indicators are:

Indicators	Cut-off to indicate problems
Height	< 145 cm (stunting)
Weight	< 45 Kg (under weight)
Body mass index	< 18.5 (wasting)
Mid-upper arm circumference	<22.5 cm (low arm circumference)

(Encyclopaedia of Health and Nutrition (3); 2002)

More recently, both biological and socio-economic landmarks bracketing the transition to adulthood had moved

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in opposite directions. In many countries the social environment - one of the most important components of health, is characterized by poverty, overcrowded, living conditions, unemployment, job insecurity and inequality, a grooming number of broken marriages, man-made as well as natural disasters. Women, researchers are especially exposing to these risks in developing country like India (WHO, 1996). On the basis of that review, the World Health Organization's Standard of BMI for Asian and Pacific Islanders had different cut off values rather than previous one. These cuts off value had more reliability and validity for Asian adults like India.

Body Mass Index is a reasonable indication of the nutritional status of adults. The BMI has good correlation with fatness. It may also be use as indicator of health risk. The following classification has been suggested by James *et al.* (1988).

A study sample comprises 726 females (≥ 18 years of age) to find out malnourished *i.e.*, almost one out of five women are classified as moderate/surely malnourished, while other 22 per cent have a marginal condition (NSPWRBW, 2003).

The objective of the study was to assess the nutritional status of the subjects on the basis of their anthropometric measurements.

METHODOLOGY

The study was conducted in four selected wards of Varanasi city, with the aim of delineating nutritional status as per B.M.I. of urban women. The field data collected was carried out for a period of one year 2002 to 2003. The desired sample size for this cross-sectional study was computed by taking the prevalence of under nutrition as 56.68 per cent and permissible level of error of 10 per cent. The required sample size of 310 women of reproduction age groups (*i.e.* 15 to 49 years) were considered as study subjects. As weight gain during pregnancy particularly 2nd and 3rd trimester may affect Body Mass Index, women had gestational period more than 4 months were excluded in the study. Multistage random sampling was followed in the present investigation. Following stages was involved in arriving at the required sample size.

Stage 1:

The authority of Banaras Corporation was contacted and the lists of all wards including the names of Mohall's were obtained.

Stage 2:

There were altogether 90 wards in the city. Out of which 9 wards (*i.e.*, 10 per cent) were selected randomly using random table.

Stage 3:

Out of previously mentioned 40 Mohall's, only 4 Mohall's

(*i.e.*, 10 per cent) were taken randomly using random table.

Stage 4:

Further, household selection was based on probability proportion to size as 310 households were to be selected from 1376. Households in selected Mohall's were divided by 4.44 (*i.e.* 1376 / 310) to get the total number of selected households.

Stage 5:

The survey was initiated in each selected Mohall. The first house selected randomly say 3rd house. Then, following the stratified sampling at the interval of 4, the next house was 3 + 4 = 7th house. This method was following continuously.

Stage 6:

The study of selected household was taking for family information. In case of Joint/Extended family, only one family was selected through sample random techniques *i.e.*, by lottery number.

Stage 7:

Lastly, for individual information, a female between 15-49 years of age from each family was selected randomly (*i.e.* by lottery number) for their interview and detailed investigation.

Tools and techniques of the study:

Interview schedule used for variable age, anthropometric measurements, *viz.*, weighing machine (Libra) and anthropometric rod.

Age:

Most of the subjects were able to furnish the correct age. For the illiterate group, age was ascertained using life events like birth, death, marriage, school entry etc. *i.e.*, a staircase approach.

Weight recording:

Recording of weight of all study subjects was done with the help of weighing machine (Libra). All study subjects were weighted with minimum possible clothing and without footwear. The machine was checked periodically by using standard known weight. According of the weighing machine was 100 g.

Height recording:

The standing heights were measured in cm, with steel anthropometric rod along the parallel bar. The steel anthropometric rod was placed on the even floor. For measurement, subject stands against the rod without foot wears. The bar was put at right angle on her head and the reading was noted. The accuracy of the steel anthropometric rod was 0.1 cm.

B.M.I. (Body Mass Index) :

The body mass index (BMI), or Quetelet index, is a heuristic proxy for human body fat based on an individual's weight and height. BMI does not actually measure the percentage of body fat. Body mass index is defined as the individual's body weight divided by the square of his or her height. The formulae universally used in medicine produce a unit of measure of kg/m². The World Health Organization's Standard of BMI for Asian and Pacific Islanders in Table A.

Table A: World Health Organization's standard of BMI

Classification of obesity	Body Mass Index (kg/m ²)	
	Proposed asian criteria	Previous WHO criteria
Under weight	< 18.5	< 18.5
Normal weight	18.5 to < 23	18.5 to < 25
Overweight	23 to < 25	25 to < 30
Obese	≥ 25	≥ 30

(Source : WHO, 1998)

OBSERVATIONS AND ASSESSMENT

The reproduction age capacity starts with the onset of menstruation (menarche) and lost till menstruation cycle stop completely (menopausal stage). Now-a-days, the reproductive age group covers 15-49 years (Mahajan and Gupta 2003). The proportion of subjects in 10 years age groups increased from 36.77 in the age group 15-24 years to 43.65 per cent in the age group 25 to 34 years and then declined to 17.10 per cent in the

age group 25 to 44 years. Only 2.58 per cent subjects belong to the age group 45 to 49 years. In comparison to urban U.P. 36.2 per cent (NFHS-2, 1998-1999), women belonged to age group 25-34 years were more in the present study (43.65%).

Table 1. Age wise distribution of the study subjects (n=310)

Age (In years)	No. (n = 310)	%
15-19	66	21.29
20-24	48	15.48
25-29	68	21.94
30-34	67	21.61
35-39	33	10.65
40-44	20	06.45
45-49	08	02.58

It was predominant over other methods of various anthropometric measurement, weight and height are commonly techniques as per Jellifies, (1966). These parameters were used to compute Body Mass Index (BMI) which had been considered as the most important indicator for assessment of nutritional status of adult population (Choudhary and Solanki, 1999; Government of India, 1995; Mahanty *et al.*, 1992; Parvarti and Sathiyayaki, 1996; Rao, 1996; Ray, 2002; Vijayragvan, 1995). Several classifications of nutritional status using BMI had been proposed (Garrow, 1981; Rao, 1996; WHO, 1998). WHO (1998) classification was widely used and a different criterion for Asian population had been proposed.

Prevalence of similar findings had been reported in some

Table 2. Age wise anthropometrics parameters of women

Anthropometrics measurement	< 20 years		20-29 years		30-39 years		40-49 years		Total		χ ²	P
	No.	%	No.	%	No.	%	No.	%	No.	%		
Weight (kg)												
< 40	9	13.64	18	15.52	12	11.88	4	14.81	43	13.87		
40-49.9	38	57.58	63	54.31	52	51.49	16	59.26	169	54.51	11.14	
50-59.9	17	25.76	26	22.42	27	26.73	3	11.11	73	23.56	df=15	
60-69.9	1	01.51	6	05.17	8	07.92	4	14.82	19	06.13		0.74
70-79.9	1	01.51	2	01.72	1	0.99	-	-	4	01.29		
≥ 80	-	-	1	00.86	1	0.99	-	-	2	00.64		
Total	66	100	116	100	101	100	27	100	310	100		
Height (cm)												
≤ 140	-	-	-	-	1	00.99	-	-	1	00.32		
141-144.9	-	-	-	-	1	00.99	-	-	1	00.32	17.54	
145-149.9	7	10.61	19	16.38	13	12.87	9	33.33	48	15.48	df=15	
150-154.9	19	28.79	28	24.14	27	26.73	3	11.11	77	24.84		0.29
155-159.9	15	22.72	28	24.14	32	31.69	6	22.22	81	26.13		
> 160	25	37.88	41	35.34	27	26.73	9	33.33	102	32.91		
Total	66	100.00	116	100.00	101	100.00	27	100.00	310	100.00		
Weight (kg) 50 kg	71.71		69.83		63.37		74.07		68.39			

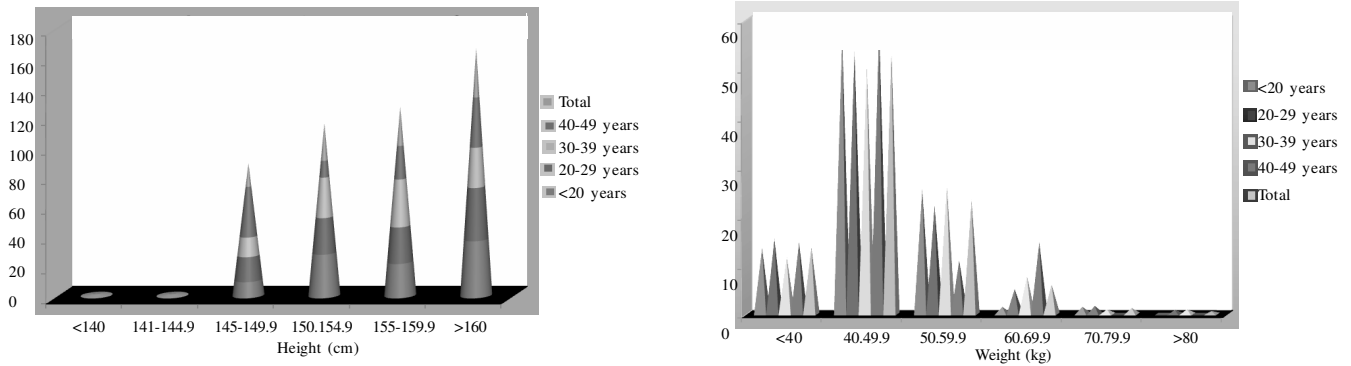


Fig. 1. Anthropometric parameter of women

of the studies conducted in the urban areas of Bihar (Singh and Yadav, 2000), Orissa (NHFS-2) and five district of Uttar Pradesh (Nigam and Vir, 2001). However, in the urban area of Baharaich district of Uttar Pradesh extent of under nutrition in women (15-49 years) of age had been higher (*i.e.* 71.5%) than the present study. In several, studies extent of under nutrition in women of reproductive age group had been lowered (Egtesadi, 2000; Krishnaswamy, 1997; NSPWRBW, 2003; NFHS-II, 1999; Ray, 2002). In three out of five districts of eastern U.P. women in the age group of 15-45 years, BMI was less than 18.5.

Nutritional status of 310 women of reproductive age group of Varanasi city was assessed on the basis of Body Mass Index and result are given in Table 3, As much as, 173 (55.81%) subjects were under nourished (B.M.I. < 18.5). The nutritional status of the women including in the study was poorer than overall situation of urban area of eastern U.P. Wide variations

of status of women on nutritional scale could be due to several factors *viz.*, priority and care to acquire girl child in general and during adolescent particular fertility performance, socio-economic differential, psychological status. However, last fact was not considered by several studies. It was unfortunate that in spite of covering several programmes (MCH, ICDS, women development programmes) for nutritional status of women in the study area was far from the being satisfactory. By using previous WHO criteria and proposed criteria 36.77 per cent and 29.03 per cent subjects were characterized as normal, respectively. Contrary to this Krishnaswamy (1997); Singh and Yadav (2000) reported that 46.3 per cent and 40.5 per cent women were normal, respectively, however, only one out of five women was considered as normal.

Obesity is emerging important problems in urban women. In this study prevalence of obesity was 1.29 per cent and 7.42 per cent using previous WHO criteria and proposed Asian criteria, respectively (Fig. 2). Several studies (Egtesadi, 2000; Krishnaswamy, 1997; NFSH, 1998-1999) had reported higher prevalence of obesity on the basis of previous WHO criteria; figures ranging from 6.6 per cent-38.3 per cent. According to a study conducted in Varanasi city the prevalence of obesity in women was 30.24 per cent. However, this study was conducted on women belonging to afferent society.

Table 3. Distribution of study subjects according to their Body Mass Index (BMI)

Body Mass Index (kg/m ²)	No	%
According to proposed Asian criteria		
> 16	35	11.29
16-16.9	28	09.03
17-18.4	110	35.49
18.5-22.9	90	29.03
23-24.9	24	07.74
≥ 25	23	07.42
Total	310	100
According to precious WHO criteria		
> 16	35	11.29
16-16.9	28	09.03
17-18.4	110	35.49
18.5-24.9	114	36.77
25-29.9	19	06.13
≥ 30	04	01.29
Total	310	100

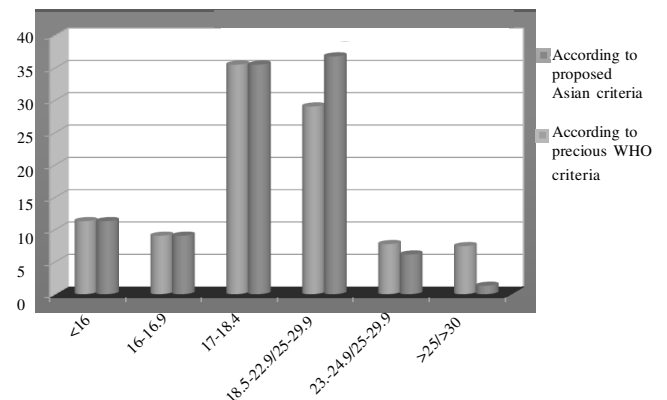


Fig. 2. Body Mass Index (kg/m²)

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