

HIGH PREVALENCE OF TYPE 2 DIABETES IN URBAN POPULATION IN NORTH EASTERN INDIA

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ABSTRACT :

There is no epidemiological data on the prevalence of diabetes from northeastern India. Therefore, a survey was conducted in the urban population of the city of Guwahati, Assam, to evaluate the prevalence of glucose intolerance and association of risk factors. In a total of 1016 randomly selected adults ages ≥ 20 years (595 men, 421 women) glucose tolerance was tested by 2h post glucose (75 gm) plasma glucose estimation (WHO criteria). The age-adjusted prevalence of Type 2 diabetes was 8.2% in total, 8.7% in men, 7.8% in women. The age-adjusted prevalence of IGT was 4% in total, 4.1% in men and 3.8% in women. In 83.3% of Type 2 diabetes, diabetes was detected earlier. In the multiple regression analysis, age, family history, increasing socio-economic status and decreasing physical activity were significantly associated with Type 2 diabetes. Sex and BMI were not contributory. In the Impaired Glucose Tolerance [IGT] group, the results were similar to Type 2 diabetes but BMI was also a contributory factor. This study showed that the prevalence of Type 2 diabetes in urban areas of Assam was also high, as reported from urban population in southern India.

INTRODUCTION :

India is a vast country with populations differing in racial admixture as well as in, social and cultural habits. It is likely that the prevalence of non-insulin dependent diabetes mellitus (Type 2 diabetes) could also be different in various races due to genetic and environment differences. In three cross sectional studies in the urban south Indian population, we noted high prevalence of Type 2 diabetes comparable to that of migrant Indian populations [1-7]. It was also noted that the prevalence was increasing over the years, in this population (8.5 to 11.6%) [3]. While reports are available from southern [1-5] and northern parts of India [8], there has been no report from the vast northeastern region of India. This study was undertaken in an urban population in the northeastern region of India, where no epidemiological study in diabetes had been done.

The result showed that the prevalence of Type 2 diabetes in urban population was similar in northeastern and southern parts of India.

MATERIALS AND METHODS :

This survey was done in the city of Guwahati in Assam, northeastern India. Written permission was taken from the District Commissioner of Kamrup, Assam. The population screened comprised of mostly literate, urban people, of different socioeconomic strata. The population consisted of Hindus and Muslims from Assam, Bengal, Rajasthan and few other regions of India. The staple food was mainly rice and majority of them used mustard oil for cooking. The populations studied were mainly housewives, professionals, skilled workers, retired persons, businessmen and teachers.

SURVEY PROCEDURE:

A preliminary door to door enumeration was conducted to collect details of persons aged 20 years and above. Tests were performed daily from September '94 to April '95. Volunteers and members of Rotaract Club of Guwahati (South) helped in conducting this study. A doctor and four technicians were engaged for the study.

All the tested persons were fasted overnight (minimum ten hours) and the period of fasting was ascertained by questioning the study subjects, prior to registration. After registration, a 75 gm anhydrous glucose was given orally dissolved in 250 ml of water. Venous blood samples were collected and were sent to the laboratory. These samples were drawn in an EDTA vial for estimation of plasma glucose [using Ranbaxy glucose kit GOD/POD], within an hour of collection. One technician was deputed for the whole study so as to avoid interpersonal error.

Diagnosis of diabetes was made if the post-glucose value was equal to or more than 200 mg/dl and diagnosis of IGT was made if the post glucose value was between 140 mg/dl to 199 mg/dl [9].

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During the survey, details of age, sex, address, occupation, community and education were recorded. Socio-economic status was classified as high, medium and low, according to their living standard, type of work and income as income, as ascertained by a questionnaire. Time spent on deskwork and manual labor, only housework and degree of outdoor activity were ascertained. Physical activity was divided into three categories viz. sedentary (elderly, retired executives, businessmen), moderate (housewives, professionals, teachers, skilled workers) and heavy (service forces and manual laborers). Physical examination included BP recording on the right arm, in sitting posture, taken by one doctor and with same BP instrument throughout the study, to avoid interpersonal variation. Height and weight were recorded by standard methods and BMI was calculated (kg/m^2).

On an average, 10-15 persons were tested on each day of survey except on Sundays, when more numbers were available for tests. The information was recorded on a computerised performa. Statistical analysis was done at the Diabetes Research Center, Madras.

STATISTICAL ANALYSIS:

Prevalence rates of diabetes and IGT were age adjusted to the 1991 census for Madras City, Tamil Nadu, as the corresponding values were not available for Guwahati. Group means were compared by unpaired 't' test. Separate multiple logistic regression analyses was done to determine the variables associated with diabetes and IGT.

RESULTS :

The total number screened was 1016, (M: F 8.85, 595:421). The age adjusted prevalence of diabetes and IGT were 8.2% (M: F 8.7% and 7.8%) and 4.0% (M: F 4.1% and 3.8%) respectively. Diabetes was already diagnosed in 83.3% of Type 2 diabetes. There was no significant gender difference in the prevalence of diabetes or IGT. Persons with diabetes were older (51.1 ± 11.4 years) compared to those with IGT (40.3 ± 10.2 years) and normoglycaemia (38.3 ± 13.1 years; $P < 0.004$ vs. IGT and $P < 0.001$ vs. normal). BMI was higher in persons with IGT ($24.7 \pm 4.1 \text{ kg}/\text{m}^2$, $P < 0.037$ vs. normal. BMI $22.2 \pm 3.4 \text{ kg}/\text{m}^2$ in normal).

Table 1. Age specific prevalence of IGT and diabetes

Age group Yrs	Total	IGT		DIABETES	
		n	%	n	%
20-29	288	6	2.17	1	0.35
30-39	275	17	6.2	9	3.3
40-49	213	13	6.1	25	11.7
50-59	133	3	3.6	21	15.2
> = 60	107	2	1.9	34	31.8

Age specific prevalence of IGT and Type 2 diabetes is shown in Table 1. While IGT was more prevalent in the age group of 30-49 years, prevalence of diabetes showed increasing trend with age.

Hypertension was recorded if the systolic BP > 160 and/or diastolic BP was > 95 mm mercury or there were records of treatment for hypertension. Hypertension was present in 133 (13%) cases.

Obesity was present in 22.4% of men ($\text{BM}^3 27 \text{ kg}/\text{m}^2$) and in 19.5% of women ($\text{BMI}^3 25 \text{ kg}/\text{m}^2$). Positive family history of diabetes was present in 24.9%.

Multiple logistic regression analysis with IGT as the dependent variable showed that age, BMI, positive family history of diabetes, increasing socioeconomic strata and decreasing physical activity were the associated factors (Table 2). Increasing age, positive family history, increasing socioeconomic status and decreasing physical activity were associated with diabetes (Table 3). Gender and BMI did not contribute to the development of diabetes.

Table 2 Multiple logistic regression analysis, IGT vs. Normal

Variables	β	SE	P	Odds Ratio	95%CI for OR
Age	0.4350	0.1055	0.0000	1.5450	1.26-1.90
BMI	0.1657	0.0577	0.0041	1.1802	1.05-1.32
FH	1.1834	0.2189	0.0000	3.2655	2.13-5.02
*Socio economic Strata	0.3114	0.1212	0.0102	1.3653	1.08-1.73
**Physical activity	0.7313	0.2671	0.0062	2.0778	1.23-3.51
Constant	-6.5848	0.5928			

Variables not in the equation = sex.

Age-categories of 10 yrs. F.H. = Family history negative / positive,

*Ascending categories.

**Descending order, Sex F = 1, M = 2.

BMI units of 2, CI = Confidence interval

Table 3 Multiple logistic Regression analysis, Diabetes Mellitus vs. Normal

Variables	β	SE	P	Odds Ratio	95%CI for OR
Age	0.5564	0.1304	0.0000	1.7443	1.35-2.25
FH	1.1889	0.2642	0.0000	3.2834	1.96-5.51
*Socio economic Strata	0.4443	0.1469	0.0025	1.5593	1.17-2.08
**Physical activity	1.1491	0.3312	0.0005	3.1553	1.65-6.04
Constant	-8.307	0.7787			

Variables not in the equation = sex, BMI.
Age-categories of 10 yrs. F.H. = Family history negative / positive.

* Ascending categories.

** Descending order, Sex F = 1, M = 2.

BMI units of 2, CI = Confidence interval

DISCUSSION

This study shows a high prevalence of Type 2 diabetes among the adults in Guwahati, Assam, in northeastern part of India. The prevalence was similar to that reported by us in southern India (8.2% age>20 yr.) [8]. Prevalence of IGT was lower compared to that from southern India (8.7%), but similar to the report from New Delhi (3.7%). A more recent survey from Southern India showed a further increase by 40% in the prevalence of Type 2-diabetes [3]. Similarities had been observed between this study and that from southern India with respect to age, age specific prevalence of diabetes and the occurrence of obesity.

The present study is significant because the population of northeastern states is different in social and cultural aspects from other parts of India. A large proportion of northeastern states is not developed or urbanized. Even with such a background, the population living in the cities has a higher prevalence of diabetes. Therefore, people living in different parts of India seem to possess identical risk of diabetes, if exposed to urban life style. Most of the migrants Indians living in UK are from the northwestern states of Gujarat and Punjab [10-12], while those in South Africa [13], Singapore [14] and Fiji [15] are from southern Indian states. All of them have exhibited equal susceptibility to diabetes when exposed to adverse environment conditions. The phenomenon is true within the Indian subcontinent where internal migration from rural to urban areas is taking place.

Prevalence of positive family history of diabetes and age were also contributory of diabetes. Unlike the study of Ahuja et al, we did not observe male excess amongst the diabetic person's [8]. No major sex difference in the prevalence of diabetes was seen in southern India [2]. This study showed significant association with decreased physical activity, which was not evident in previous studies [1-3]. Majority of the study population was not habituated to physical exercises and therefore physical activity had to be assessed based on their occupation.

This study highlights the fact, that urban Indians, living in any geographical location of the country, have a high prevalence of diabetes. The inter-state differences in the prevalence of the disease are minor. This could be due to the common etiological factors, namely presence of high familial aggregation and the environmental influences associated with urbanisation.

Majority of the Indian population lives in rural areas. There is a wide urban-rural difference in the prevalence of diabetes as shown in several studies [2,4,5]. It is essential to study the effect of rural-urban migration in India, as changes in life styles seem to be related to urbanization.

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