

## Study of Type II Diabetes Mellitus in Gujarat University Campus



### Zoology

KEYWORDS :

<b>Dr. Anshita Purohit</b>	SRF, GenDiCe, Human Genetics Center, Zoology Dept. Guj. Uni.
<b>Dr. Tapan Patel</b>	SRF, GenDiCe, Human Genetics Center, Zoology Dept. Guj. Uni.
<b>Gaurang Sindhav</b>	JRF, GenDiCe, Human Genetics Center, Zoology Dept. Guj. Uni.
<b>Swati Thakur</b>	JRF, GenDiCe, Human Genetics Center, Zoology Dept. Guj. Uni.
<b>Shahil Shah</b>	JRF, GenDiCe, Human Genetics Center, Zoology Dept. Guj. Uni.
<b>Yasin Mansuri</b>	JRF, GenDiCe, Human Genetics Center, Zoology Dept. Guj. Uni.
<b>Dr. Banshi Saboo</b>	Diabetologist, Diacare, Navrangpura, Ahmedabad.
<b>Dr. Mandava V. Rao</b>	Prof. & HOD, Director, GenDiCe, Zoology Dept. Guj. Uni.

### ABSTRACT

*Type II diabetes mellitus (T2DM) is one of the most common and costly chronic diseases world wide. Incidence and prevalence of type II diabetes mellitus continue to rise in Indian populations. India alone was home to an estimated 50 million people with diabetes in 2010 and this number is projected to reach 87 million by 2030. Population based studies show a rapidly increasing prevalence of T2DM in India over a past few decades. In this study, several individuals at different age groups (20-80 yrs) were studied to estimate the random blood glucose levels along with the body mass index (BMI). Data from the age over 40 years showed increased incidence in T2DM prevalence independent to BMI. Individuals below the age of 40 showed normal glucose level. This population based study illustrates the rapid incidences of diabetes in the patients at higher age in Gujarat university campus. Obesity did not relate with the glucose levels. This article is a systematic review of the epidemiology of adult onset type II diabetes in the individuals of the particular campus. Further studies are needed to unravel the genetics of diabetes in the Indian population.*

### Introduction:

The impacts of T2DM are considerable as a lifelong disease; it increases morbidity and mortality and decreases the quality of life (Hoskote and Joshi 2008). At the same time, the disease and its complications cause a heavy economic burden for diabetic patients themselves, their families and society. A better understanding about the cause of a predisposition of Indians to get T2DM is necessary for future planning of healthcare, policy and delivery in order to ensure that the burdens of disease are addressed (Hoskote and Joshi 2008). The prevalence of diabetes is rapidly rising all over the world at an alarming rate (Huizinga and Rothman 2006). Over the past 30 years, the status of diabetes has changed from mild disorder to one of the major causes of morbidity and mortality affecting the youth and middle aged people in India leading to 109 thousand deaths in 2004, 1.157 million years of life lost in 2004 (Venkataraman et al. 2009) and 2.263 million disability adjusted life years (DALYs) in India during 2004 (ICMR 2006). T2DM is a non-autoimmune, complex, heterogeneous and polygenic metabolic disease condition in which the body fails to produce enough insulin, characterized by abnormal glucose homeostasis (Gupta et al. 2008). Its pathogenesis appears to involve complex interactions between genetic and environmental factors (Gupta et al. 2008). It occurs when impaired insulin effectiveness (insulin resistance) is accompanied by the failure to produce sufficient -cell insulin (Permutt et al. 2005). Obesity is also considered a key risk factor for T2DM. The association between increasing body mass index (BMI) and greater weight gain and risk of diabetes is most pronounced among Asians, suggesting that lower cut off BMI values are needed to identify Asians at a higher risk of diabetes (Shai et al. 2006). BMI cut point for Indians for any cardiometabolic risk factors is 23 kg/m<sup>2</sup> in both sexes (Mohan et al. 2007). There is also a probable indication that there is a preferential abdominal adiposity in Indians irrespective of the degree of general adiposity (Ramachandran et al. 2002). Changes in work patterns from heavy labour to sedentary, the increase in computerization and mechanization, and improved transport are just a few of the changes that have had an impact on human metabolism associated with it (Abate and Chandalia 2001). Since 2007, Genome-wide association studies has catalogued around 20 genes (like

TCF7L2, HHEX, CDKAL1, SLC30A8 etc.) showing a strong association with T2DM (Mohan et al. 2007). Finally, the interethnic differences among Europeans, Americans, Chinese and Asian Indians in insulin resistance may have an environmental or genetic explanation (Abate and Chandalia 2001).

The burden of diabetes is to a large extent the consequence of macrovascular (coronary artery disease, peripheral vascular disease, and atherosclerosis) and microvascular (like retinopathy, neuropathy, and nephropathy) complications of the disease (Permutt et al, 2005).

Due to all the complications caused by this disease, it becomes important to study the prevalence and causes of the disease in detail as an epidemiological survey. Hence, this study is undertaken in University campus.

### Materials and Methods:

A population based study was conducted in Gujarat University campus and recruited 280 subjects within age limit 20-60 yrs. Four age groups i.e. 20-30, 31-40, 41-50 and 51-60 were considered. Random blood sugar levels were estimated by using Acu-test Kit (Thyrocare). Body weight of the individuals was noted down in kilograms with the height in meter square in order to obtain the body mass index (BMI). A correlation between the blood glucose level as well as BMI was also evaluated to find out the dependency of T2DM on the obesity factor. The normal fasting blood sugar level is considered below 165mg/dL. The unit for BMI is Kg/m<sup>2</sup> and the health risks increase below the cut-off point of 25 kg/m<sup>2</sup> that defines overweight in the current WHO classification. The results were expressed in percentage (%).

### Results:

The support of the rising prevalence of diabetes comes from the result obtained from the Gujarat University (GU) campus. This study was conducted on a representative population including students, employees and the general civilians who visit the campus. A total of 280 individuals falling in four age groups viz. 20-30, 31-40, 41-50 and 51-60 and above.

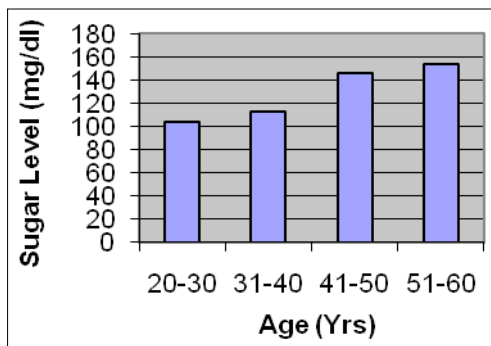


Figure 1: Age v/s Sugar level amongst the Gujarat university parivar

**Blood sugar levels:**

No cases of diabetes were found in 20-30 and 31-40 groups. They exhibited normal blood sugar levels (104.2 mg/dl on an average). In the age group 41-50, out of 18 individual studied, 5 individuals were diabetic. On an average, the sugar levels were 113mg/dl. Out of 18 individuals studied in the age group 51-60, 9 individuals were affected from which 3 were undiagnosed prior and were surprised to have it. On an average, the blood glucose level of this group was 153.6 mg/dl which is very high from normal level (Fig. 1).

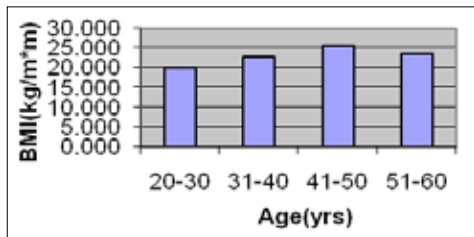


Figure 2: Age v/s Body Mass Index (BMI) amongst the population studied

**Body Mass Index and age:**

The graph 2 represents Age versus BMI which shows that 41-50 of age group exhibited the highest BMI (25.58) followed by 51-60 age group (23.7). The other 2 age groups (20-30 and 31-40) expressed approx. normal BMI (Fig. 2).

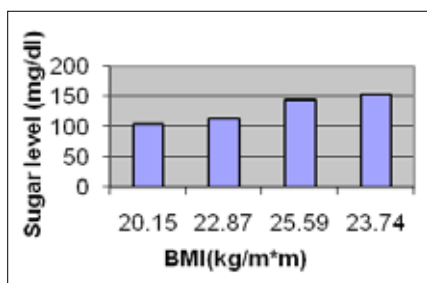


Figure 3: BMI v/s Sugar level amongst the studied individuals

**BMI and Sugar Levels:**

This gives the relation of BMI and sugar level. As the BMI increased, the expression of diabetes in that age group also increased. This indicates that the occurrence of diabetes is correlated to obese status (Fig. 3).

**Discussion:**

In support of rising prevalence and awareness of diabetes, this study was done to celebrate World diabetes day in our campus. Total 280 subjects were screened in four age groups viz. 20-30, 31-40, 41-50 and 51-60 having students, employees and visitors of the Gujarat University. This survey included random blood glucose levels, BMI and age indices. These were correlated with prevalence of T2DM as a pilot investigation in our genetic center of Gujarat University. The data indicated that among the four groups recruited, the first two groups did not show the incidence of T2DM which was discovered in the last two groups (41-50 and 51-60) studied. The data suggest that the incidence of diabetes type 2 increases with increasing age, obesity and lifestyle (Ripsin et al., 2009). Excess body fat is associated with 30% of cases of diabetes in those of Chinese and Japanese descent, 60-80% of cases in those of European and African descent, and 100% of Pima Indians and Pacific Islanders (Shoback, 2011). The data also suggests that as the age increases, the BMI increases due to the lifestyle and eating habits which directly enhances diabetes in the individuals. Hence, all the parameters studied are correlated. Obesity has recently emerged as a major global health problem as noted in our study. According to World Health Organization estimates, ≈1.6 billion adults worldwide were overweight (body mass index [BMI] ≥25 kg/m<sup>2</sup>) and at least 400 million were obese (BMI ≥30 kg/m<sup>2</sup>) in 2005. These numbers are expected to reach 2.3 billion and 700 million, respectively, by 2015. The percentage of overweight and obese adults increased markedly from 47% and 15% in 1976 to 1980 to >66% and 33% in 2005 to 2006, with the greatest proportion of increase seen among the individuals studied (Block et al., 2004; Ogden et al., 2006). The implications of excess body weight are far-reaching. Epidemiological studies indicate that overweight and obesity are important risk factors for type 2 diabetes mellitus (T2DM), cardiovascular disease, cancer, and premature death (Hu, 2008). In the United States, healthcare expenditures attributable to overweight and obesity are estimated to be \$147 billion or 9.1% of total healthcare costs per year (Finkelstein et al., 2009).

Although, India has worked continuously to improve its health care system in recent decades and efforts have been made to expand the public health system and reduce the burden of disease, there remains no universal coverage (Rao et al. 2002). Diabetes is a chronic condition that requires continuing medical care and self-management in order to minimize the risk of complications and mortality. The goals of treatment are to achieve optimal glycemic control, to reduce other cardiovascular risk factors, including hypertension, hyperlipidemia, overweight and obesity; and to diminish complications such as heart disease, peripheral vascular disease, renal disease, and neuropathy (Norris et al. 2008). T2DM may be treated by diet and exercise, often combined with 1 or more oral hypoglycemic agents. Optimal treatment, however, may require the use of insulin with or without oral agents. Systematic review of the published literature also on the efficacy and safety of herbal therapies and vitamin/mineral supplements for glucose control in patients with diabetes suggest that there is still insufficient evidence to draw definitive conclusions about the efficacy of individual herbs and supplements for diabetes; however, they appear to be generally safe (Gloria et al. 2003). The results suggest that the incidence of diabetes increases after the mid age. The lower age groups donot express it but the incidence is at peak at the level of 40's. It is not only predeposited on the genes but lot on environmental characters triggers it. BMI is one of the factors which are directly related to diabetes with advancing age.

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