

# Assessment of Anthropological and Physiological Indices in Diabetes Mellitus: A Prospective Tertiary Care Center Level Evaluation

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## Abstract

**Introduction:** For proper risk assessment for diabetic syndrome status, it is first and foremost priority to observe and understand any disparities between the predisposing factors in both diabetic and non-diabetic individuals and their role risk for development of diabetes.

**Materials and Methods:** A total of 300 subjects aged between 25 and 60 years were included for study. Waist circumference, body mass index, blood pressure, hemoglobin, and fasting blood glucose levels were measured by appropriate methods. Based on the obtained data subjects were divided into diabetic and non-diabetic groups. We observed 28 subjects out of 300 were diabetics based on fasting glucose levels. Hence, we compared anthropometric and other hematological parameters between 28 diabetic subjects and rest 272 individuals.

**Results:** There is statistically significant increase in the mean body mass index of diabetic individuals ( $28.64 \pm 6.43$ ) than normal healthy subjects ( $23.87 \pm 5.67$ ). Waist circumference also showed the statistically significant difference (more in the diabetics than normal subjects). Significant difference was found in systolic blood pressure of two groups. Whereas, diastolic blood pressure did not show any significant difference. The hemoglobin statistics also did not show any significant change between two groups.

**Conclusion:** In the present study, we can conclude that a positive association exists in hyperglycemia and waist circumference, body mass index and systolic blood pressure.

**Key words:** Body mass index, Diabetes mellitus, Obesity

## INTRODUCTION

Rapid economic development and urbanization made a profound effect on the scenario of health problems in the community. Particularly in developing countries like India it led to a shift in paradigm from communicable to non-communicable diseases like diabetes. Diabetes prevalence is increasing worldwide. According to World Health Organization (WHO) statistics, 347 million people around the world are having diabetes. WHO predicted that India

would contribute nearly 57 million people to the global burden of diabetes by the year 2025. WHO projects that Diabetes will become the 7<sup>th</sup> leading cause of death by 2030 in the world. WHO states that more than 80% of the deaths reported due to diabetes and its complications are occurring in low and middle-income countries.<sup>1,2</sup> Because of its high prevalence, India is infamously known as the Diabetes capital of the world.<sup>3</sup> More prevalent Type 2 diabetes is predominantly dependent on the individual's lifestyle.<sup>4</sup>

It can be seen, that predisposing factors of diabetes mellitus have a profound effect in causation of disease and these factors can be monitored through assessment of body mass index, lipid profile and blood pressure of the population.

Body fat distribution and lipid profile are the important predicting parameters for various metabolic disturbances

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www.ijss-sn.com

**Month of Submission :** 04-2015

**Month of Peer Review :** 05-2015

**Month of Acceptance :** 05-2015

**Month of Publishing :** 06-2015

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such as diabetes, hypertension, and dyslipidemia.<sup>5</sup> Risk of development of diabetes is more if waist circumference of is more than 80 cm in case of females and 90 cm in case of males.<sup>6</sup> Anemia can occur in 25% of diabetic cases. Also, it increases the risk of developing diabetic complications like retinopathy and cardiovascular diseases.<sup>7</sup>

Diabetes is also one of the most preventable non-communicable diseases. According to known risk factors for diabetes, prevention strategies for health promotion can be planned and implemented. As the risk of development of diabetes varies between different ethnic populations, therefore, it is necessity of medical science to have population-based data to identify the risk factors for diabetes to control and treat the diabetes and its complications according to local ethnicity.<sup>1,8</sup>

Hence, for proper risk assessment for diabetic disease status, it is first and foremost priority to observe and understand any disparities between the predisposing factors in both diabetic and non-diabetic individuals and their role risk for development of diabetes.

## MATERIALS AND METHODS

The study was conducted in the department of Physiology in association with department of Anatomy, Gold Field Institute of Medical Science and Research, Ballabgarh, Faridabad, Haryana (India) on healthy 300 subjects aged between 25 and 60 years after taking informed written consent from all the participants. Known cases of diabetes, hypertension, and any other chronic disease status were not included for study. Ethical approval for the study was taken from Institutional Ethics Committee.

All the anthropometric measurements and laboratory samples were collected from subjects in the morning after overnight fasting. Subject's Height was measured with the help of stadiometer (nearest to 0.1 cm) and weight with the help of standard weighing machine with minimal clothing (nearest to 0.01 kg). The body mass index was calculated with above two measurements. Blood pressure was taken by sphygmomanometer in sitting position and waist circumference was measured with the help of a measuring tape in standing position. Venous blood samples of blood were collected. Fasting plasma glucose levels and hemoglobin values were measured by appropriate laboratory methods. Data collected and then analyzed and statistical values of mean and standard deviation were calculated.

## RESULTS

In the present study, we observed 28 subjects out of 300 were diabetics based upon fasting glucose levels. So,

we compared anthropometric and other hematological parameters between 28 diabetic subjects and rest 272 individuals.

A significant difference was found in the body mass index (BMI) of two groups. There is statistically significant increase in mean BMI of diabetic individuals ( $28.64 \pm 6.43$ ) than normal healthy subjects ( $23.87 \pm 5.67$ ). Statistically significant difference was found for waist circumference (more in the diabetics than normal subjects) (Table 1).

Significant difference was found in systolic blood pressure (BP) of two groups (mean systolic BP of diabetics were  $137.57$  than normal healthy subjects  $126.42$ ). Whereas diastolic BP did not show any difference. The hemoglobin statistics also did not show any significant change between two groups (Table 2).

## DISCUSSION

In the present study, we observed statistically significant increase in the mean values of BMI and the waist circumference in the diabetic subjects when compared to the non-diabetic normal healthy subjects. Similar findings were observed by other researchers in literature.<sup>6,9,10</sup>

No significant difference in hemoglobin levels were found in the present study. Cawood *et al.*<sup>7</sup> observed that diabetics are prone to anemia. They stated that due to decreased kidney functions in diabetes, less erythropoietin hormone production and eventually it leads to decreased red blood cells in the body that will lead to anemia. Our findings were inconsistent with findings of Cawood *et al.*<sup>7</sup>

**Table 1: Anthropological parameters of study population**

Parameters	Mean $\pm$ SD		P value
	Normal subjects n=272	Diabetics n=28	
Age	42.37 $\pm$ 11.43	46.36 $\pm$ 12.41	>0.05
BMI*	23.87 $\pm$ 5.67	28.64 $\pm$ 6.43	<0.05
Waist circumference**	79.05 $\pm$ 11.33	90.02 $\pm$ 12.83	<0.05

\*BMI: Body mass index, \*\*in centimeters, SD: Standard deviation

**Table 2: Hematological parameters of study population**

Parameters	Mean $\pm$ SD		P value
	Normal subjects n=272	Diabetics n=28	
BP*			
Systolic	126.42 $\pm$ 46.58	137.57 $\pm$ 17.83	<0.05
Diastolic	77.69 $\pm$ 12.83	80.42 $\pm$ 8.43	>0.05
Hb**	10.11 $\pm$ 1.97	9.98 $\pm$ 2.07	>0.05

\*BP: Blood pressure, \*\*Hb: Hemoglobin (g%), SD: Standard deviation

Various researchers pointed out the increased prevalence of hypertension in diabetics than in the non-diabetic individuals. They stated that a direct, toxic effect on vascular endothelial cells can be produced by chronic hyperglycemia and these can lead to increased vasoconstriction and vascular remodeling.<sup>11</sup>

## CONCLUSION

In the present study, we have observed statistically significant increase in systolic BP in diabetics than normal healthy subjects and we conclude that a positive association exists in hyperglycemic status and BMI, waist circumference, and systolic BP.

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**How to cite this article:** Mohan A, Bindra GS. Assessment of Anthropological and Physiological Indices in Diabetes Mellitus: A Prospective Tertiary Care Centre Level Evaluation. *Int J Sci Stud* 2015;3(3):81-83.

**Source of Support:** Nil, **Conflict of Interest:** None declared.