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PREVALENCE OF DIABETES MELLITUS AND IMPAIRED GLUCOSE REGULATION AMONGST THE EXECUTIVES OF AN INDUSTRIAL AREA OF ASSAM

Sultana Jesmin Ahmed¹, Alak Barua²

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ABSTRACT: BACKGROUND: Diabetes Mellitus is often asymptomatic in early stage and can remain undiagnosed for many years. The chronic hyperglycemia of diabetes is associated with long-term damage and failure of various organs like kidney, heart, eyes etc. The present study aims to find out the prevalence of diabetes mellitus and impaired glucose regulation amongst the executives of an industrial area of Assam. The reason behind choosing this group is as follows—People in the industrial set up, specially the executive group, are from the different parts of the country who are inducted at a comparatively young age and undergo drastic life style changes. **MATERIAL AND METHOD:** Executive staff between the ages of 20 to 60 years were selected by simple random sampling in a cross-sectional study. The sample size was calculated to be 340. Data was collected by a pre-designed pre-tested proforma including age, sex, marital status, educational qualification, occupation, income, socio-economic status, medical history of diabetes mellitus. 2 Finger prick blood specimens were taken, one in the morning at fasting state and the other after 2 hour of 75g glucose given orally. **RESULTS AND OBSERVATION:** 87.7% study subjects were male and 12.3% were female. 74.4% of males and 55.3% of females were married. The overall prevalence of diabetes mellitus was 20.1%. The prevalence of diabetes mellitus was 21.1% amongst male executives and 13.2% amongst female executives. Prevalence of impaired glucose regulation amongst the male subjects was 18.5 % and amongst the female study subjects was 28.9%. The highest prevalence (44.44%) of IGR was observed in the age group 50-60 years. **CONCLUSION:** A package for the early diagnosis and management of diabetes may be initiated to bring down the morbidity and mortality in these group of population. **KEYWORDS:** prevalence, diabetes mellitus, impaired glucose regulation, industrial area, executives.

INTRODUCTION: Demographic transition combined with urbanization and industrialization has resulted in drastic changes in life style globally.¹ This shift, representing a decline in death from infectious diseases to an increase in those due to chronic diseases is often referred to as the modern 'epidemiological transition'.² Diabetes Mellitus (DM) comprises a heterogeneous group of hyperglycemic disorders. The hyperglycemia is the consequence of relative or absolute deficiency of insulin and a relative or absolute excess of glucagons.³

According to the recent WHO report, India today leads the world with over 32 million diabetes patients and the number is projected to increase to 79.5 million by the year 2025 with changing environment, urbanization and altered life styles.⁴

Diabetes Mellitus is often asymptomatic in early stage and can remain undiagnosed for many years. The chronic hyperglycemia of diabetes is associated with long-term damage and failure of various organs like kidney, heart, eyes etc.⁵ The present study aims to find out the prevalence of diabetes mellitus and impaired glucose regulation amongst the executives of an industrial area of

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Assam. The reason behind choosing this group is as follows-People in the industrial set up, specially the executive group, are from the different parts of the country who are inducted at a comparatively young age and undergo drastic life style changes. Basing on the above observation, the executives of an Oil industrial area were chosen as subjects representing all industrial population.

Research Question: What is the prevalence of diabetes mellitus and impaired glucose regulation amongst the executives aged 20-60 years in an Industrial area?

OBJECTIVES: To determine the prevalence of diabetes mellitus and impaired glucose regulation amongst the executives aged 20-60 years in an Industrial area.

MATERIAL AND METHODS: The present study was undertaken under the Department of Community Medicine, Assam Medical College & Hospital, Dibrugarh, to study the prevalence diabetes mellitus and impaired glucose regulation amongst the executives aged of 20 to 60 years of an industrial area of Assam. They are inducted at younger age & undergo drastic lifestyle changes during the course of their occupation.

Study Universe: All executives employed in an Oil industry of Assam, in the age group 20-60 years were included in the study.

Study Design: Cross- sectional study.

Sampling Design: Simple random sampling.

Sample Size: The sample size calculated was 340 taking p-13.9% (Prevalence of diabetes mellitus in National urban diabetes survey, by Ramachandran A et al, 2001)⁶

Data Collection: The survey was done by a predesigned pre tested proforma including age, sex, marital status, educational qualification, occupation, income, socio economic status, medical history of diabetes mellitus, family history of diabetes mellitus. Prior permission from Institutional Ethics Committee was taken. Written consent from every study subject after properly elaborating nature and aim of research work was taken. Finger prick blood specimen was taken in the morning at fasting state and after 2 hour of 75 g glucose intake to determine 2 hour capillary blood glucose.

Blood Glucose Measurement: The study subjects were advised to take dinner at 8-10p.m. and not to take anything till the blood sample taken in the next morning. The study subjects were met in the next morning and enquired about their fasting state. The investigation was carried out only after reporting of fasting state by the participants. The hanging blood drop was obtained by Life-scan One Touch glucose cubet slide. The Life-scan One Touch machine was calibrated with standard range of reading prior to start estimation, and it was rechecked after every 20 patients. Fasting blood glucose (FBG) from capillary whole blood was performed from 308 individuals.

Every individual was advised to take 75g of oral glucose dissolved in 250ml of water after taking the fasting blood sample. After 2-hour finger prick was done to estimate 2-hour capillary blood glucose level.

Working Definition of Diabetes Mellitus⁶: If the individual was under antidiabetic treatment for diabetes mellitus or if fasting capillary blood glucose $\geq 126\text{mg/dl}$ or 2hour capillary blood glucose $\geq 200\text{mg/dl}$ or Individuals with symptoms of DM and random blood glucose concentration $\geq 200\text{mg/dl}$.

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Glucose Tolerance was classified into 3 Categories Based on Fasting Capillary Blood Glucose:

- 1) FCBG <100mg /dl was considered normal.
- 2) FCBG $\geq$ 100MG/dl but <126mg/dl was defined as impaired fasting glucose.
- 3) FCBG $\geq$ 126mg/dl warrants diagnosis of DM.

Impaired glucose tolerance was defined as blood glucose level between 140 and 200 mg/dl 2hour after 75-gm oral glucose load.

Exclusion Criteria:

- a) Patient with known type 1 diabetes mellitus.
- b) Patient suffering from any disease that can lead to secondary diabetes (eg: Acromegaly, Cushing's syndrome, Hyperthyroidism, Pheochromocytoma, disease of exocrine pancreas like pancreatitis, cystic fibrosis).
- c) Individual taking medication like Glucocorticoids, Thyroid hormone, Diazoxide, Phenytoin, pentamidine, OCP.

RESULTS AND OBSERVATION: During the study a total of 340 executives were interviewed. However, only 308 of them had agreed to cooperate. And thus the study was undertaken amongst those 308 executives of an oil industry, Assam.

The participation rate was 90.6% for the study. 270 numbers (87.7%) of the study subjects were males and the remaining 38 numbers (12.3%) were females. 44.8% of the males and 55.3% of the females were in the age group 40-50 year. 74.4% of males and 55.3% of females were married (Table4.1, 4.2). All belongs to Class 1 socio economic status.

The overall prevalence of diabetes mellitus was 20.1%. It was found that 1.6% known diabetic, 4.6% showed DM in FBS, 1.6% showed DM in 2 hour blood glucose sample and 12.3% in both the sample.

Age Specific prevalence was found to be 3.3% in age group 20-30 years, 9.2% in the age group 30-40 years, 21.1% in the age group 40-50 years and 35.2 % in the age group 50-60 years. It showed an increasing trend with advancement of age. (Table 4.3). The prevalence of diabetes mellitus was 21.1% amongst the male executives and 13.2% amongst the female executives (Fig 4.2, fig 4. 3).

It was observed that prevalence of impaired glucose regulation (IGR) amongst the male study subjects was 18.5% (Fig 4.4). The highest prevalence (32.3%) of IGR was observed in the age group 50-60 years and the lowest prevalence (15.5%) of IGR was observed in 30-40 years age group. Prevalence of impaired fasting glucose (IFG) 0.97%, prevalence of impaired glucose tolerance (IGT) 12.01%, prevalence of IFG and IGT 5.5% and IGR 18.5% (Table4.4). Prevalence of impaired glucose regulation amongst the female study subjects was 28.9% (Fig4.5). The highest prevalence (44.44%) of IGR was observed in the age group 50-60 years and the lowest prevalence (0%) was observed in 20-30 years of females. Prevalence of impaired fasting glucose (IFG) 7.9%, prevalence of impaired glucose tolerance (IGT) 10.5%, prevalence of IFG and IGT 10.5% and IGR 28.9% (Table 4.5).

DISCUSSION: Diabetes mellitus is a rapidly emerging public health problem causing a lot of mortality and morbidity in the developed as well as in the developing country. It is an 'iceberg' disease.⁸ As 50% of cases of type 2 diabetes are currently undiagnosed, enhanced detection and diagnosis are critical.⁹

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The prevalence of diabetes mellitus in different studies depends on two important factors: sample size and methodology used in the study. So, for meaningful comparison of prevalence, it is essential to compare the studies having an adequate sample size and adoption of standard methodology.

As all the executives belong to same socioeconomic group, having similar type of life styles, habits and covered by one health-screening programme, the sample seems to be more homogenous than the usual rural or urban samples. On the above context the finding of our study may represent true population value.

In the present study, the prevalence of diabetes mellitus 20.1% is higher than the prevalence of DM observed by Raman Kutty et al 16.3%. Zargar AH reported prevalence of 14.23%.^{10,11}

It was observed that prevalence of impaired glucose regulation (IGR) amongst the male study subjects was 18.5% and amongst the female study subjects was 28.9%. Castelic et al reported prevalence of impaired glucose regulation 23.3% amongst the male population and 24.2% amongst the female population in Spain. Bai PV et al, (1999) reported prevalence of impaired glucose regulation 26% in Indian urban population. It is comparable with the finding of Castelic et al, DECODE study group and Bai PV et al.^{12,13,14}

CONCLUSION:

- To achieve the success of the primordial and primary prevention, increased public awareness regarding periodic checkup of fasting blood glucose and 2 hour blood glucose should be created.
- A package for the early diagnosis and management of diabetes may be initiated to bring down the morbidity and mortality in these group of population.
- The finding of this study may help in providing the baseline data for the proper implementation and working of recently launched National program for prevention and control of diabetes, cardiovascular diseases and stroke (NPDCS).

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Age in years	Male	Female	Total
20-30	29(10.7%)	1(2.6%)	30(9.7%)
30-40	58(21.5%)	7(18.4%)	65(21%)
40- 50	121(44.8%)	21(55.3%)	142(46.1%)
50-60	62(23.0%)	9(23.7%)	71(23.1%)
Total	270(100%)	38(100%)	308(100%)

Table 4.1: Distribution of the study subjects according to age and sex

Marital status	Male	Female	Total
Single	69(25.6%)	17(44.7%)	86(27.9%)
Married	201(74.4%)	21(55.3%)	222(72.1%)
Total	270(100%)	38(100%)	308(100%)

Table 4.2: Distribution of the study subjects according to Marietal status

Age	Known Diabetic	FCBG ≥126mg/dl	2hr CBG≥200mg/dl	Both	Total Diabetic
20 to 30	0	0	1(3.3%)	0	1(3.3%)
30 to 40	0	1(1.5%)	0	5(7.7%)	6(9.2%)
40 to 50	1(0.7%)	7(4.9%)	2(1.4%)	20(14.1%)	30(21.1%)
50 to 60	4(5.6%)	6(8.5%)	2(2.8%)	13(18.3%)	25(35.2%)
Total	5(1.6%)	14(4.6%)	5(1.6%)	38(12.3%)	62(20.1%)

Table 4.3: Prevalence of Diabetes Mellitus amongst the Study Subjects

Age	Impaired Fasting Glucose	Impaired Glucose Tolerance	Both I.F.G. & I.G.T.	I.G.R.
20 to 30	0	5(17.2%)	0	5(17.2%)
30 to 40	0	8(13.8%)	1(1.7%)	9(15.5%)
40 to 50	1(0.8%)	14(11.6%)	8(6.6%)	23(19.0%)
50 to 60	2(3.2%)	10(16.1%)	8(12.9%)	20(32.3%)
Total	3(.97%)	37(12.01%)	17(5.5%)	57(18.50%)

Table 4.4: Prevalence of IGR among Male Executives

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Age	Impaired Fasting Glucose	Impaired Glucose Tolerance	Both I.F.G. & I.G.T.	I.G.R.
20 to 30	0	0	0	0
30 to 40	0	0	1(14.3%)	1(14.3%)
40 to 50	3(14.3%)	2(9.5%)	1(4.8%)	6(28.6%)
50 to 60	0	2(22.2%)	2(22.2%)	4(44.4%)
Total	3(7.9%)	4(10.5%)	4(10.5%)	11(28.9%)

Table 4.5: Prevalence of Impaired Glucose Regulation amongst the Female Executives

Fig. 4.1: Prevalence of Diabetes Mellitus amongst Male Executives

Fig 4.2. Prevalence of Diabetes Mellitus amongst Female Executives

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Fig. 4.3: Prevalence of Impaired Glucose Regulation among Male Executives

Fig. 4.4: Prevalence of Impaired Glucose Regulation among Female Executives

AUTHORS:

1. Sultana Jesmin Ahmed
2. Alak Barua

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Community Medicine, Assam Medical College, Dibrugarh, Assam.
2. Professor & HOD, Department of Community Medicine, Assam Medical College, Dibrugarh, Assam.

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NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sultana Jesmin Ahmed,
Associate Professor,
Department of Community Medicine,
Assam Medical College,
Dibrugarh.
E-mail: drjesminahmed@gmail.com

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