

## NUTRITIONAL STATUS OF WOMEN

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### ABSTRACT

The present study was conducted to assess the nutritional status of 30 adult women engaged in household activities from district Ambala. The measurement of height, weight, midarm circumference and triceps skinfold thickness were taken. From these, various derived indices were calculated and co-relation coefficients were drawn. The average height and weight of the subjects was more than the LIC standards but it compared well with the NCHS standards. The triceps skinfold (TSF), mid-upper arm circumference (MUAC), mid-arm muscle circumference (MAMC) indicate lack of physical activity among the subjects. Co-relation coefficients between the various indices were correlated to each other and these indices can be used as predictive indicators of the anthropometric status of population which could be used for rapid assessment of anthropometry of the community. The need of the hour is to impart nutrition education to raise the nutritional status of women.

### INTRODUCTION

Nutritional anthropometry is concerned with the measurement of the various physical dimensions and the gross composition of the human body at different age levels and degree of nutrition. Weight and height for age and weight for height are useful indicators for the assessment of nutritional status; but body mass index (BMI) is the best indicator for adults. The measurement of arm circumference and triceps skinfold thickness are also important in field surveys. The sum of four measurement i.e. triceps, biceps, the sub-scapular and the suprailiac provides a better index of sub-cutaneous fat which provides an estimate of the body fat. **The present study was undertaken to assess the nutritional status of urban adult women from district Ambala.**

### MATERIAL AND METHODS

Thirty volunteer women in the age group of 29 to 40 years were selected from District Ambala. A three day dietary survey of the subjects was conducted by weightment of cooked foods. The height, weight, mid-arm circumference and skinfold thickness was measured at four sites i.e. triceps, biceps, sub-scapular and suprailiac area. Body fat percentage was calculated from the sum of these four measurements by using table given by Durnin and Womersley (1974). Body surface area was calculated by using equation given by Dubois and dubois (1916). Lean body mass (LBM) was calculated from the equation given by Omen et al. (1986). The body mass index (BMI) was obtained using equation given by Garrow (1981). From these measurements mid-arm muscle circumference (MAMC), arm muscle area (AMA) and arm fat area (AFA) were calculated. The data thus obtained was statistically analysed and co-relation coefficients were calculated.

### RESULTS AND DISCUSSION

The average daily energy consumption of the subjects was  $1777 \pm 317$  (Table 1) Kcal which was less when compared to the recommended dietary allowances (ICMR 1990). The subjects were consuming 32 kcal/kg body weight while the recommended level is 35.5 kcal/kg body weight which was 87 per cent of the RDA. The average height (Table 2) of the subjects was  $158 \pm 0.81$  cm

while weight was  $57.5 \pm 0.83$  kg. The weight of the subjects was higher for their height when compared with the LIC standards (1965) of India while it was less when compared to NCHS standards which are considered more appropriate for the Punjabi population. Similar height and weight figures of the university female teachers of the same age group were reported by Harpreet (1992). The triceps skinfold thickness (TSF) was  $21.0 \pm 0.5$  mm which was 4.5 mm more than the standard of Jelliffe (1966) but was similar to observations of Kalsi (1989) who reported the TSF of normal adult women  $20.5 \pm 1$  mm. The average mid-upper arm circumference (MUAC) was  $29.31 \pm 0.7$  cm which was closed to the standard of reference for normal heavy adult women.

**Table-1****Daily intake of energy by the subjects**

Energy (KCAL)	Summer	Winter	Overall	Recommended Level*
Range	1170-2302	1262-2672	1170-2672	--
Mean $\pm$ SE	1733 $\pm$ 351	1905 $\pm$ 378	1777 $\pm$ 317	2040* 2475**
Per Kg Body weight	30 $\pm$ 5.5	33 $\pm$ 6.6	31.5 $\pm$ 6	35.5

\* ICMR, 1990

\*\* FAO/WHO, 1985

**Table-2****Anthropometric measurements of the subjects**

Anthropometric parameters	Range	Mean $\pm$ S.E.
Height (cm)	150.00-167.5	150.00 $\pm$ 0.81
Body weight (kg)	48.00-66.0	57.50 $\pm$ 0.83
Triceps skinfold (mm)	17.00-26.8	21.00 $\pm$ 0.50
Mid upper arm circumference <sup>2</sup>	22.00-32.0	29.31 $\pm$ 0.70
Mid arm muscle circumference <sup>3</sup> (cm)	14.27-26.34	20.61 $\pm$ 0.57
Body mass index <sup>4</sup> (kg.m <sup>2</sup> )	18.53-27.95	23.11 $\pm$ 0.36
Body surface area (m <sup>2</sup> )	1.41-1.69	1.58 $\pm$ 0.001
Body fat <sup>5</sup> (%)	28.34-39.64	34.00 $\pm$ 2.89
Lean body mass (kg)	34.92-44.11	29.71 $\pm$ 0.38
Arm fat area <sup>6</sup> (cm <sup>2</sup> )	16.50-35.90	26.12 $\pm$ 1.18
Arm muscle area <sup>7</sup> (cm <sup>2</sup> )	12.57-55.21	33.64 $\pm$ 1.18

Normal values

1. 16.5 mm (Jelliffe, 1996)
2. 28.5 cm (Jelliffe, 1996)
3. 23.3 cm (Jelliffe, 1996)
4. 20-4 kg. m<sup>2</sup> (Garrow, 1981)
5. 19.53% (Gurnin and Womersley, 1974)
6. 21.81 cm<sup>2</sup> (Calculated from normal values of MAMC and MAC by formula of Frisancho, 1981)
7. 42.83 cm<sup>2</sup> (Calculate from normal value of MAMC by formula of Frisancho, 1981).

The average value of mid-arm muscle circumference (MAMC) was  $20.61 \pm 0.57$  cm which was 2.6 cm less than the standard value. The body mass index (BMI) was  $23.1$  kg m<sup>2</sup> of the subjects in the present study. However Harpreet (1992) reported a slightly higher present study. However Harpreet (1992) reported a slightly higher BMI of  $24.2$  kg m<sup>2</sup> for adult female teachers out of the total subjects studied, only 3 per cent were low in body weight and 13 per cent subjects were obese and had grade I category obesity. The body surface area (BSA) of the subjects ranged between 1.41-1.69 m<sup>2</sup> with an average value of  $1.58 \pm 0.001$  m<sup>2</sup>. The calculated body fat ranged between 28.34 to

39.64 percent with an average value of  $34.0 \pm 2.89$  per cent while the range given by Durnin (1974) is 19 to 53 per cent. The average lean body mass (IBM) was  $39.71 \pm 0.38$  kg while the calculated arm-fat area (AFA) was  $26.12 \pm 1.18$  cm<sup>2</sup>. The arm-muscle area (AMA) was  $33.64 \pm 1.95$  cm<sup>2</sup>.

The correlation coefficients between the various anthropometric measurements showed (Table 3) that the BMI was strongly related to IBM ( $r=+0.73$ ). The TSF of subjects was significantly  $p < (0.05)$  correlated to AFA ( $r=0.369$ ). The IBM was significantly correlated to weight, BMI, MAC, AFA and AMA. The mid arm circumference was significantly correlated to the weight, BMI, IBM, AFA and AMA. The arm fat area was significantly correlated to weight, IBM, MAC, BMI, TSF. The arm muscle area was significantly related to weight, BMI, IBM and to MAC. The energy intake of the subjects was not significantly (Table 4) correlated to weight, BMI, BSA, IBM and body fat. BMI is an indicator of obesity was  $23.11$  kg/ m<sup>2</sup> which was within the normal range of 20-24 kg/ m<sup>2</sup>. Although the dietary intake was below the RDA, it should not be increased as the subjects may be over-eating while socializing or in festival season which can balance the low intake during normal routine days which can explain the higher weights of the subjects.

**Table-3****Correlation coefficients between anthropometric measurements of the subjects**

	Height	Weight	BMI	TSF	LBM	MAC	AFA
Weight	0.242	-	-	-	-	-	-
BMI	-0.115	0.79**	-	-	-	-	-
TSF	0.132	0.178	0.116	-	-	-	-
LBM	0.271	0.988**	0.730**	0.199	-	-	-
MAC	0.240	0.724**	0.509**	0.228	0.700**	-	-
AFA	0.246	0.592**	0.374*	0.369*	0.614**	0.630**	-
AMA	0.126	0.517**	0.460**	0.076	0.530**	0.870**	0.246
Body fat (%)	0.138	0.622**	0.382**	0.023	0.616**	0.168	0.277

\*\* Significant at 1 per cent level

\* Significant at 5 per cent level

**Table-4****Correlation coefficients between anthropometric measurements and energy status**

	Energy intake	Energy expenditure by			
		MSU nutriguide	FAO/WHO	ICMR	Caltrac
Weight	0.067	0.605*	0.99**	0.99**	0.207
BMI	0.004	0.401*	0.752**	0.753**	0.239
BSA	0.099	0.589**	0.863**	0.866**	0.131
LBM	0.024	0.627**	0.979**	0.980**	0.218
Body fat (%)	0.189	0.392*	0.612**	0.604**	0.079

\*\* Significant at 1 per cent level

\* Significant at 5 per cent level

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