

A Study on Body Composition Components in Vegetarian and Non-Vegetarian Patients with Diabetes Mellitus

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ABSTRACT The present study deals with the body composition components of 201 randomly selected patients with diabetic mellitus (93 males and 108 females) of Amritsar aged 27-70 years. To solve the purpose, ten kinanthropometric measurements, viz. height, weight, BMI, BMR, hip circumference, waist circumference, waist to hip ratio, waist to height ratio, percent body fat and percent lean mass were taken from all the subjects. Results indicate highly significant differences ($p < 0.001$) in BMR ($t = 3.53$) and statistically significant differences ($p < 0.05$) in height ($t = 2.95$) and weight ($t = 3.05$) between vegetarian and non-vegetarian patients with diabetes mellitus.

INTRODUCTION

Diabetes mellitus is a dreadful disease. It itself is not so harmful disease but it is the mother of many harmful diseases such as diabetic retinopathy, diabetic neuropathy, diabetic foot, cardiovascular diseases, hypertension, dyslipidemia, hyperglycemia, etc. According to WHO, in the world, around 171,000,000 people were affected with diabetes by the year 2000 and will reach around 366,000,000 by the year 2030. The prevalence of diabetes is on the rise, more alarmingly in the developing nations. In India alone, 31,705,000 people were affected by the year 2000 and will reach around 79,441,000 by the year 2030 (WHO, 2005).

There are strong correlations between diabetes mellitus and changes in body composition components (Banerji et al., 1999; Goodpaster et al., 2003; Lopatynski et al., 2003). In fact, body composition is rather needed to evaluate the physical status of an individual. Associations of body composition with other diseases like cardiovascular (Dalton et al., 2003), hypertension (Okosun et al., 2000), etc. have been reported. Literatures regarding the associations of body compositions and diabetes mellitus are scanty in Indian populations, especially with north Indian population. Thus the present study is planned to fulfill the lacunae of knowledge. In the present study an attempt has been made to find the

correlations between body composition components and diabetes mellitus with special reference to vegetarian and non-vegetarian group.

MATERIALS AND METHODOLOGY

In the present study a total of 201 individuals (93 males and 108 females) with diabetes mellitus were selected randomly from Health Center, Guru Nanak Dev University, Amritsar, Diabetic Clinic and Research Center, Amritsar and Government Medical College Amritsar, aged 27-70 years. The subjects were then further classified into vegetarian and non-vegetarian groups according to their diet intake. Vegetarian group consisted of 107 subjects (44 males and 63 females). Non-vegetarian group consisted of 94 subjects (49 males and 45 females).

A pre-tested semi-structured questionnaire was applied to the subjects to gather the necessary information. Ten kinanthropometric variables viz. height, weight, BMR, BMI, hip circumference, waist circumference, waist to hip ratio, waist to height ratio, percent body fat and percent lean mass were measured after Weiner and Lourie (1969).

Standard statistical calculations were also done.

RESULTS AND DISCUSSION

Table 1 showed the distribution of mean

values and standard deviations of ten kinanthropometric variables in vegetarian and non-vegetarian patients with diabetes mellitus. Non-vegetarian patients with diabetes mellitus have higher mean values almost in all the variables though, highly significant differences ($P < 0.001$) were noted only in BMR ($t = 3.53$) and statistically significant differences ($P < 0.05$) were found in height ($t = 2.95$) and weight ($t = 3.05$) among them. Individuals of non-vegetarian group, are found to be slightly taller and heavier than the vegetarian group, the reasons may be the vegetarian group comprised of more females (58.88%) than males. Females are generally shorter and less heavy than males. More intake of animal proteins may cause non-vegetarian people heavier than their vegetarian counterparts.

Distribution of mean values and standard deviations of ten kinanthropometric variables in vegetarian and non-vegetarian male patients with diabetes mellitus is shown in table 2. Non-vegetarian patients with diabetes mellitus have

the higher mean values in all the variables than their vegetarian counterparts showing statistically significant differences ($P < 0.05$) in height ($t = 2.25$), weight ($t = 2.46$), BMR ($t = 2.66$) and hip circumferences ($t = 1.99$) between them. The reason for these differences can be due to diet intakes. Non-vegetarian males consume more amount of animal protein along with minerals as compared to vegetarian males, due to this, non-vegetarian males had more absorption of calcium and therefore greater bone mass and muscle mass. As more energy is required to breakdown animal proteins, non-vegetarian males had higher BMR mean values than vegetarian male group. Non-vegetarian males had greater body fat deposition in hip region resulting significant differences between vegetarian and non-vegetarian male patients.

Table 3 shows distribution of mean values and standard deviations of ten kinanthropometric variables in vegetarian female and non-vegetarian female patients with diabetes mellitus. Non-vegetarian female patients with diabetes mellitus

Table 1: Distribution of mean values and standard deviations of ten kinanthropometric variables in vegetarian and non-vegetarian patients with diabetes mellitus

Variables	Vegetarian (N=107)		Non-vegetarian (N=94)		t' Values
	Mean $\pm$ S.D.	S.E.	Mean $\pm$ S.D.	S.E.	
Height (cm)	158.34 $\pm$ 8.17	0.79	161.82 $\pm$ 8.53	0.88	2.95*
Weight (kg)	68.33 $\pm$ 12.13	1.17	74.69 $\pm$ 17.24	1.78	3.05*
BMR (Kcal/day)	1398.44 $\pm$ 185.19	17.90	1508.01 $\pm$ 253.09	26.10	3.53**
BMI (kg/m ²)	27.22 $\pm$ 4.64	0.45	28.21 $\pm$ 5.62	0.58	1.38
Hip cir. (cm)	97 $\pm$ 8.89	0.86	99.72 $\pm$ 11.44	1.18	1.90
Waist cir. (cm)	99.83 $\pm$ 11.17	1.08	102.27 $\pm$ 13.51	1.39	1.40
Waist:Hip	1.03 $\pm$ 0.07	0.01	1.03 $\pm$ 0.10	0.01	0.30
Waist:Height	0.63 $\pm$ 0.08	0.01	0.63 $\pm$ 0.08	0.01	0.13
Percent body fat	37.89 $\pm$ 6.69	0.65	37.51 $\pm$ 7.10	0.73	0.38
Percent lean mass	62.11 $\pm$ 6.69	0.65	62.59 $\pm$ 7.09	0.73	0.50

*indicates $P < 0.05$; **indicated $P < 0.001$

Table 2: Distribution of mean values and standard deviations of ten kinanthropometric variables in vegetarian male and non-vegetarian male patients with diabetes mellitus

Variables	Vegetarian Male (n=44)		Non-Vegetarian Male (n=49)		t' Values
	Mean $\pm$ S.D.	S.E.	Mean $\pm$ S.D.	S.E.	
Height (cm)	163.62 $\pm$ 7.36	1.11	167.08 $\pm$ 7.38	1.05	2.25*
Weight (kg)	69.98 $\pm$ 13.40	2.02	78.59 $\pm$ 19.42	2.77	2.46*
BMR (Kcal/day)	1491.95 $\pm$ 224.88	33.90	1625.06 $\pm$ 267.5	38.21	2.58*
BMI (kg/m ²)	26.02 $\pm$ 4.75	0.72	27.98 $\pm$ 6.33	0.90	1.66
Hip cir. (cm)	94.42 $\pm$ 8.49	1.28	98.92 $\pm$ 12.62	1.80	1.99*
Waist cir. (cm)	96.75 $\pm$ 12.17	1.83	102.39 $\pm$ 16.25	2.32	1.88
Waist:Hip	1.02 $\pm$ 0.07	0.01	1.03 $\pm$ 0.07	0.01	0.66
Waist:Height	0.59 $\pm$ 0.08	0.01	0.61 $\pm$ 0.10	0.01	1.15
Percent body fat	32.16 $\pm$ 5.87	0.88	34.24 $\pm$ 6.30	0.90	1.64
Percent lean mass	67.84 $\pm$ 5.87	0.88	65.75 $\pm$ 6.30	0.90	1.64

*indicates $P < 0.05$; **indicated $P < 0.001$

Table 3: Distribution of mean values and standard deviations of ten kinanthropometric variables in vegetarian female and non-vegetarian female patients with diabetes mellitus

Variables	Vegetarian Female (n=63)		Non-Vegetarian Female (n=45)		't' Values
	Mean $\pm$ S.D.	S.E.	Mean $\pm$ S.D.	S.E.	
Height (cm)	154.65 $\pm$ 6.55	0.83	156.09 $\pm$ 5.48	0.82	1.20
Weight (kg)	67.18 $\pm$ 11.11	1.40	70.43 $\pm$ 13.47	2.01	1.37
BMR (Kcal/day)	1333.13 $\pm$ 114.12	14.38	1380.56 $\pm$ 159.54	23.78	1.80
BMI (kg/m ²)	28.05 $\pm$ 4.42	0.56	28.47 $\pm$ 4.79	0.71	0.47
Hip cir. (cm)	98.80 $\pm$ 8.78	1.11	100.59 $\pm$ 10.06	1.50	0.98
Waist cir. (cm)	101.98 $\pm$ 9.96	1.25	102.12 $\pm$ 9.88	1.47	0.07
Waist:Hip	1.03 $\pm$ 0.07	0.01	1.03 $\pm$ 0.12	0.02	0.02
Waist:Height	0.66 $\pm$ 0.07	0.01	0.65 $\pm$ 0.06	0.01	0.35
Percent body fat	41.89 $\pm$ 3.62	0.46	41.07 $\pm$ 6.20	0.92	0.85
Percent lean mass	58.11 $\pm$ 3.62	0.46	59.15 $\pm$ 6.29	0.94	1.08

have higher mean values for almost all the variables than their vegetarian counterparts though, no significant differences were noted in any case ($P > 0.05$).

Figure 1 shows the correlation between percent body fat and other nine kinanthropometric variables in vegetarian and non-vegetarian patients with diabetes mellitus. Percent body fat had positively significant correlation in BMI, hip circumference, waist circumference, waist to height ratio and negatively significant

correlations in height and percent lean mass in vegetarian patients. In non-vegetarian group, percent body fat had positively significant correlations in weight, BMI, hip circumference, waist circumference, waist to height ratio and negatively significant correlations in percent lean mass. Increment in percent body fat caused the increase in BMI, hip and waist circumferences and waist to height ratio resulting positive correlation with them both in vegetarian and non-vegetarian patients with diabetes mellitus.

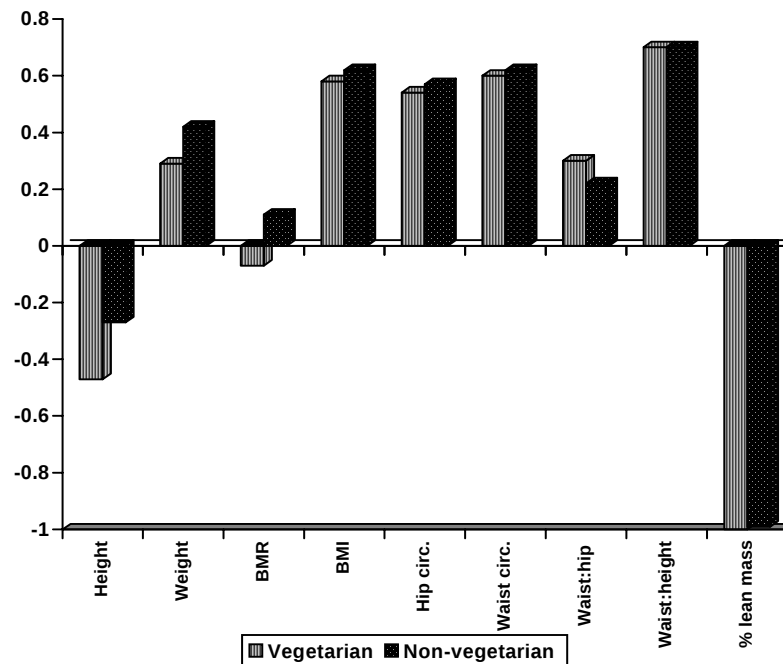


Fig. 1. Correlation between percent body fat and other 9 kinanthropometric variables in vegetarian and non-vegetarian patients with diabetes mellitus

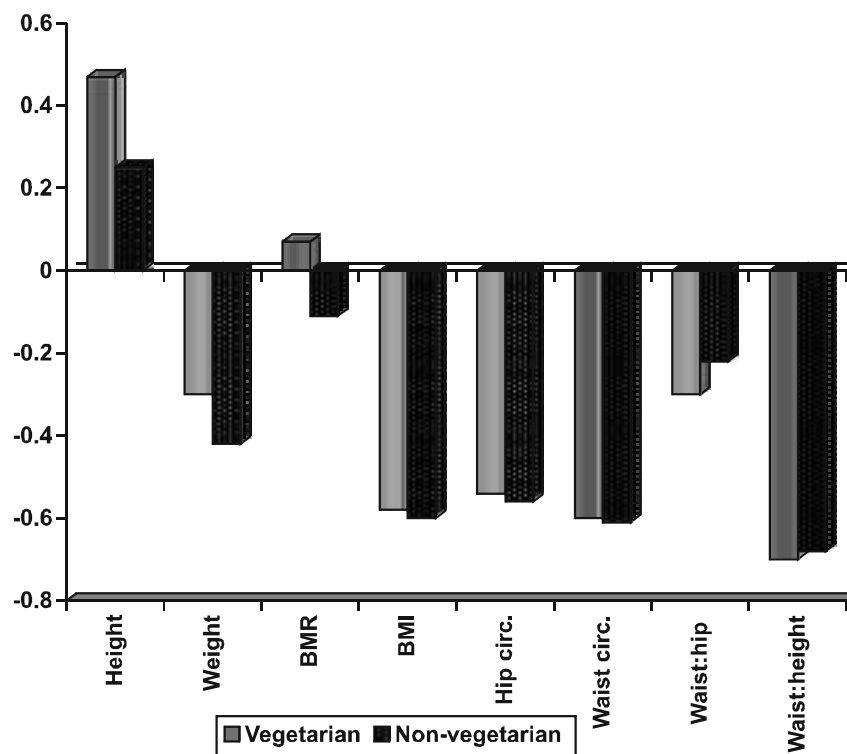


Fig. 2. Correlation between percent lean mass and other 8 kinanthropometric variables in vegetarian and non-vegetarian patients with diabetes mellitus

Percent lean mass had significant positive correlations (Fig. 2) both in vegetarian and non-vegetarian patients with BMI, hip circumference, waist circumference and waist to height ratio. Diet pattern has considerable affect in the body composition components of diabetes mellitus. Patients with non-vegetarian diet are more prone to accumulate extra body fat resulting in increment in weight, BMI, BMR, percent body fat and several circumferential measurements.

From the present study it may be concluded that vegetarian diet is helpful for the reduction of weight, BMI, different circumferential measurements and percent body fat.

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