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# A Study on Somatotyping of Patients with Type 2 Diabetes Mellitus in Amritsar

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**ABSTRACT** In the present study an attempt has been made to evaluate the somatotype status of patients with diabetes mellitus aged 27-70 years. A total of 204 randomly selected diabetic samples (100 males and 104 females) were considered from Amritsar, Punjab, for the present study. The results indicate that diabetic females have higher mean values for endomorphy (8.3) and mesomorphy ( 5.6 ) and lesser mean value for ectomorphy (0.4 ) than their males counterpart ( 7.2, 4.9 and 0.7 respectively), however highly significant differences ($p<0.001$ ) were noted in endomorphy ( $t = 4.81$ ) and statistically significant differences ($p<0.05$) were found in ectomorphy ($t=2.25$) among them. The mean somatotype for the type 2 diabetic patients was 7.77-5.09-0.56.

## INTRODUCTION

Diabetes mellitus is the wide spread health problem and most common health disorder. According to WHO around 171000000 people were effected world wide and the number will reach around 366000000 by the year 2030 (Wild et al., 2004). In India alone 31705000 people are affected by the year 2000 and will reach around 79441000 by the year 2030 (WHO, 2006). Somatotype is defined as a numerical descriptor of overall physique in terms of body shape and composition (Heath and Carter, 1990). It is expressed in a three-number rating representing endomorphy, mesomorphy and ectomorphy components respectively. Reports are available on the association of somatotyping and ischemic heart disease ( Valkov et al., 1996), schizophrenia (Shivkov and Akabaliev, 1999), thalassemia major (Gaur and Sarkar, 1998), abnormal blood pressure (Herrera et al., 2004) and (Kalichman et al., 2004), and genetic disorders like down syndrome (Bronks and Parker, 1985). No such literature is available regarding the somatotype distribution in patients with diabetes mellitus. Infact, it is well known that obesity has a strong positive correlation with the onset of diabetes mellitus (Edward et al, 2000). To fulfill the lacuna of the knowledge the present study was planned.

## MATERIALS AND METHODOLOGY

A total of 204 randomly collected cases of type 2 diabetes mellitus (100 males and 104 females) aged 27-70 years were considered for the present study. Samples are collected from District Hospital Amritsar, and Arora Diabetic Clinic and Research Center, Amritsar. The sample was divided into four age groups of ten years interval. Only patients suffering from type 2 diabetes mellitus for at least one year were taken. All the subjects were informed about the nature of the study before giving their voluntary consent to participate in the study. The population mainly comprises with Sikhism and Hinduism. Ten anthropometric measurements viz height, body weight, triceps skin fold, sub scapular skin fold, supraspinale skin fold, medial calf skin fold, biepicondylar humerus breadth, biepicondylar femur breadth, calf girth and upper arm girth were taken with standard instruments and techniques after Weiner and Lourie (1969). Somatotypes for each individual were determined according to Heath-Carter anthropometric somatotype method (1990). The individual component ratings were computed and the X and Y co-ordinates for each subject were calculated using the formulae of Carter et al. (1983). Somatotypes were plotted on somatoplots using X and Y co-ordinates. Standard statistical calculations for HWR ($ht\sqrt[3]{wt}$) and three somatotype components, viz endomorphy, mesomorphy and ectomorphy are also done. The student's t-test was used to find out the significance of sex differences for each somatotype component. One way analysis of variance was also calculated for intra and inter group differences.

## RESULTS AND DISCUSSION

Table 1 shows the age and sex wise distribution of three somatotype components along with HWR in patients with diabetes mellitus. For HWR, males have the maximum mean value (40.05) in age group 27-38 years and the minimum (38.67) in age group 38.1-49 years. In females the maximum mean value (38.35) was noted in age group 61-70 years and the minimum (36.56) in age group 27-38 years for this trait, showing the statistically significant differences ($p<0.05$) in the age group 27 – 38 years between male and female patients ($t = 3.1$).

For endomorphy, in males, the maximum mean value (7.87) was noted in age group 38.1-49 years and the minimum (6.44) in age group 27.38 years. In females, the maximum mean value for this trait (8.83) was noted in age group 27-38 years and the minimum (8.06) in age group 38.1-49 years, showing statistically significant differences ($p<0.05$ ) in age group 27-38 years ($t = 3.69$) and highly significant differences ($p<0.001$ ) in age group 60.1-70 years ($t = 4.30$) among them.

For mesomorphy, males have the maximum mean value (5.18) in age group 38.1-49 years and the minimum (4.36) in age group 60.1-70 years, whereas females have the maximum mean value (6.57) in age group 27-38 years and the minimum (5.06) in age group 49.1-60 years, highlighting highly significant differences ($p<0.001$) in age group 38.1-49 years ($t=3.65$) and in age group 60.1-70 years ($t= 7.74$) between the two sexes.

For ectomorphy, male diabetic patients have the maximum mean value (1.15) in age group 27-38 years and the minimum (0.54) in age group 38.1-49 years, whereas female patients have the maximum mean value (0.53) in age group 60.1-70 years and the minimum (0.10) in age group 27-38 years, showing statistically significant differences ($p<0.05$) in this age group between male and female patients with diabetes mellitus ($t=2.60$). When all the age groups were pooled, highly significant differences ($p< 0.001$) were noted in HWR ($t=2.38$), endomorphy ($t=4.81$) and ectomorphy ($t=2.25$) between male and female patients.

One way anova was used to find out the significance of sex differences in patients with diabetes mellitus in table 2. Highly significant ($p<0.001$) between group differences were noted in endomorphy ($F= 23.99$) and statistically significant ($p<0.05$) between group differences were found in mesomorphy ($F= 3.65$), ectomorphy ($F= 5.96$) and HWR ($F = 5.78$). So far intra-group differences are concerned, significant differences ($p<0.05$) were found in five sets in males and in one set in females out of twenty four sets each.

From the present study, it may be concluded that age wise no such specific trends were found in both the sexes for the distribution of endomorphy, mesomorphy and ectomorphy. So far our knowledge is concerned; it was the first

**Table 1: Somatotype characteristics (± SD) of patients with diabetes mellitus according to age and sex**

| *Age Grp (Yrs)* | *N* | *HWR* | *Endomorphy* | *Mesomorphy* | *Ectomorphy* |
|---|---|---|---|---|---|
| | | | *Males* | | |
| 27-38 | 8 | 40.05 ± 2.09 | 6.44 ± 1.16 | 4.95 ± 1.14 | 1.15 ± 1.14 |
| 38.1-49 | 23 | 38.67 ± 1.83 | 7.87 ± 0.87 | 5.18 ± 1.25 | 0.54 ± 0.59 |
| 49.1-60 | 50 | 38.76 ± 2.89 | 7.44 ± 1.27 | 4.97 ± 1.25 | 0.62 ± 0.51 |
| 60.1-70 | 19 | 39.35 ± 1.38 | 7.07 ± 0.80 | 4.36 ± 0.69 | 0.70 ± 0.54 |
| 27 - 70 | 100 | 39.20 ± 2.39 | 7.20 ± 1.15 | 4.86 ± 1.17 | 0.75 ± 0.61 |
| | | | *Females* | | |
| 27-38 | 3 | 36.56 ± 1.47 | 8.83 ± 0.87 | 6.57 ± 1.12 | 0.10 ± 0.00 |
| 38.1-49 | 32 | 38.28 ± 1.98 | 8.06 ± 1.23 | 5.36 ± 1.57 | 0.50 ± 0.56 |
| 49.1-60 | 49 | 38.23 ± 1.93 | 8.11 ± 0.96 | 5.06 ± 1.57 | 0.45 ± 0.48 |
| 60.1-70 | 20 | 38.35 ± 1.95 | 8.25 ± 0.92 | 5.46 ± 1.53 | 0.53 ± 0.46 |
| 27 – 70 | 104 | 37.85 ± 1.94 | 8.31 ± 1.03 | 5.61 ± 1.56 | 0.39 ± 0.49 |

**Table 2: One way analysis of variance in patients with diabetes mellitus on the basis of sex.**

| *Variables* | *Df- Within* | *Df-Between* | *f-ratio* | *p-value* |
|---|---|---|---|---|
| Endomorphy | 202 | 1 | 23.99 | 0.001 |
| Mesomorphy | 202 | 1 | 3.65 | 0.054 |
| Ectomorphy | 202 | 1 | 5.96 | 0.015 |
| HWR | 202 | 1 | 5.78 | 0.016 |

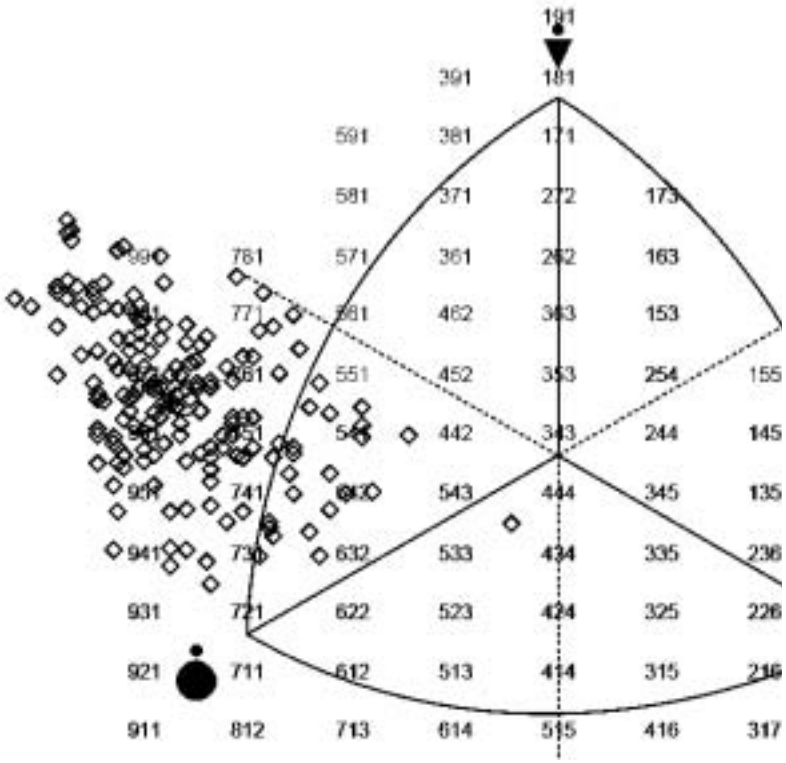


**Fig. 1. Somatochart of patients with diabetes mellitus.**

study of its kind. More researches are required in this regard to draw the generalized statements, as distribution of these three somatotype components is area specific, ethnic group specific and nutritional status specific.

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