Research Article

Prevalence and associated risk factors of Diabetes Mellitus in Age group 20 and above in the rural area attached to our medical college

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Abstract

Background: Diabetes in adults is now a global health problem, Projections related to diabetes are often based on one or two available studies. To make these figures more robust, it is necessary to have more studies. This paper contributes new data on the prevalence of diabetes and IGT. This was a cross sectional study involving 600 subjects aged 20 years and above (300 males and 300 females) conducted in the rural field practice area of the concerned medical college. To assess the prevalence and the associated risk factors for DM (in the age group 20 and above). **Result:** The total prevalence of diabetes was 4.67% and was higher among males as compared to females. (4 % females and 5.3 % males). Prevalence of Pre-diabetes in our study is 3%. The prevalence of diabetes increased significantly with advancing age and this difference was found to be statistically highly significant. The prevalence of obesity was highest in diabetics, and further decreased among pre-diabetics and non-diabetics. This difference was found to be statistically highly significant. Similar results were obtained with central obesity also. Family history of diabetes was present in 12% subjects, being more common in patients with diabetes and high risk subjects i.e. pre-diabetic. This difference was found to be statistically highly significant. Diabetes was more prevalent in higher social class, higher percentage of them were addicted to alcohol while tobacco addiction was similar in diabetics and non diabetics. Diabetic subjects were involved less in moderate activity as compared to non diabetics and more of light activity was seen among diabetics as compared to non diabetics. **Conclusion:** The study suggests that prevalence of diabetes is on an increase even in rural areas with occurrence even in the younger age group. There are associated risk factors as obesity, addiction to alcohol, and physical activity which are modifiable risk factors and if taken care of can help in controlling this epidemic of diabetes. Besides we have certain non modifiable risk factors contributing to this disease as family history of diabetes and social class.

Keywords: Diabetes, Pre-diabetes, Central Obesity, Physical activity.

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Received Date: 26/11/2014 Accepted Date: 14/12/2014

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 15 December 2014

INTRODUCTION

DM (Diabetes Mellitus) refers to a group of common metabolic disorders that share the phenotype of hyperglycaemia. It is a chronic, debilitating and costly disease associated with severe complications which poses severe risks for families and can go unnoticed and undiagnosed for years. It is now increasingly found in young adults too. Today, there are 382 million people living with diabetes - 8.3% adults. A further 316 million with impaired glucose tolerance (IGT) are at high risk from the disease – an alarming number that is set to reach 471 million by 2035. Diabetes is on the rise all over the world and countries are struggling to keep pace. In 2013, roughly half of all deaths due to diabetes in adults were in people under the age of 60, and in less-developed regions like sub-Saharan Africa, that proportion climbs to 75%.[1] There is still a misconception held by some that diabetes is 'a disease of the wealthy'– to the detriment of desperately needed funding to combat the pandemic. But evidence published in the IDF Diabetes Atlas proves that a staggering 80% of people with diabetes live in low- and middle-income countries, and that the socially

How to site this article: S Mangal, M Khatri, M Mangal, A Nagar. Prevalence and associated risk factors of Diabetes Mellitus in Age group 20 and above in the rural area attached to our medical college. *International Journal of Recent Trends in Science and Technology* December 2014; 13(2): 368-372 http://www.statperson.com (accessed 17 December 2014).

disadvantaged in any country are the most vulnerable to the disease.[1] Building on the momentum of the 2011 UN Political Declaration on non-communicable diseases (NCDs), the 66th World Health Assembly in May 2013 saw the unanimous adoption by Member States of a voluntary Global Action Plan for the prevention and control of NCDs. Thus, Diabetes is now prominent on the global health agenda. India has the largest population of diabetics, trailing only China, according to the International Diabetes Federation. The disease affects more than 65.1 million Indians (between 20-79 yrs.) - 9% of the nation's adults; which is projected to be 109 million by 2035 - and kills about 1 million Indians a year.[1] It is estimated that 8.2% of the adult population of South East Asia Region (SEAR) area, or 72.1 million people, have Diabetes, and is likely to double by 2035 to 123 million (10.1% of adult population in SEAR)[2] According to the World Economic Forum's 2009 report, non-communicable diseases are among the most severe threats to global economic development, more likely to be realized and potentially more detrimental than fiscal crises, natural disasters, or pandemic influenza. In observational[3] and intervention studies[4,5], obesity and physical inactivity represent the most important modifiable risk factors for DM. Indeed, in subjects with pre-diabetes[4,5] lifestyle intervention significantly and cost effectively reduced the incidence of DM, thus justifying the implementation of population based strategies for identifying and treating high-risk individuals.

Projections such as these are often based on one or two available studies. To make these figures more robust, it is necessary to have more studies. This paper contributes new data on the prevalence of diabetes and IGT.

MATERIAL AND METHODS

Diabetes Mellitus, the commonest form of diabetes, is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period[6]. This high blood sugar produces the symptoms of frequent urination, increased thirst, and increased hunger. Type 2 DM begins with insulin resistance, a condition in which cells fail to respond to insulin properly[7]. As the disease progresses a lack of insulin may also develop[8]. This form was previously referred to as "non-insulin-dependent diabetes mellitus" (NIDDM) or "adult-onset diabetes". The primary cause is excessive body weight and not enough exercise[7]

WHO projects it will be the 7th leading cause of death in 2030.[9]

This was a cross sectional study conducted in the rural field practice area of our medical college. The study population included subjects in the age group 20 years and above i.e. 300 males and 300 females (excluding pregnant females). Simple random sampling was used. All those who consented to participate in the study till a sample of 600 was obtained. We used a pre-structured, pretested questionnaire.

Fasting blood glucose level

was noted down with the help of a glucometer. From the randomly selected households the prevalence of Diabetes (known and unknown) and its associated risk factors was estimated. Subsequently their blood glucose samples were taken, if they were fasting or if not so they were advised to remain so next morning and sample was then taken in the morning after an overnight fast of at least 8 hours to screen for undiagnosed Diabetes with the help of glucometer. The individuals were subjected to anthropometric data assessment (height, weight, waist and hip circumference), physical activity, socioeconomic status (SES), smoking and alcohol intake, were obtained using a standardized questionnaire by a structured interview. Blood samples were drawn by the method of finger pricking for the determination of blood glucose.

1. FPG <110 mg/dl (6.1 mmol/l) = normal fasting glucose;
2. FPG 110–125 mg/dl (6.1–6.9 mmol/l) = IFG (impaired fasting glucose) - impaired fasting glucose is not a clinical entity in its own right, but rather risk category for cardiovascular disease and/or future diabetes.
3. FPG ≥126 mg/dl (7.0 mmol/l) = provisional diagnosis of diabetes[10]

In the case of fasting plasma glucose (FPG) > 126mg /dl a second determination was performed. In addition, subjects with previous history or who were taking oral hypoglycaemic agents or insulin were considered to have DM. Subjects with known diabetes were not tested for FPG. The Weight was measured by an electronic digital weighing machine to the nearest 0.1kg Height, Waist circumference, Hip circumference were measured using a measuring tape. Height was measured in “m” from the highest point of head (vertex) to heel without footwear. Waist was measured in “cm” at the mid-point between the lower border of the rib cage and iliac crest. Hip measurement was done in “cm” at the level of maximum convexity of the gluteal region. The body mass index (BMI) was calculated using the formula weight (Kg) / height (m^2). The waist-hip ratio (WHR) was calculated using the formula waist (cm) /hip (cm) Blood pressure was recorded in the sitting position in the left arm to the nearest 2 mm Hg with a mercury sphygmomanometer. Two readings were taken 5 minutes apart and the mean of the two was taken as the blood pressure.

Classification of blood pressure for adults[11,12]

Category	systolic, mm Hg	diastolic, mm Hg
Hypotension	< 90	< 60
Desired	90–119	60–79
Prehypertension	120–139	80–89
Stage 1 hypertension	140–159	90–99
Stage 2 hypertension	160–179	100–109
Hypertensive emergency	≥ 180	≥ 110

Over weight was defined as BMI≥25 and Obesity was defined as BMI≥30[13] and Central obesity according to the WHR being >0.85 (for males) and >0.9 (for females)[14] Socio - economic status was determined as per the classification devised by B.G. Prasad on the per capita income of the family. The modified classification (Rahul S. Revision of Prasad's social classification and provision of an online tool for real-time updating. South Asian J Cancer. 2013 Jul-Sep; 2[3]: 157.)[15] was used for determining the socio-economic status of subjects under survey. Physical activity level was graded as light, moderate and heavy based on the physical activity questionnaire, which included job related and leisure time activities and specific questions on exercise.

OBSERVATIONS

Table 1: Prevalence of Diabetes Mellitus according to Age and Sex

Age Group (years)	No. of Patients/Population (%)		Total no. of Patients/Population (%)
	Male	Female	
20-40	2/220 (0.9%)	4/240 (1.7%)	6/460 (1.3%)
40-60	10/64 (19.2%)	4/38 (8%)	14/102 (13.7%)
>60	4/16 (25%)	4/22 (18.2%)	8/38 (21%)
Total	**16/300 (5.3%)**	**12/300 (4%)**	**28/600 (4.67%)**

Males v/s females - (x^2 =0.337, df = 1, p = 0.561).
Between ages - (x^2 =53.43, df = 2, p = 0.00).

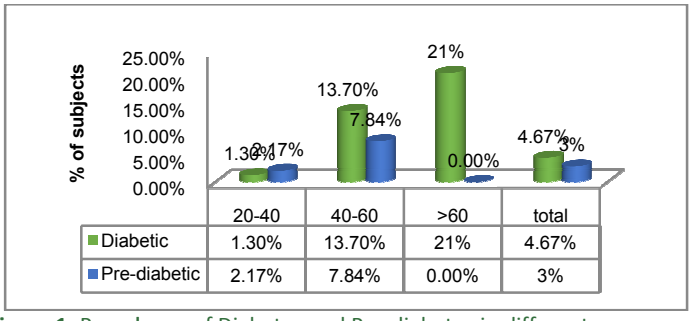

Figure 1: Prevalence of Diabetes and Pre-diabetes in different age groups

Table 2: Prevalence of obesity in diabetic, pre-diabetic and normal subjects

	Diabetics (n=28)	Pre-diabetics (n=18)	Non-diabetics (n=554)	Total (n=600)
Over weight + Obese individuals (BMI≥25)	18 (64.3%)	10 (55.5%)	120 (21.7%)	148 (24.7)
Central obesity [WHR> 0.85 (F) and >0.9 (M)]	26 (92.8%)	14 (77.7%)	278 (50.2%)	318 (53%)

(x^2 =39.9, df = 2, p = 0.000) (Obesity) (x^2 =49.109, df = 2, p = 0.000). (Central obesity)

Table 3: Prevalence of family history of diabetes in Diabetic, Pre-diabetic and non-diabetic subjects

	DM (FPG>126mg/dl)	Pre-Diabetic (FPB 110-126mg/dl)	N-DM (FPG <110mg/dl)	Total
Family history of DM	8(28.57%)	4(22.22%)	60(10.8%)	72(12%)
No history of DM	20(71.4%)	14(77.78%)	494 (89.17%)	528(88%)
Total	**28 (100%)**	**18 (100%)**	**554 (100%)**	**600 (100%)**

(x^2 =10.043, df = 2, p = 0.007)

Table 4: Prevalence of risk factors/ addictions

	Diabetics (n=28)	Non-diabetics(n = 572)	Total (n = 600)
Alcoholics	2 (7%)	23 (4%)	25 (4.2%)
Tobacco users	6 (21.4%)	126 (22%)	132 (22%)

Table 5: Distribution according to physical activity

	Diabetic (n = 28)	Non-diabetic (n=572)
Light	6 (21.4%)	58(10.1%)
Moderate	22 (78.6%)	498 (87%)
Heavy	0	16(2.7%)

RESULT AND DISCUSSION

Diabetes in adults is now a global health problem, and populations of developing countries, minority groups, and disadvantaged communities in industrialized countries now face the greatest risk. This was a cross sectional study involving 600 subjects aged 20 years and above (300 males and 300 females) conducted in the rural field practice area of the concerned medical college. The total prevalence of diabetes in our study was 4.67% and it was higher among males as compared to females (4 % females and 5.3 % males) age [Table 1], although difference was not statistically significant. The prevalence of diabetes increased significantly with advancing age (13.7% vs. 21 %, for 41-60 vs. > 60 years). This difference was found to be statistically highly significant. 4.33% of subjects were known diabetics while 0.33% were newly diagnosed. Mean age at diagnosis was 45.9 yrs (48.6 for males and 42.2 for females.) The prevalence of diabetes increased significantly with advancing age [Table 1]. Indeed there was more than 1.5 times increase in the prevalence of diabetes after the age of 60 years (13.7% vs. 21 %, for 40-60 vs. > 60 years). This difference was found to be statistically highly significant (x2 =53.43, df = 2, p = 0.00). Jonas JB, *et al.*[16] Observed in rural India. Mean age was 48.0 ± 13.7 years. Prevalence of diabetes was similar for men and women, and rose with age in both. Ahmad J. *et al*[17]. In a study in Kashmir Valley, found the prevalence of DM was 6.05%, with known DM being 4.03% of the study population and undiagnosed DM being 2.02% subjects. They also detected significant difference between males and females (3.6% vs 8.3%, p <0.05) and significant increase in the prevalence with increasing age (age 20-40 years: 3.02% vs > 60 years 16.66%, P<0.05). Rathod HK. *et al*[18] showed there was no association between gender and diabetes. MR Chhetri *et al*[19]. (2009) on a study among the elderly population in the Kathmandu Valley of Nepal detected an overall diabetes prevalence of 25.9%. which corresponds to ours. (21%). Gupta A. *et al*[20]. in a study among urban subjects in western India showed Diabetes was present in 70 men (13.2%) and 64 women (11.5%) which is more than our study as ours study population belongs to a rural area. Izharul Hasan *et al*[21] observed diabetes was in 11.12% and 10.87% of males and females respectively; the overall prevalence being 11% in Haridwar Uttrakhand. V. Mohan *et al.*[22] in urban South India showed crude prevalence of diabetes using WHO criteria as 15.5% (365/2, which comprised 6.1% known diabetic subjects (143/2,350) and 9.4% newly detected diabetic subjects. Ono K *et al*[23] in study in semi-urban population of Nepal also showed prevalence of diabetes increased with increasing age. In the present study prevalence of Pre-diabetes (impaired fasting glucose level) is 3% [Figure 1]. It is maximum in the 20-40 yr age group, and is decreasing as the age is increasing as more of diabetics are present in older age group. Anjana, R. M. *et al.*[2] showed the prevalence of pre-diabetes (impaired fasting glucose and/or impaired glucose tolerance) were 8.3%, 12.8%, 8.1% and 14.6% in Tamil Nadu, Maharashtra, Jharkhand, and Chandigarh respectively. Reason for lower prevalence in our study can be due to low prevalence of diabetes in our area. While in a study by Ono K *et al*[23]. The prevalence of pre-diabetes was increasing with age. The prevalence of obesity in the entire study population was 24.7%. It was highest in diabetics, and further decreased among pre-diabetics and non-diabetics. (64.3%, 55.5% and 21.7% respectively). This difference was found to be statistically highly significant. Further more central obesity was observed in 53% of study population which shot up to 92.8% in patients with diabetes, decreasing to 77.7% among pre-diabetics and further decreasing to 50.2% among non-diabetics. This difference was also found to be statistically highly significant. [Table 2] Family history of diabetes was present in 12% subjects, being more common in patients with diabetes (28.57%) and high risk subjects i.e. pre-diabetic (22.2%).This difference was found to be statistically highly significant. Family history of HT was present in 17% of subjects and was not much related to presence of DM. [Table 3]. Diabetes was more prevalent in higher social class. 42.8%, 14.3%, 28.6% in class I, II and III respectively and 7.2% in Classes IV and V. Higher percentage of them were addicted to alcohol while tobacco addiction was similar in diabetics and non diabetics. (Table - 4) Diabetic subjects were involved less (78.6%) in moderate activity as compared to non diabetics (87%) and more of light activity (21.4%) was seen among diabetics as compared to non diabetics (10.1%). Although difference was not found to be statistically significant. (Table – 5) Ahmad J. *et al*[17] Also, observed central obesity and family history were significantly associated with the presence of DM. Katulanda P *et al*[25]. Also observed those with diabetes and pre-diabetes compared with normal glucose tolerance were older, physically inactive, and had a family history of diabetes. They had higher body mass index, waist circumference, waist-hip ratio. Gupta A. *et al*[20] also observed those with diabetes had significantly greater prevalence of obesity, central obesity, hypertension Mohan V. *et al*[26] showed urban residents with abdominal obesity and sedentary activity had the highest prevalence of self-reported diabetes. Rathod HK. *et al*[18] found overweight status was associated with diabetes, Similarly abnormal waist hip ratio was associated with diabetes: Also family history was strongly associated with diabetes.

CONCLUSION

The total prevalence of diabetes in our study was found to be 4.67% and was higher among males as compared to females (4 % females and 5.3 % males), Prevalence of Pre-diabetes in our study was 3% which is also very high. The prevalence of diabetes is increasing significantly with advancing age. The present study shows a positive relationship of obesity, family h/o diabetes, social class, addiction to alcohol, and physical activity. The prevalence of diabetes mellitus is showing a rising trend in rural areas also, life style changes and aggressive control of the risk factors are urgently needed to tame this trend.

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Source of Support: None Declared
Conflict of Interest: None Declared