

PREVALENCE AND RISK FACTORS OF DIABETES AMONG BANK EMPLOYEES OF MEERUT DISTRICT

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ABSTRACT

Introduction: Diabetes mellitus, a lifelong disease is achieving pandemic proportions. Even in India its prevalence is on the rise making our country the diabetic capital or the world. Many studies have found that sedentary lifestyle and increased mental stress are risk factors for diabetes. The job of bank employees is both sedentary in nature and accompanies high levels of mental stress. With this background the present study was conducted with the following objective. **Objective:** To find out the prevalence and associated risk factors of diabetes among bank employees of Meerut district. **Methodology:** A Cross-sectional study was conducted and all the employees (n=200) of 7 banks of urban area of Meerut district were studied. Along with collecting information about their biosocial characteristics, their weight, height, blood pressure, fasting plasma glucose was measured and recorded. Data was analyzed by SPSS 11.5 for Windows. Statistical test employed was Chi-square test for proportions. **Results:** Prevalence of diabetes mellitus was found to be 20%. Diabetes was significantly associated with age >45 years, waist circumference, body mass index (BMI), type of diet and hypertension. The findings of the present study highlight the high disease burden among bank employees. **Suggestions:** It is therefore strongly suggested that all bank employees especially above 45 years of age should be put on high-risk approach for the secondary prevention of diabetes.

Keywords: *diabetes, bank employees, prevalence, BMI, hypertension*

INTRODUCTION

Diabetes mellitus is a chronic disease that has been known since ancient times. This disease is found long back in Indian Vedic literature when Susruta (5th century B.C.) described this disorder as 'Madhumeha' meaning 'honey-urine'. World Health Organization (WHO) defines the term diabetes mellitus as- 'a metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both'. Non-communicable diseases associated with changes in lifestyle and diet has become a major public health problem in both the developed and developing countries. Diabetes is at the forefront of non-communicable diseases¹. According to WHO, the latest estimate (for the number of people with diabetes worldwide, in 2000) is 171 million. This will increase to about 366 million by 2030. It is estimated that South-East Asia countries will become the most challenged region in the world and it will bear the maximum global burden of the disease in the initial decades of the 21st century². Until the 1970s it was believed that India had a low prevalence of diabetes compared to many Western countries.

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The National Urban Diabetes Survey (NUDS) was the first truly national study of diabetes to be carried out in six major Indian cities covering all regions of the country. The prevalence ranged from 9.3% to 16.6%³. With this it is expected that 20 percent of the diabetic patients worldwide would reside in India making it the diabetic capital of the world.

Annual report 2003-2004 states that during the tenth five year plan, efforts will be made to improve preventive, promotive, curative and rehabilitative services for non-communicable diseases throughout the country at all levels of care so as to reduce morbidity and mortality. One of the areas of major thrust will be creation of an epidemiological database in noncommunicable diseases implementing, cardiovascular diseases, stroke and diabetes³. Thus it is essential an attempt is made to assess the magnitude of diabetes in high-risk groups and take steps to control and prevent it and provide appropriate care.

Objectives:

1. To assess the prevalence of diabetes mellitus among the bank employees of Meerut district.
2. To identify the associated risk factors of diabetes mellitus.
3. To suggest measures for the prevention and control of diabetes mellitus among them.

MATERIAL AND METHODS

This study was an institution-based cross-sectional study. In all seven banks from urban area of Meerut district were purposively selected based on their accessibility and all the bank employees belonging to officer as well as clerical grades were included in the study. The total sample size covered was 200. The period of the study was five months, from July 2007 to November 2007. Written permission was taken from the Managers of the respective banks for conducting the study. After explaining the respondents about the study procedure, verbal consent was taken for the study including their fasting plasma glucose estimation. Information regarding their biosocial characteristics, their type of diet, and family history of diabetes was recorded in a predesigned and pretested schedule.

Also their weight, height, blood pressure was measured and recorded. Blood pressure was classified on the basis of Seventh Joint National Committee on Hypertension (JNC-VII) criteria. For measuring blood pressure two readings were taken and the lower reading was recorded (mercury sphygmomanometer was used). Subjects having Systolic Blood Pressure ≥ 160 mmHg or Diastolic Blood Pressure ≥ 95 mmHg or on hypertensive medications were classified as hypertensive (JNC-VII criteria). Body Mass Index (BMI) ≥ 30 kg/m² was considered obese and Waist circumference (for men ≥ 102 cm and for women ≥ 88 cm) was considered obese. The respondents were explained about the fasting blood test to be done the next morning and were requested to be in at least 8 hours fasting state. Fasting was defined as no calorie intake for at least last 8 hours. The next morning at the preappointed schedule, the investigator tested the Fasting Plasma Glucose level, using a glucometer. Classification of diabetes was done on the basis of WHO (1999) criteria, according to which Fasting Plasma Glucose ≥ 126 mg/dl and FPG ≥ 110 mg/dl are categorized as diabetic, impaired fasting glycemic and normoglycemic respectively⁵. Those on hypoglycemic drugs/insulin were classified as diabetic.

Statistical Analysis: Data was entered in MS Excel and analyzed using the software SPSS 11.5 for Windows. The prevalence rates are given as percentages and 95% confidence intervals were estimated. Discrete data was analyzed using Pearson's Chi-square test for difference in proportions (Fischer's exact test in case if the expected count in any cell was less than 5) Two tailed p-values less than 0.05 were considered significant.

RESULTS AND DISCUSSION

Among the 200 bank employees studied 40 (20%) were found to be diabetic, 17 (8.5%) were having impaired fasting glycemia and 143 (71.5%) were normoglycemics. Ramachandran A *et al*⁶ reported from a national urban diabetes survey

conducted in six major cities of India covering all regions that the prevalence of diabetes ranges between 9.0% to 16.6%, the average being 12.1%.

Table 1: Association of diabetes prevalence with certain biosocial characteristics and risk factors

| Biochemical characteristics | | No. of patients | | No. of Diabetics | | Statistical value |
|-----------------------------|-----------------------|-----------------|------|------------------|------|---|
| | | No. | % | No. | % | |
| Age | <45 yrs | 61 | 31.0 | 3 | 4.8 | $\chi^2=12.9$; df=1; p=<0.005** |
| | ≥45 yrs | 138 | 69.0 | 27 | 26.8 | |
| Sex | Male | 176 | 88.9 | 34 | 19.3 | |
| | Female | 24 | 12.0 | 6 | 25.0 | |
| Occupational grade | Clerical | 68 | 34.0 | 11 | 16.2 | $\chi^2=0.94$; df=1; p=>0.05 |
| | Officer | 132 | 66.0 | 29 | 22.0 | |
| Religion | Hindu | 183 | 91.5 | 36 | 19.7 | Chi-square test not applied due to very low values in cells |
| | Muslim | 4 | 2.0 | 2 | 50.0 | |
| | Sikh | 2 | 1.0 | 0 | 0.0 | |
| | Christian | 9 | 4.5 | 2 | 22.2 | |
| | Others | 2 | 1.0 | 0 | 0.0 | |
| Caste | General | 144 | 72.0 | 34 | 23.6 | $\chi^2=3.944$; df=2; p=>0.05 |
| | OBC | 12 | 6.0 | 0 | 0.0 | |
| | SC/ST | 44 | 22.0 | 6 | 13.6 | |
| Types of Family | Nuclear | 145 | 72.5 | 29 | 20.0 | $\chi^2=0.00$; df=1; p=>0.05 |
| | Joint | 55 | 27.5 | 11 | 20.0 | |
| RISK FACTORS | | | | | | |
| Type of diet | Vegetarian | 172 | 86.0 | 30 | 17.4 | $\chi^2=5.025$; df=1; p=<0.05** |
| | Non-vegetarian | 28 | 14.0 | 10 | 35.7 | |
| Smoking | Never used | 149 | 74.5 | 29 | 20.0 | $\chi^2=1.05$; df=1; p=>0.05 |
| | Ever used | 51 | 25.5 | 11 | 20.0 | |
| Alcohol | Never used | 129 | 64.5 | 24 | 18.6 | $\chi^2=0.442$; df=1; p=>0.05 |
| | Ever used | 71 | 35.5 | 16 | 22.5 | |
| Body Mass Index | <30 kg/m ² | 172 | 86.0 | 29 | 19.5 | $\chi^2=7.569$; df=1; p=<0.05** |
| | ≥30 kg/m ² | 28 | 14.0 | 11 | 21.6 | |
| Waist circumference | Obese | 61 | 30.5 | 19 | 31.1 | $\chi^2=6.817$; df=1; p=<0.05** |
| | Non-obese | 139 | 69.5 | 21 | 15.1 | |
| Blood pressure | Hypertensive | 139 | 69.5 | 33 | 23.7 | $\chi^2=3.986$; df=1; p=<0.05** |
| | Non-hypertensive | 61 | 30.5 | 7 | 11.6 | |
| Family history of diabetes | Present | 58 | 29.0 | 20 | 34.5 | $\chi^2=10.709$; df=1; p=<0.05** |
| | Absent | 142 | 71.0 | 20 | 14.1 | |

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Indian Council of Medical Research⁷ did a meta-analysis for estimating the prevalence of diabetes in India after reviewing the prevalence studies from 1990-2002, which included six studies from urban areas, and they found that the prevalence of diabetes was higher in urban areas than in rural areas. Table 1 shows the association of diabetes with certain biosocial characteristics as well as certain risk factors. In the present study, diabetes prevalence was more among females as compared to males, but the difference was not statistically significant. Majority of the epidemiological surveys show a greater male preponderance world wide as well as among the Indian diabetics. However in some areas there has been an increased female prevalence. The situation in India that has come to light in community-based studies has shown the general trend world wide of increased male involvement (Ramachandran *et al*⁸ and Nadeem *et al*⁹). Females are under more mental stress as compared to males as they have to balance their professional as well as family responsibilities, which may to some extent explain the increased female preponderance in our study.

Prevalence of diabetics was significantly more (26.8%) among those <45 years age group. In a study conducted by Nadeem *et al*⁹, in a district of Northern India to assess the epidemiological pattern of diabetes in high risk age groups (> 45 years of age), it was observed that maximum prevalence of diabetes mellitus (11.01%) was in the age group of 56-60 years. Wild S *et al*¹⁰ in a study on Global Prevalence of Diabetes: Estimates for the year 2000 and projections for 2030, has demonstrated the importance of age on the prevalence of diabetes. Occupational grade and type of family were not significantly associated with prevalence of diabetes. Among the other risk factors analyzed, non-vegetarian diet, increased BMI, increased waist circumference, hypertension and family history of diabetes were significantly associated with diabetes prevalence. Alcohol use and smoking were not found to be significantly associated with diabetes prevalence. Also the prevalence of hypertension was found to be quite high (69.5%) among the study subjects.

Our study showed an increased prevalence of diabetics among non-vegetarians as compared to vegetarians. American Dietetic Association; Dietitians of Canada concluded that appropriately planned vegetarian diets are healthful, nutritionally adequate, and provide health benefits in the prevention and treatment of certain diseases. Vegetarians have been reported to have lower body mass indices than non-vegetarians, and lower rates of type 2 diabetes¹¹. Nadeem *et al* have reported similar findings from their study done in Northern India⁹.

In the present study, diabetes prevalence was more among ever smokers as compared to never-smokers and also the same pattern was observed among ever alcoholics and never alcoholics, although these differences were not statistically significant. Aguilar-Salinas CA *et al* in their study on the characteristics of patients with type 2 diabetes in Mexico found that tobacco smoking was more frequent in the diabetic group (34% vs 29%; OR: 1.22; 95%CI:1.13-1.31)¹². Carlsson S *et al* in their study on type 2 diabetes mellitus among middle aged Swedish men found that heavy alcohol consumption significantly increases the risk of type 2 diabetes¹³. Further extensive studies including duration and quantities of alcohol and smoking are needed to study their impact on diabetes prevalence among bank employees. Obesity (both increased BMI and increased waist circumference) was significantly associated with diabetes prevalence. Ramachandran A *et al*, Nadeem *et al* have in their studies reported a significant association of diabetes prevalence with BMI and waist circumference.

Hypertension was significantly associated with diabetes prevalence in our study. The prevalence of diabetes mellitus has been shown to be significantly associated with hypertension ($p < 0.001$) in a study conducted in Northern India by Nadeem *et al*⁹. Gupta A *et al* in their study on the prevalence of diabetes in an urban Indian Population reported that those with hypertension were significantly associated with diabetes prevalence ($p < 0.01$)¹⁵. High blood pressure in diabetics hints at syndrome X or the metabolic syndrome which includes hypertension, hyperglycemia, obesity and hyperlipidemia. A positive family history of diabetes was significantly associated with diabetes prevalence in our study. Nadeem *et al*⁹, Gupta A *et al*¹⁵ from their studies done in India and Colagiuri S *et al*¹⁶ in their study on the prevalence of diabetes in the kingdom of Tonga, one of the many Pacific islands, reported similar findings.

Intervention: After completing the study, a meeting of all bank employees was called in their bank headquarters which was attended by even regional and general managers of the banks. The findings were discussed and a 2 hour session was conducted to motivate them for adopting healthy lifestyles. Visibly motivated employees promised to start walking, limit calories and start yoga. Though we have not quantified the impact of our intervention but anecdotal incidents are being reported where a drastic change has taken place in lifestyles of some of the bank employees.

CONCLUSIONS AND SUGGESTIONS

The prevalence of diabetes mellitus came out to be a whopping 20% among the bank employees of urban area of Meerut district reflecting the high burden of diabetes among bank employees. Bank employees, with a job demanding a complete sedentary and mentally stressed life are at an increased risk of being diabetic. This has also been shown in our study as the diabetes prevalence in our study was about two-fold than that reported from population-based studies. While nothing can be done about non-modifiable risk factors such as age and a hereditary predisposition; but modifiable risk factors like BMI, waist circumference, dietary patterns, level of physical activity and mental stress can be modified so that risk of diabetes can be reduced. Studies on non-communicable diseases, focused on such occupational groups are rarely reported in our country and more of such studies are needed. Special programmes, integrating promotive, preventive and curative care for bank employees are required urgently.

REFERENCES

1. Amos AF *et al*: The rising global burden of diabetes and its complications: Estimates and projections to the year 2010: *Diabet Med* 1997, (Suppl. 5): S1-S85
2. Ekoe JM. Recent trends in prevalence and incidence of diabetes mellitus syndrome in the world. *Diabetes research and clinical practice*, 1986, 1: 249-64
3. Annual Report 2003-04; Planning Commission, Ministry of Health and Family Welfare, Government of India, Available from <http://planningcommission.nic.in/plans/planrel/fiveyr/welcome.html> accessed on 11th September 2005.
4. World Health Organization, Technical Report Series No. 916; WHO 2003.
5. World Health Organization, Definition, Diagnosis and Classification of Diabetes Mellitus; its risks and complication; Report of a WHO Consultation 1999.
6. Ramachandran A *et al*, High prevalence of diabetes and impaired glucose tolerance in India: National Urban Diabetes Survey. *Diabetologia*, 2001 Sep; 44(9): 1094-101.
7. Indian Council of Medical Research 2004. Assessment of Burden of Non-Communicable diseases; Final Report of project WR/SE IND RPC 00IRB02-SE/02/419575. ICMR, New Delhi, India
8. Ramachandran A, Snehalatha C, Dharmaraj D *et al*. Prevalence of glucose intolerance in Asian Indian: Urban-rural difference and significance of upper body obesity. *Diabetes Care* 1992; 15:1348-55
9. Nadeem *et al*. An epidemiological study of Diabetes Mellitus amongst high risk age, group population in urban and rural areas of Kanpur. *Indian J Community Health* 2003 vol 15, No.2, July-Dec.:31-35
10. Wild S *et al*. Global prevalence of diabetes: Estimates for the year 2000 and projection for 2030. *Diabetes Care* 2004; 27 (5): 1047-53.
11. American Dietetic association, Dietitians of Canada. Position of the American Dietetic Association and Dietitians of Canada: vegetarian diets. *Can J Diet Pract Res* 2003; Summer 64(2):62-81
12. Aguilar Salinas *et al*. Characteristics of patients with type 2 diabetes in Mexico. *Diabetes Care* 2002; 25: 1551-1556
13. Carlsson S, Hammer n *et al*. Alcohol consumption, type 2 diabetes and impaired glucose tolerance in middle aged Swedish men. *Diabet Med* 2000; 17:776-781
14. Ramachandran A *et al*. Temporal changes in the, prevalence of diabetes and impaired glucose tolerance associated with lifestyle transition occurring in the rural population in India. *Diabetologia* 2004 May; 47(5): 860-5
15. Gupta A *et al*. Prevalence of diabetes, impaired fasting glucose and insulin resistance syndrome in an urban Indian population. *Diabetes Res Clin Pract* 2003; Jul 61(1): 69-76.
16. Colagiuri S *et al*. The prevalence of diabetes in the kingdom of Tonga. *Diabetes Care* 2002, 25: 1378-1383.
