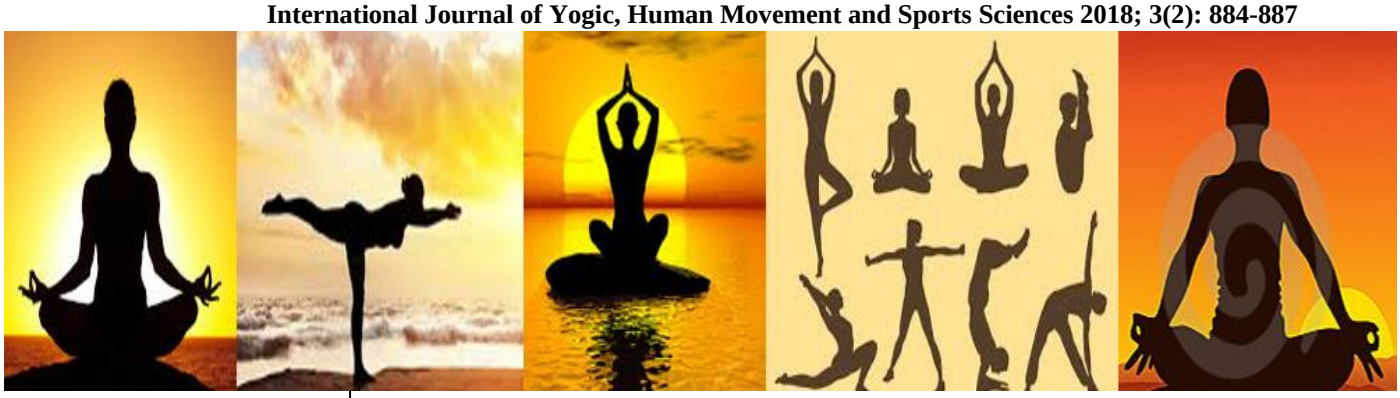
International Journal of Yogic, Human Movement and Sports Sciences 2018; 3(2): 884-887



ISSN: 2456-4419
Impact Factor: (RJIF): 5.18
Yoga 2018; 3(2): 884-887

www.theyogicjournal.com
Received: 23-05-2018
Accepted: 24-06-2018

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Evaluation of lean body mass among different age group men and women physical education teachers

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Abstract
The intention of this study was to evaluate the lean body mass among different age group men and women physical education teachers. To accomplish the purpose of this study ninety school physical education teachers from Kanyakumari district, Tamil Nadu, India were selected, in which 45 subjects were men and remaining 45 subjects were women. The selected participants were in the age group of 31 to 60 years. The investigator administered standard tests and procedures to measure the lean body mass. Two-way analysis of variance was used to find out the influence of each factor independently and also their combined influence on selected variable. The result of the study shows that significant difference exists between gender (men & women) irrespective of age group and also significant difference exists among age groups (31-40, 41-50 and 51-60) irrespective of gender on lean body mass.

Keywords: Lean body mass and physical education teachers

Introduction
Obesity has reached epidemic levels in developed countries. Overweight and obesity are known to have significant impact on both physical and psychological health. The mechanism of obesity development is not fully understood and it is believed to be a disorder with multiple causes. The environmental factors, lifestyle preferences, and cultural environment play pivotal roles in the rising prevalence of obesity worldwide. In general, overweight and obesity are assumed to be the results of an increase in caloric and fat intake. On the other hand, there are supporting evidence that excessive sugar intake by soft drink, increased portion size, and steady decline in physical activity have been playing major roles in the rising rates of obesity all around the world. Consequently, both over-consumption of calories and reduced physical activity are involved in obesity.

Almost all researchers agree that prevention could be the key strategy for controlling the current epidemic of obesity. Prevention may include primary prevention of overweight or obesity, secondary prevention or prevention of weight regains following weight loss, and avoidance of more weight increase in obese persons unable to lose weight. Until now, most approaches have focused on changing the behaviour of individuals in diet and exercise. It seems, however, that these strategies have had little impact on the growing increase of the obesity epidemic. There are 50% of the adults are overweight and obese in many countries, it is difficult to reduce excessive weight once it becomes established. Prevention may be achieved through a variety of interventions targeting built environment, physical activity, and diet. All in all, there is an urgent need to initiate prevention and treatment of obesity.

Body composition is the proportion of the lean body mass and depot fat and it is one of the most important morphological features characterizing human organization. Ideal body fat levels for men are 12% to 17% and 18% to 22% for women. Body fat is essential for certain bodily functions. Body composition assessment has revealed that athletes generally have physique characteristics unique to their specific sports. For example, field events athletes have large quantities of lean tissue and a high percent body fat whereas long distance runners have the least amount of lean body and fat weight. Now a day's body composition is considered one of the components of fitness as it plays important role in developing fitness (Singh *et al.*, 2004) [10].

Fat-free mass is composed of muscle, bone, organs and water whereas, fat is the underlying adipose tissue. Excessive fat is a good predictor of health problems because it is associated with cardiovascular disease, high cholesterol, and high blood pressure. Higher proportions of fat-free mass indicate an increase in muscle, and thus an increased ability to adapt to everyday stress. There are scanty data on gender differences in body composition analysis among physical education teachers. Therefore, we aimed to see the gender differences in lean body mass among different age groups of physical education teachers.

Methodology

To achieve the purpose of this study ninety school physical education teachers from kanyakumari district, Tamilnadu, India were selected, in which 45 subjects were men and remaining 45 subjects were women. They were further categorized into three sub-groups of 15 subjects each. The first one is 31-40 age groups of men and women separately and another one 41-50 age groups of men and women separately and third one 51-60 age groups of men and women separately. The selected participants were the inhabitants of kanyakumari district, and they were in the age group of 31 to 60 years. The investigator administered standard tests and procedures to measure the lean body mass.

Statistical Procedure

The experimental design used for this study was 2 × 3 factorial design. In this design the first factor was 'gender' and it consisted of two classifications namely men & women. The second factor was 'age' and it was classified into three age categories that is 31-40, 41-50 years and 51-60 years. The data collected from the different age group men and women were statistically analyzed by using two way (2 x 3) factorial ANOVA. Whenever the obtained 'F' ratio for interaction effect was found to be significant, the simple effect test was used as a follow up test. Whenever the obtained 'F' ratio value in the simple effect was significant the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases statistical significance was fixed at .05 level.

Result

The mean and standard deviation values on lean body mass among men and women of different age group of physical education teacher have been analyzed and presented in table 1.

Table 1: Descriptive Statistics on Lean Body Mass among Men and Women of Different Age Groups

Gender	Different Age groups	Lean Body Mass	
		Mean	SD
Men	Group – I (Age -31 – 40)	49.84	2.09
	Group – II (Age -41 – 50)	52.10	2.04
	Group – III (Age -51 – 58)	51.91	1.41
Women	Group – I (Age -31 – 40)	38.67	1.65
	Group – II (Age -41 – 50)	43.23	0.02
	Group – III (Age -51 – 58)	41.87	0.58

Table – 1 presents the mean and standard deviation values of men's different age groups are 49.84 ± 2.09, 52.10 ± 2.04 and 51.91 ± 1.41 and women's different age groups are 38.67 ± 1.65, 43.23 ± 0.02 and 41.87 ± 0.58 respectively on lean body mass.

The data collected from the different age groups of men and women physical education teachers on lean body mass is graphically represented in figure-1 for better understanding.

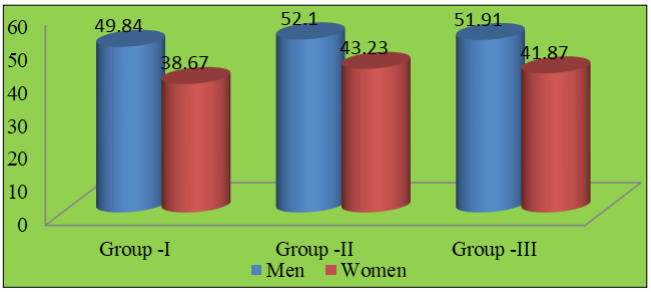

Fig 1: Cylinder Diagram Showing the Mean Value on Lean Body Mass among Men and Women of Different Age Groups

The two-way analysis of variance on lean body mass among different age group men and women physical education teacher have been analyzed and presented in table-2.

Table 2: Two-Way Analysis of Variance on Lean Body Mass among Men and Women of Different Age Groups

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
Gender (Male & Female)	2270.14	1	2270.14	996.78*
Age Groups (group-I, II and III)	193.77	2	96.88	42.54*
Interaction (Gender & Age)	18.96	2	9.48	4.16*
Error	191.30	84	2.27	

(Table values required for significance at 0.05 levels with df 1 and 84; 2 and 84 are 3.96 and 3.11 respectively)

Table –2 shows that the obtained 'F' ratio value of gender (men & women) 996.78, and age groups (group-I, group-II & group-III) 42.54 which are greater than the table value of 3.96 and 3.11with df 1 and 84; 2 and 84 respectively required for significance at 0.05 level of confidence. Also the obtained 'F' value of interaction (gender & age groups) 4.16 which is higher than the table value of 3.11 with df 2 and 84 required for significance at 0.05 level of confidence. The result of the study shows that significant difference exists among gender (men & women) and age groups (group-I, group-II & group-III) on lean body mass.

Since, the interaction effect is significant, the simple effect test has been applied as follow up test and it is presented in table- 3.

Table 3: The Simple Effect Scores of Men and Women Three Different Age Groups on Lean Body Mass

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
• Gender at Age group - I	935.65	1	935.65	917.30*
• Gender at Age group – II	596.83	1	596.83	585.13*
• Gender at Age group - III	756.61	1	756.61	741.77*
• Men Age Group I, II & III	48.44	2	24.22	23.75*
• Women Age Group I, II & III	164.28	2	82.14	80.53*
• Error	43.13	42	1.02	

(Table values required for significance at .05 levels with df 1 and 42, & 2 and 42 are 4.07 and 3.22 respectively.)

Table -3 shows that the obtained 'F' ratio values for gender at age group –I, II and III are 917.30, 585.13 and 741.77 respectively, which are higher than the table value of 4.07 with degrees of freedom 1 and 42 required for significance at 0.05 level of confidence. It indicates that significant difference exists between the paired means of gender at age group –I, II and III on lean body mass.

Table -3 also shows that 'F' values obtained for tests of men and women all age groups are 23.75 and 80.53 which are greater than the table value of 3.22 with the degrees of freedom 2 and 42. It implies that significant difference exists among different age groups of men as well as women on lean body mass.

Since, the obtained 'F' ratio value in the simple effect is found to be significant, the Scheffe'S test is applied as post hoc test to find out the paired mean difference, and it is presented in table -4.

Table 4: Scheffe's Test for Mean Value on Lean Body Mass among Different Age Groups of Men

Group – I (Age -31 – 40)	Group – II (Age -41 – 50)	Group – III (Age -51 – 58)	DM	CI
49.84	52.1		2.26*	1.39
49.84		51.91	2.07*	1.39
	52.1	51.91	0.19	1.39

*****Significant

Table-4 shows the Scheffe's test results that there are significant differences between the means value of group-I and group-II; group-I and group-III on lean body mass. Result also showed that there is no significant difference between group-II and group-III on lean body mass.

Table 5: Scheffe's Test for Mean Value on Lean Body Mass among Different Age Groups of Women

Group – I (Age -31 – 40)	Group – II (Age -41 – 50)	Group – III (Age -51 – 58)	DM	CI
38.67	43.23		4.56*	1.39
38.67		41.87	3.20*	1.39
	43.23	41.87	1.36	1.39

*****Significant

Table-5 shows the Scheffe's test results that there are significant differences between the means value of group-I and group-II; group-I and group-III on lean body mass. Result also showed that there is no significant difference between group-II and group-III on lean body mass.

Discussion

Body composition is an important parameter for humans because previous studies indicate high values of body fat as a predictor of mortality. Obesity, understood as a condition of excessive fat accumulation, is a global problem now reaching epidemic proportions. It is a major, yet largely preventable risk factor for a number of chronic diseases including coronary artery disease and type 2 diabetes mellitus. Body weight is not a suitable measure for assessing ideal body composition related fitness because an increase in weight due to an increase in fat-free mass (FFM) can be misinterpreted as an increase in body fatness. There are reports that say that ethnicspecific muscularity, fat distribution, bone mass and leg length are characteristics that may contribute to ethnic differences in the relationships between BMI and body fat (Deurenberg *et al*., 1999) [1].

The human body consists of several components including fat mass, lean muscle mass, skeletal bone mass and total body water. The proportions of each of these components have important implications for present and future health outcomes including cardiovascular, nutritional and psychological status as well as physical performance capability (Donnelly *et al*., 1996; Salbe *et al*., 2002; Ribeiro *et al*., 2003) [2, 9, 8]. Men have more lean mass, and women have more body fat than men of the same BMI, and men are more likely to accumulate adipose tissue around the trunk and abdomen, whereas women usually accumulate adipose tissue around the hips and thighs. Although males and females are both susceptible to obesity, the incidence and health consequences differ between the sexes (Power & Schulkin 2008) [7] as do the patterns of fat distribution (Lemieux *et al*., 1993) [7].

Sex differences in muscle mass become apparent during puberty, with boys having larger muscles than girls (Kanehisa *et al*., 1994; Tanner *et al*., 1981) [5, 11]. Gallagher *et al*., (1985) [3] assessed sex differences in skeletal muscle mass by DXA in 148 women and 136 men. Men had higher muscle mass than women, and this difference was greater in the upper compared to the lower body. With aging a larger magnitude decrease of muscle was observed in men compared to women (Gallagher *et al*., 1985) [3]. Janssen *et al*., (1985) [4] performed whole body MRI in 468 men and women from 18 to 88 years. Men had significantly higher skeletal muscle mass than women in both absolute terms and relative terms relative to body mass (38% vs 31%). The sex differences were greater in the upper (40%) than lower (33%) body. Aging was associated with loss of muscle mass, independent of sex, with greater loss of muscle in the lower body (Janssen *et al*., 1985) [4]. The result of the present study shows that significant difference exists between gender (men & women) irrespective of age group and also significant difference exists among age groups (31-40, 41-50 and 51-60) irrespective of gender on lean body mass.

Conclusion

Based on the result obtained from the statistical analysis of the data it was concluded that significant difference exists between 31-40 age group men and women; 41-50 age group men and women and also between 51-60 age group men and women on lean body mass. When comparing different age categories of men, significant differences were found between 31-40 and 41-50 age groups; and also between 31-40 and 51-60 age groups men on lean body mass however, no significant difference were found between 41-50 and 51-60 age groups men on lean body mass. When comparing different age categories of women, significant differences were found between 31-40 and 41-50 age groups; and also between 41-50 and 51-60 age groups women on lean body mass whereas no significant difference were found between 41-50 and 51-60 age groups on lean body mass. Hence, it is suggested that, public awareness programs including exercise and diet teaching are required at large scale to cope up with the growing burden of obesity.

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