

Evaluation of Body Composition in Female Athletes using Bioelectrical Impedance Technique

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Abstract--Background -Body compositions refer to the distribution of muscle, fat and various constituent elements in the human body and its measurements play an important role in both sports and health. Keeping this view in mind the Aim of present research deals with assessment of the body composition of female athlete's using bioelectrical impedance technique. The objective of the present study was to assess body fat, fat% and lean and lean % of female athletes. 32 female athletes selected for purposive sampling method from Degree College of physical education H.V.P.M Amravati. Bioelectrical impedance measure of body fat was taken using the maltron instrument (Maltron, BF-907, and Rayleigh, Essex, UK). Result shows that the mean score of body fat (kg) 12.55, fat % 24.5, lean kg 38.62, lean % 75.86, higher after nutrition education of female athletes than before nutrition education body fat in kg 12.44 and 24.19 % body fat, Lean in kg 38.59, Lean % 75.81.

Keywords - Body composition, Bioelectrical Impedance, Female athletes, Nutritional assessment, Nutrition Education.

INTRODUCTION

Body compositions refer to the distribution of muscle, fat and various constituent elements in the human body and its measurements play an important role in both sports and health. (Nande et al., 2010). A measurement of body weight shows only total body mass and cannot specify lean mass or fat mass as separate values. Body composition relies on using height and body weight to develop numerical value that signifies density, referred to as the body mass index (BMI). The body mass index is also known as Quetelet index, is defined as body weight divided by height squared, and is usually reported as kg/m² or without units. Athletes may be inaccurately represented when only using BMI to calculate body composition due to the contribution of increased muscle mass to the overall body weight. Athlete's body composition differs certain morphological characteristics of persons who are not involved in sports and who are not physically active. The importance of body composition analysis in athletes as a determinant of their performance. There are several methods used for body composition such as DXA (dual-energy X-ray absorptiometry, isotope dilution, and air displacement plethysmography, MRI, skin fold neutron activation all these methods are highly accurate but time consuming and highly expensive and non-portable. Bioelectrical impedance analysis is a commonly used method for estimating body composition, and in particular body fat. The portable equipment necessary, relatively affordable, simple and painless procedure, suitable for studying large groups of participants. (Mazic S. et al., 2014). This work is not studied any were and hence therefore work has been under taken to my systematic study for the evaluation of body composition in female athletes using bioelectrical impedance technique. Keeping this view in mind the objectives should be formed

OBJECTIVES

- To Assess Anthropometric measurement of female athletes. (Weigh in kg, Height in cm,)
- To assess body composition of female athletes using data provided by bioelectrical impedance. (Fat kg, Fat %, Lean kg, Lean %)
- To calculate intake of various nutrients based on 24 hours dietary recall of three consecutive days.

RESEARCH DESIGN

Before and after without control experimental research design was used.

II METHODOLOGY**Selection of Subjects**

The respondents of the study were 32 female athletes, aged between 20-29 years of the student engaged in regular practice of Degree College of Physical Education through purposive sampling method. All female athletes were selected on the basis of their willingness or participant in the study.

Development of Tool

For data collection, schedule is an important, useful and widely acceptable tool of data collection. Data was collected personally through interview with the help of schedule so developed. Work has been carried out in DCPE laboratory Hanuman Vayam Prasarak Mandal Amravati. At the beginning collection of information regarding age and basic data were defined for all subjects,

Anthropometric Measurements:-Including the body height using stadiometer, body weight measures using electronic weighing machine and body mass index was calculated.

Body composition:-with respect to evaluation of some body composition i.e. (Fat mass(kg) Fat percent (%), Lean mass (kg), Lean (%)) in female has been studied using bioelectrical- impedance technique. Bioelectrical impedance measure of body fat was taken using the maltron instrument (Maltron, BF-907, and Rayleigh. Essex, UK).

Nutrient intake:- Nutrient intake was calculated based on 24 hour recall of three consecutive days. Calculation of nutrients intake was done with the help of the nutritive value of Indian foods and Indian food composition table (IFCT).

Nutrition Education

Nutrition education program was developed for athletes, consisting of 6 week. The methods used during educational program were included lecture, lecture with discussion, one to one counseling. Power point presentation used as media and educational material using booklet. Before and after nutrition education intervention program was conducted and difference was found.

Statistical Analysis

The results were subjected to statistical analysis

- 1) Tabulation and Diagrammatic representation
- 2) Descriptive statistics (mean, standard deviation) were calculated.
- 3) Test of hypothesis –t test

III RESULT & DISCUSSION**Diagrammatic Representation of data**

Table –III.1 Mean Height (cm), Weight (kg) and BMI of female athletes

VARIABLES	BEFORE	AFTER
BODY HEIGHT (cm)	157	157
BODY WEIGHT (kg)	50.84	50.95
BMI (kg/m ²)	20.66	20.72

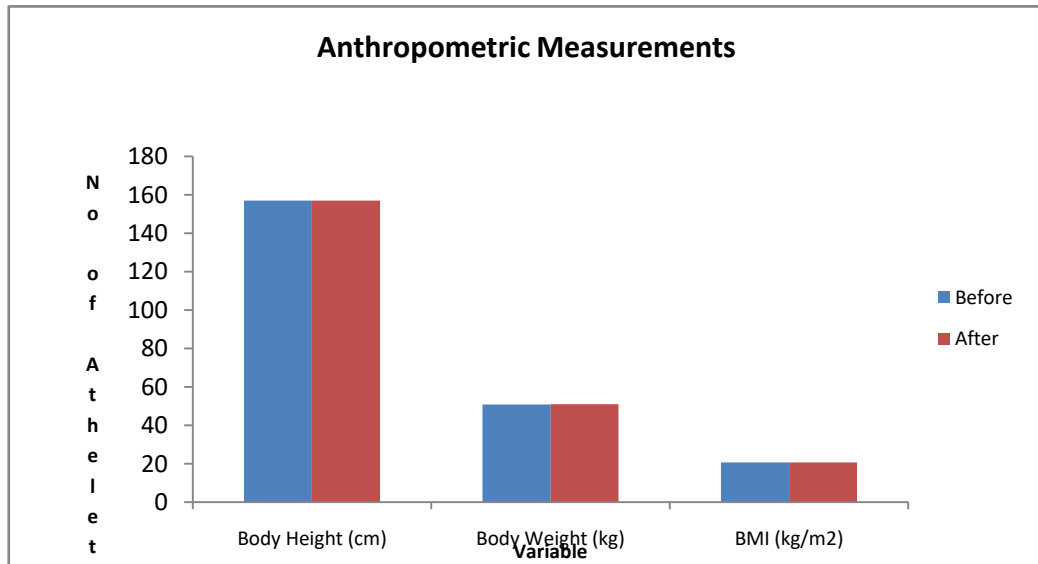


Fig.1. Mean Height (cm) ,Weight (kg) and BMI of female athletes

Table –III.2 Body composition of female athletes

VARIABLES	BEFORE MEAN	AFTER MEAN
FAT (KG)	12.44	12.55
FAT (%)	24.19	24.5
LEAN (KG)	38.59	38.62
LEAN (%)	75.81	75.86

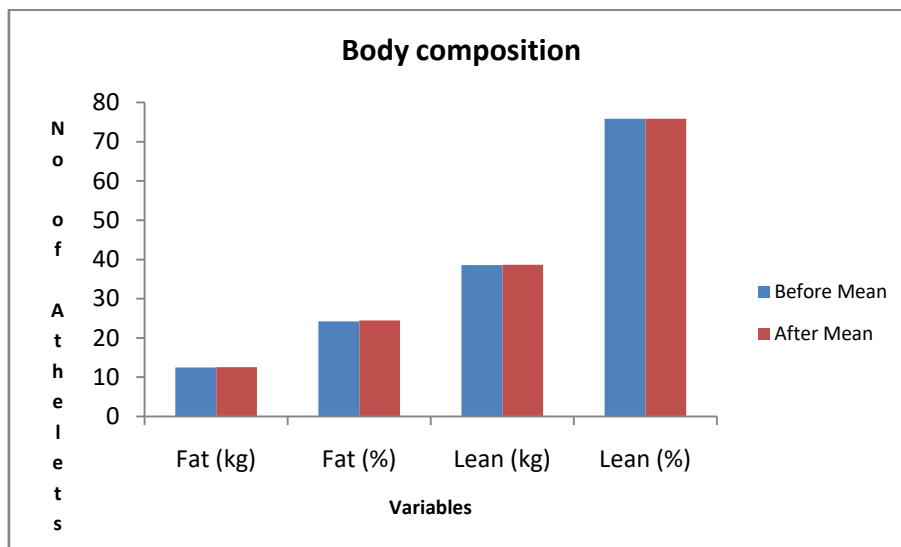


Fig.2. Body composition of female athletes

Table –III.3 Mean Height (cm) ,Weight (kg)of Female Athletes Before andAfterNutrition Education

VARIABLES	BEFORE MEAN ± SD RANGE	AFTER MEAN ± SD RANGE	t-Value
BODY HEIGHT (CM) 164 CM	157 ± 6.02 (145-166)	157 ± 6.02 (145-166)	-
BODY WEIGHT (KG) 55 KG	50.84 ± 6.33 (40-68)	50.95 ± 6.75 (39-68)	0.43

*ICMR (2010)

*NCHS Standard (2004)

Table – III.3 The above table presents the mean values of height (cm) and weight (kg) of female athletes in the age group 20-29 years. The height of an individual affects both by genetic and environmental factors. The mean heights and weights of female athletes compared to standard it was found that the above values height (cm) I was shorter than the standard height values, weight (kg) not equal to the standards. The mean score of the height was observed to be same before and after nutrition education .Mean score of the weight was observed to be higher after nutrition education i.e. 50.95 ± 6.75 than before i.e 50.84 ± 6.33 When t test was applied to see the level of significance it was found that theno significant difference was found of heightbutin body weight significant difference was found .

Table- III .4BodyMassIndexCategoriesofFemale Athletes.

RANGE	RISK	CLASSIFICATION	BEFORE		AFTER	
			NO	%	NO	%
LESS THAN 18.5	MODERATE	UNDERWEIGHT	5	15.62	4	12.5
18.5-24.9	VERY LOW	NORMAL	25	78.12	26	81.25
25.0-29.9	LOW	OVERWEIGHT	2	6.26	2	6.25
30.0-34.9	MODERATE	OBESE CLASS I				
35.0-39.9	HIGH		-	-	-	-
GREATER THAN 40.0	VERY HIGH		-	-	-	----
TOTAL			32	100%	32	100%

Table- III .4 The relationship between weight and height is expressed as body mass index. The body mass index (BMI)is calculated as weight (kg),height (m²).Reduced BMI is an indicator for chronic energy deficiency.The body mass index BMI calculated and tabulated table.

The above table shows that the BMI valuewas observed that the before78.12%and afternutrition education 81.25% female belong to normal range or very low risk category.15.62% before and 12.5% after female belongs to moderate risk and underweight category.Before nutrition education 6.26% and after 6.25 % female under low risk and overweight category. Majority of the athletes was normalBMI value.

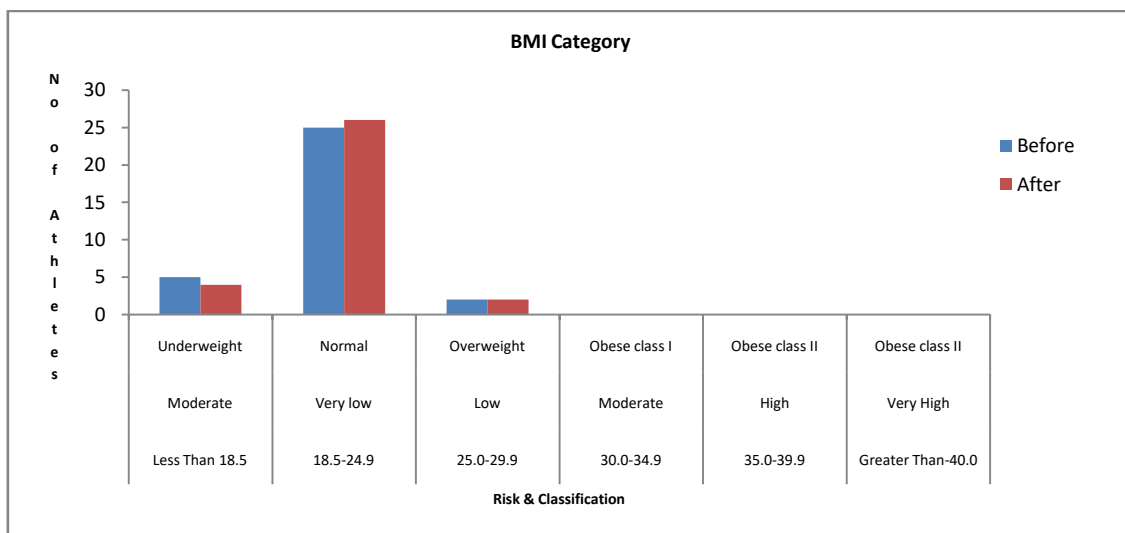


Fig.3 Mean and CategoriesBody Mass Index of Female Athletes.

Table-III .5Mean and Standard deviationof Body composition of Female Athletes

VARIABLES	Before	After	Difference	t-value
	MEAN \pm SD (RANGE)	MEAN \pm SD (RANGE)		
FAT (KG)	12.44 \pm 2.78 (6.9-19.8)	12.55 \pm 2.91 (6.7-20)	0.11	0.40
FAT (%)	24.19 \pm 3.33 (17.1-33.5)	24.5 \pm 3.36 (17.2-33.3)	0.31	0.59
LEAN (KG)	38.59 \pm 4.18 (30.8-51.3)	38.62 \pm 4.41 (30.8-52.5)	0.03	0.14
LEAN (%)	75.81 \pm 3.31 (66.5-82.9)	75.86 \pm 3.10 (66.7-82.8)	0.05	0.17

Table- III .5The female athletes had fat mass before nutrition education 12.44 \pm 2.78 kg and after 12.55 \pm 2.91 and fat percent before 24.19 \pm 3.33, after 24.5 \pm 3.36, lean mass before 38.59 \pm 4.18, after nutrition education 38.62 \pm 4.41, lean percentage 75.81 \pm 3.31 before nutrition education and after 75.86 \pm 3.10. When t test was applied significant difference was found. Similar results was found Joseph et al.,(2012) found high body fat among female sportspersons.

Table III .6Mean Nutrient Intake of Athletes Before and After Nutrition Education

NUTRIENTS	BEFORE MEAN \pm SD	AFTER MEAN \pm SD	DIFFERENCE
ENERGY	1312.39 \pm 238.42	1352.78 \pm 226.44	40.39
PROTEIN	37.55 \pm 10.66	39.33 \pm 9.04	1.78
FAT	45.59 \pm 9.46	46.01 \pm 10.55	0.42
CHO	184.66 \pm 43.5	193.89 \pm 41.90	9.23
VIT-C	39.68 \pm 14.94	42.55 \pm 14.62	2.87
IRON	8.55 \pm 2.9	9.35 \pm 2.18	0.8
CALCIUM	267.42 \pm 127.68	278.07 \pm 124.60	10.65
ZINC	6.4 \pm 1.93	6.65 \pm 1.63	0.25

Table- III .6 The above table shows that the mean score of after nutrition education was found that Energy 1352.78, Protein 39.33, Fat 46.01, Carbohydrate 193.89, Vitamin C 42.55, Iron 9.35, Calcium 278.07, Zinc 6.65 higher than before values energy 1312.39, Protein 37.55, Fat 45.59, Carbohydrate 184.66, Vitamin C 39.68., Iron 8.55., Calculation 267.42., Zinc 6.4. It was found that the after nutrition education values are found to be higher than before values.

IV CONCLUSIONS

It could be concluded that the body composition of female athletes before and after nutrition education it was found that after mean value of body fat percent, fat kg, Lean body mass, Lean Percent amount higher than before nutrition education it may be due to the fact of increasing level of nutrition knowledge, and nutrient intake. It is important for athletes to be frequently monitored for body composition changes and educated on the potential health consequences that can occur. Research shows that screening and preventing are relevant for female athletes from collegiate level.

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