

Research Paper :

## Body composition and physical fitness of farm women

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### ABSTRACT

The present study was carried out to assess the physical fitness and body composition of the farm women of younger and older age groups. Thirty agricultural women within the working age range of 25-45 years without any kind of major illness or cardiovascular problems were selected for each activity as sample of the study. The mean age of the agricultural women was 31.27 years and 40.33 years with the mean height of 151.03 cms and 153.53 cms and the mean body weight of 47.27 kg and 50.13 kg under the age group of 25-35 and 35-45 years age group, respectively. The blood pressure and pulse rate of the respondents were found to be normal. Both the age group subjects had high average to very good range of oxygen consumption *i.e.* Vo<sub>2</sub> max (ml/kg.min). Majority of the farmwomen (46.66%) had ectomorph body type and maximum percentage farm women (46.66%) had endomorph body type as per Quetlets Index. Significant and positive relation was observed between age and weight of the respondents. Highly significant and positive correlation was observed between weight and body mass index and per cent. To conclude, the general health condition of selected farmwomen of both the age groups were found to be normal but the older aged subjects had lower fat free mass. The general health condition of selected farmwomen of both the age groups were found to be normal.

**Key words :** Physical fitness, Body composition, Body mass index and aerobic capacity

**H**uman body is composed of four basic chemical constituents, water, protein, mineral and fat. Body size and composition are constantly changing throughout the major stages of life. An understanding of the direction and magnitude of changes in body size, composition, health implication are necessary and to provide approximately health care and nutritional support. Measurements of body composition are more complex than body size. It is important in many human metabolic and physiological studies. For many purposes anthropometric measurements such as body mass index, provide satisfactory information but for detailed studies, more precise method for analysis of body composition is required.

Body composition includes information concerning the amount and distribution of human subcutaneous fat. It is the direct measurement of fat deposits on various parts of the body. It assumes that the total body mass is composed of two major chemical components *i.e.*, body fat and the fat free mass (Jayashree, 1999). Fat is one of the basic components built into all models of body composition. Fat has also received much emphasis for reasons that, it is the most variable component of the body composition, a concern for overweight and obesity, disease mortality and correlates to excess fatness.

Ageing is characterized by reduction in fat free mass primarily via loss of muscles, loss of bone mineral in

women, redistribution of body fat leading to increased deposition of body fat in internal fat depots as opposed to subcutaneous depots. Greatest loss of fat free mass occurs after age of 60 years in females. The amount of fat free mass has functional significance in ageing. Fat free mass is the main determinant of physical strength in elderly people.

Methods to measure body fat can be considered either reference or prediction techniques. The reference methods are body density, total body water and some physical property of body. Prediction method considers the skinfold thickness. The measurements of skinfolds is the most commonly used indicator of fatness and is used to describe subcutaneous fat distribution. The skinfold measure consists of a double layer of skin and subcutaneous fat and is measured at many sites on the body with the triceps, biceps, sub-scapular and suprailiac being perhaps the most common regions. The most appropriate 'pinch' sites depend on the purpose of the study and age of the population. Fat distribution varies with age, sex, precision in locating the particular site, the relative homogeneity of the thickness of the layer of fat and skin in a given region. The fact is that increase or depletion of subcutaneous fat stores is not uniform all over the body. Physical anthropometry using skinfold calipers is practicable in field circumstances.

The fat and the fat free mass (lean body mass) are having greater influence on the physical fitness and performance of the individuals. There is growing interest in the measurement of body composition, particularly body fat in different age groups. The present study is carried out to assess the physical fitness and body composition of the farm women of younger and older age groups.

## METHODOLOGY

Thirty women volunteered for the study. These farmwomen were divided into two groups *i.e.*, from 25-35 years of younger age group and 35-45 years of older age. Care was taken to select non-pregnant and healthy farm women without any major illness and who were performing all the agricultural activities regularly in the field.

The physical parameters like height, weight and blood pressure were measured using anthropometric rod, weighing balance and digital blood pressure apparatus, respectively.

Based on the above measurements the physiological parameters like the body mass index and aerobic capacity were estimated to assess the health status, body type and physical fitness of the farm women.

### Body Mass Index (BMI):

It was determined based on body height and weight by using the formula :

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

The subjects were classified into various health conditions based on the Garrow (1987) classification table.

### Aerobic capacity :

The consumption of maximum volume of oxygen (VO<sub>2</sub> max) was estimated based on the body weight and age of the subjects by using the following formula -

$$\text{VO}_2 \text{ max (l/min)} = 0.023 \times \text{Body weight (kg)} - 0.034 \times \text{Age(yrs)} + 1.652$$

$$\text{VO}_2 \text{ max (ml/kg.min)} = \text{VO}_2 \text{ max (l/min)} / \text{Body weight} \times 1000$$

The subjects were classified into various physical fitness categories according to the classification given by Saha *et al.* (1996).

### Body type:

The subjects were classified into different body types based on the Quetelets Body Mass Index classification

table.

### Body fat:

The body fat estimation was done by using skin fold thickness measurements. Skin fold thickness of the farmwomen at four sites biceps, triceps, subscapular and suprailiac muscles were measured using Herpenden Skinfold Callipers. The measurements were taken in two replications at both right and left side of body and the results were averaged. At all sites, a lengthwise skin fold was firmly grasped and slightly lifted up between fingers and thumb of the left hand. Care was taken not to include underlying muscles. The calipers were applied about 1 cm below the operator's fingers at a depth about equal to the skinfold.

Lean body mass and fat mass was calculated by using the following formula :

$$\text{Body density (D)} = 1.1599 - (0.0717 \times \log \text{ of sum of 4 skinfolds})$$

$$\text{Per cent fat} = (4.95 / \text{D} - 4.5) \times 100$$

$$\text{Fat weight} = \text{Body weight} \times \text{Per cent fat} / 100$$

$$\text{Lean body mass (kg)} = \text{Body weight} - \text{Fat weight}$$

The correlation co-efficient test was used to know the relationship between the age, weight, height, body mass index, body density and fat weight.

## OBSERVATIONS AND DISCUSSION

The physical parameters of the farm women selected for the experiment are presented in Table 1. The mean age of the younger age group farm women was 31.27 years with height of 151.03 cms and body weight of 47.27 kg. The mean age was 40.33 years with height of 153.53 cms and body weight being 50.13 kg for the older age groups at farm women. The blood pressure and pulse rate were found to be normal for both younger and older age groups of farm women *i.e.* 101.53 / 68.13, 82.93 and 103.93 / 70.80, 78.33, respectively.

The aerobic capacity of the selected farm women has been depicted in Table 2. Both the age groups of farm women had high average to very good range of oxygen consumption *i.e.* VO<sub>2</sub> max (ml/kg.min). As high as 66.66 per cent of younger age group farm women were in good range of oxygen consumption and 60 per cent of older age group farm women were in the range of high average of oxygen consumption.

The distribution of the respondents according to body type are presented in Table 3. Maximum percentage of younger age group farm women (46.66%) had ectomorph body type and maximum percentage of older age group farm women (46.66%) had endomorph body type as per

**Table 1: Mean physical parameters of the subjects (N=30)**

Sr. No.	Physical characteristics	Age group		
		25-35 years	35-45years	Average
1.	Age (year)	31.27 ± 3.95	40.33 ± 3.15	35.8
2.	Height (cms)	151.03 ± 4.16	153.53 ± 5.38	152.28
3.	Weight	47.27 ± 6.67	50.13 ± 6.39	48.7
4.	Blood pressure	101.53 / 68.13 ± 10.84 / 16.19	103.93 / 70.80 ± 17.63 / 11.20	102.73/69.46
5.	Pulse	82.93 ± 16.19	78.33 ± 9.24	80.63

**Table 2 : Distribution of the subjects according to aerobic capacity (N=30)**

Physical fitness	Frequency (%)	
	25-35 years	35-45years
Poor	--	--
Lower average	--	--
High average	--	9(60.00)
Good	10(66.66)	6(40.00)
Very good	5(33.33)	--
Excellent	--	--

**Table 3 : Distribution of subjects according to body type (N=30)**

Quetlets classification	Frequency (%)	
	25-35 years	35-45years
Ectomorph	07 (46.66)	06 (40.00)
Mesomorph	06 (40.00)	02 (13.33)
Endomorph	02 (13.33)	07 (46.66)

**Quetlets Index.**

Average of skinfold thickness measured at four sites is presented in Table 4. It was found that the

**Table 4 : Average skin fold thickness of subjects (N=30)**

Sites of measurements (mm) (Right and Left)	Age group	
	25-35 years	35-45years
Biceps	4.56 ± 2.83	5.19 ± 3.29
Triceps	9.04 ± 4.62	10.22 ± 4.01
Subscapular	11.27 ± 5.03	12.53 ± 4.12
Suprailiac	9.66 ± 3.63	9.6 ± 4.01

**Table 6 : Correlation matrix between physical parameters and body density, body mass index and per cent fat**

Physical and physiological characteristics	Age	Weight	Height	BMI	Body density	% Fat
Age	1					
Weight	0.344*	1				
Height	0.107	0.157	1			
BMI	0.288	0.892**	-0.301	1		
Body density	-0.001	-0.634**	0.068	-0.632**	1	
% Fat	0.003	0.638**	-0.066	0.635**	-0.999**	1

subcutaneous fat measured were towards higher side in the age group of 35-45 years. In both the age groups, subcutaneous fat was observed to be more in subscapular site followed by triceps sites of the body. Andrew and Eric (1993) conducted similar study on women from 18-81 years of age where the distribution of subcutaneous fat was higher in triceps(16.9mm) followed by suprailiac region (16.5mm). The fact is that the increase or depletion of subcutaneous fat stores is not uniform all over the body.

The body composition of the subjects are presented in Table 5. The mean body density of both age groups was 1.05. Based on the skinfold measurements the mean per cent fat was found to be more in the older age group *i.e.*, 21.88 per cent than the younger age group *i.e.*, 20.38

**Table 5: Body composition of the subjects (N=30)**

Body composition	Age group	
	25-35 years	35-45years
Body density	1.05 ± 0.01	1.05 ± 0.01
Fat mass	11.47 ± 4.74	12.76 ± 4.71
Lean body mass (kgs)	40.46 ± 12.01	39.0 ± 4.25
Per cent fat	20.38 ± 6.55	21.88 ± 5.56

per cent of the total body weight and the fat weight was 11.47 kg in younger age group and 12.76 kg in older age group. There is age associated effect on both the body composition and body fat distribution. Older age group had lower lean body mass of 39 kg than the younger age group *i.e.*, 40.46 kgs. The level of physical activity and the degree of disability seem to be the major determinants

for such differences. Infact an age mediated decline in the fat free mass has been ascribed to disability and overall physical inactivity.

Correlation matrix between physical parameters and Body density, Body mass index and per cent fat is presented in Table 6. Significant and positive relation was observed between age and weight of the respondents. Highly significant and positive correlation observed between weight and body mass index and per cent. Where as negative and highly significant correlation was observed between body density and weight and body mass index. Negative and significant relation was observed between per cent fat had body density.

### Conclusion:

Body fat has received much emphasis for reasons that, it is the most variable component of the body composition, a concern for overweight and obesity, disease mortality correlates to excess fatness. Body fat and fat free mass are having greater influence on the physical performance. In the age range from 20-60 years, there is tendency towards the accumulation of body fat and fat free mass significantly declines with advancing age. This study investigated the physical fitness and body composition of farmwomen of two age groups from 25-35years and 35-45 years. Fifteen members engaged in agricultural activities regularly in each group volunteered for the study. Results revealed that the maximum percentage of women were in normal body mass index range. Body composition of two age groups varied. Body fat mass and per cent fat was found to be slightly towards higher range in older age group compared to younger age group. Significant and positive relation was observed

between age and weight of the respondents. Highly significant and positive correlation was observed between weight and body mass index and per cent. Where as negative and highly significant correlation was observed between body density and weight and body mass index. In conclusion the older aged subjects had lower fat free mass and the general health condition of selected farmwomen of both the age groups were found to be normal.

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