Original Article

Risk factors of diabetes mellitus amongst the executives of an industrial area of North East India: A community based cross sectional study

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ABSTRACT

Aim: To assess risk factors of diabetes mellitus amongst the executives of an industrial area of North East India.

Material and method: Executive the aged 20 to 60 years were selected by simple random sampling in a community based cross-sectional study. The sample size was 340. Data was collected by a predesigned pretested proforma to know about different risk factors. Fasting capillary blood glucose and 2 h capillary blood glucose were taken to assess diabetes mellitus.

Results and observation: 30.7% of the male and 18.4% of the female participants had family history of DM. 29.3% of the male and 39.5% of the female had family history of hypertension. 24.7%, 0.6% and 2.9% smoked regularly, occasionally and in the past respectively. 2.9% subjects consumed chewed tobacco regularly, 0.3% consumed occasionally and 1.6% consumed tobacco in the past. 44.5%, 10.7%, 2.3% of the study subjects took alcohol regularly, occasionally, in the past respectively. 44.5%, 47.4% and 8.1% of the participants were involved in sedentary work, active work and heavy work respectively. Prevalence of diabetes mellitus was significantly associated with advancement of age, family history of diabetes mellitus, family history of hypertension and sedentary life style. No significant association of diabetes mellitus with gender, tobacco consumption and alcohol intake.

Conclusion: A package for the early diagnosis and management of diabetes may be initiated to bring down the morbidity and mortality in industrial population.

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1. Introduction

India has the largest diabetic population and it is expected to increase to 174 million in the year 2025 [1]. Studies in migrant Indians, and Indians in urban and rural southern India illustrate the strong influences of genetic and environmental factors in the development of NIDDM [2].

People without risk factors also develop diseases but are less likely to do so than those with risk factors. Risk factors represent association, which may or may not be causal [3–5]. The term "risk factors" usually refers to modifiable biological characteristics (obesity, habitual physical inactivity, race/ethnicity, previously identified IFG and IGT, H/O GDM, delivery of baby >4 kg, HTN, serum lipid and its fraction) other behaviors or life style in particular dietary habits, social and psychological influences are also modifiable risk factors [6,7]. Biological traits such as age and sex and some genetic factors are non-modifiable [8]. A strong family history of diabetes mellitus, age, obesity, and physical inactivity identify those individuals at highest risk [9].

The present study aims to assess risk factors of diabetes mellitus amongst the executives of an industrial area of North East India. 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 of North East India were chosen as subjects representing all industrial population.

2. Material and methods

2.1. Study design, study area and study population

A community based cross sectional study was carried out for a period of 1 year amongst the executives aged 20 to 60 years of age in an oil sector of North Eastern region of India to study the risk factors of diabetes mellitus in an industrial population.

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2.2. Sample size and sampling design

The sample size calculated was 340 taking p = 13.9% and allowable error, 10–20% of p [10]. The subjects were selected by using Simple random sampling using random number table.

Ethical clearance was obtained from the Institutional Ethics Committee for conducting the study and written informed consent was taken from all the participants before collection of data.

2.3. Data collection

Data was collected by a predesigned pre-tested schedule including different variables like age, sex, marital status, educational qualification, occupation, income, socio economic status, medical history of diabetes mellitus, family history of diabetes mellitus, medical history of hypertension, behavioral habits including alcohol, tobacco intake, physical activity from each study participants. Finger prick blood specimen was taken in the morning after 12 h of fasting state. Another finger prick blood specimen after 2 h of 75 g glucose intake to determine 2 h capillary blood glucose.

2.3.1. Blood glucose measurement

The study subjects were advised to take dinner at 8–10 p.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 Lifescan One Touch glucose cubet slide. The Lifescan 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 75 g of oral glucose dissolved in 250 ml of water after taking the fasting blood sample. After 2-h finger prick was done to estimate 2-h capillary blood glucose level.

2.4. Working definition of diabetes mellitus [11]

If the individual was under antidiabetic treatment for diabetes mellitus or

If fasting capillary blood glucose $\geq$126 mg/dl or 2 h capillary blood glucose $\geq$200 mg/dl or

Individuals with symptoms of DM and random blood glucose concentration $\geq$200 mg/dl.

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

2.5. Exclusion criteria

- Patient with known type 1 diabetes mellitus.
- 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).
- Individual taking medication like Glucocorticoids, Thyroid hormone, Diazoxide, Phenytoin, pentamidine, OCP.

2.6. Statistical analysis

Data about prevalence of risk factors were presented in percentages. Statistical analysis was done using MS Excel 2007 and Graph Pad Prism 7. Chi-square test and Fisher's exact probability test was used to test the association of risk factors and diabetes mellitus status amongst the study population. Statistical significance was considered at 5% level of significance

3. 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 of North East of India. It was observed that 30.7% of the male study subjects had family history of DM. 39.5% of the female executives had family history of hypertension. 24.7% of the study subjects smoked tobacco regularly. 2.9% of the study subjects consumed chewed tobacco regularly. Majority of the study subjects (44.5%) consumed alcohol regularly. 44.5% of the study subjects were sedentary workers. (Table 1)

A significant association was observed between advancement of age and prevalence of diabetes mellitus. Odds ratio was 2.92 (95% CI: 35–13.33) for the age group 30 to 40 years, 7.77 (95% CI: 1.0–28.5) for the age group 40–50 years and 15.6 (95% CI: 1.95–59.74) for the age group 50–60 years. The risk of developing diabetes mellitus was 1.77 times (C.I: 0.67–4.71) more amongst males than the females. But it was not statistically significant. Persons having positive family history of hypertension showed a risk of developing diabetes mellitus 2.45 times (CI: 1.38–4.34) more than that of persons with no positive family history of hypertension. The association between family history of hypertension and prevalence of diabetes mellitus was found to be statistically significant (p < 0.01). Persons having positive family history of diabetes showed a risk of developing diabetes mellitus 8.66 times (C.I: 4.67–16.08) more than that of persons with no positive family history of diabetes. A significant association was observed between family history of diabetes mellitus and prevalence of diabetes mellitus (p < 0.001). The odds of having diabetes mellitus were 1.23 times more amongst regular tobacco

Table 1
Prevalence of risk factors.

Parameter	Male No. (%)	Female No. (%)	Total No. (%)
Age(in years)			
20–29	29 (10.7%)	1 (2.6%)	30 (9.7%)
30–39	58 (21.5%)	7 (18.4%)	65 (21.1%)
40–49	121 (44.8%)	21 (55.3%)	142 (46.1%)
50–59	62 (23.0%)	9 (23.7%)	71 (23.1%)
Family history of DM			
Absent	187 (69.3%)	31 (81.6%)	218 (70.8%)
Present	83 (30.7%)	7 (18.4%)	90 (29.2%)
Family history of hypertension			
Absent	191 (70.7%)	23 (60.5%)	214 (69.5%)
Present	79 (29.3%)	15 (39.5%)	94 (30.5%)
H/O Smoking			
No	183 (67.8%)	38 (100.0%)	221 (71.8%)
Regular	76 (28.1%)	–	76 (24.7%)
Occasional	2 (0.8%)	–	2 (0.6%)
Ex-smoker	9(3.3%)	–	9 (2.9%)
H/O Tobacco intake in chewed form			
No	256(94.8%)	37 (97.4%)	293 (95.1%)
Regular	8 (3%)	1 (2.6%)	9 (2.9%)
Occasional	1 (0.3%)	–	1 (0.3%)
Ex- Tobacco chewer	5 (1.9%)	–	5 (1.6%)
Alcohol intake			
No	98 (36.3%)	33 (86.9%)	131 (42.5%)
Regular	133 (49.3%)	4 (10.5%)	137 (44.5%)
Occasional	32 (11.8%)	1 (2.6%)	33 (10.7%)
Ex drinker	7(2.6%)	–	7(2.3%)