AN ASSESSMENT OF NEWLY DIAGNOSED CASES OF TYPE 2 DIABETES MELLITUS IN RURAL AND URBAN POPULATION

Medicine

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ABSTRACT

There are two types of diabetes seen in general population: Type 1 diabetes or juvenile-onset diabetes. It is usually caused by an auto-immune reaction where the body's defense system attacks the cells that produce insulin, and type 2 diabetes or non-insulin dependent diabetes or adult-onset diabetes. The number of patients with diabetes mellitus has increased four folds in the last three decades worldwide, and diabetes mellitus is the ninth main cause of mortality. Approximately 1 in 11 adults globally now present diabetes mellitus, 90% of them have type 2 diabetes mellitus. Asia is a major region of the rapidly growing type 2 diabetes mellitus global epidemic, with China and India the top two central points. Type 2 diabetes is now a common and serious global health problem, which, for most countries, has evolved in association with rapid cultural and social changes, ageing populations, increasing urbanization, dietary changes, reduced physical activity and other unhealthy lifestyle and behavioral patterns. Given the lifestyle differences in urban and rural population, it is of interest to know the status of type 2 diabetes mellitus in urban and rural population.

KEYWORDS

Type 2 diabetes mellitus, blood glucose, HBA1c

Introduction

The prevalence of diabetes is rapidly rising all over the globe at an alarming rate. [1] Over the last four decades, the status of diabetes has changed from being considered as a mild disorder of the elderly to one of the major causes of morbidity and mortality affecting the youth and middle aged people. [2] The number of patients with diabetes mellitus (DM) has increased four folds in the last three decades worldwide, and DM is the ninth main cause of mortality. Approximately 1 in 11 adults globally now present DM, 90% of them have type 2 diabetes mellitus (T2DM). Asia is a major region of the rapidly growing T2DM global epidemic, with China and India holding top positions. [3]

Type 2 diabetes is now a common and serious global health problem, which, for most countries, has evolved in association with rapid cultural and social changes, ageing populations, increasing urbanization, dietary changes, reduced physical activity and other unhealthy lifestyle and behavioural patterns [4]. Although, diabetes is generally considered a lifestyle disorder related with urbanization, however, recent studies have indicated that the prevalence of diabetes in rural population is not far behind. In a study done by Ahuja (ICMR) [5], the prevalence of diabetes in urban population was 2.1% as compared to 1.5% in rural population. In another assessment[6] of mixed urban and rural population, prevalence of known T2DM was as high as 6.1% whereas that of undiagnosed diabetes was 9.1%. The PODIS (Prevalence of Diabetes in India Study) study carried out in 49 urban and 59 rural centre revealed the prevalence of T2DM according to ADA criteria to be 4.7% in urban as compared to 2.0% in rural population.[7] The findings in effect indicate that the menace of diabetes is no more limited to urban areas only but is fast taking over the rural population. Given the lifestyle differences in urban and rural population, it is of interest to evaluate the newly diagnosed cases of T2DM from rural and urban areas.

MATERIAL AND METHODS

The present study was conducted for 18 months in the Department of Medicine, Era's Lucknow Medical College and Hospital, Lucknow. This study was carried out on newly diagnosed cases of T2 DM attending the Medical OPD or IPD wards of same institution. Simple purposive sampling method was performed and 100 patients (50 urban and 50 rural) (Table: 1) were included in the study. Approval for the study was obtained from Institutional Ethical Committee. Patients with Diagnosis of T2DM according to ADA criteria were selected and patients with diabetes diagnosed >3 months ago, critically ill patients and pregnant women were excluded from the study. Fasting, Post prandial blood sugar level, HBA1c and blood pressure were measured for all patients. All the patients falling in sampling frame were invited to participate and their informed consent was sought. A detailed medical, personal, family history, socioeconomic status, profession with clinical examination and investigations of the patients was recorded. The collected data were statistically analysed using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical analysis software. The values were represented in Number (%) and Mean±SD.

## RESULTS

Distribution of study subjects was as under:

Table 1: Distribution of Study Subjects

S.No.	Group	Habitat	Number of patients	Percentage
1-	Group I	Rural	50	50.0
2-	Group II	Urban	50	50.0

Table 2: Comparison of Demographic Variables in Study Population

| Variables	Group I (Rural) (n=50)		Group II (Urban) (n=50)		Total (N=100)	
	No.	%	No.	%	No.	%
Age Group (years)						
Upto 35	0	0.0	9	18.0	9	9.0
36-45	16	32.0	20	40.0	36	36.0
46-55	13	26.0	8	16.0	21	21.0
55-65	18	36.0	12	24.0	30	30.0
>65	3	6.0	1	2.0	4	4.0
	χ^2=12.835; p=0.012					
Mean age (Range)	53.44+8.77 (40-70)		46.70+10.41 (30-66)		50.07+10.16 (30-70)	
	't' = 3.502; p<0.001					
Gender						
Female	23	46.0	22	44.0	45	45.0
Male	27	54.0	28	56.0	55	55.0
	χ^2=0.040; p=0.841					
Occupation						
Business/ Shopkeeper	11	22.0	19	38.0	30	30.0
Farmer/Labourer	15	30.0	1	2.0	16	16.0
House Wife	22	44.0	17	34.0	39	39.0
Mechanic/ Driver	0	0.0	8	16.0	8	8.0
Officer/ Teacher	2	4.0	5	10.0	7	7.0
	χ^2=24.3; p<0.001					

Fig: 1
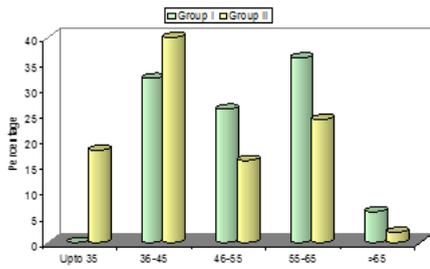
Proportion of newly diagnosed T2DM patients aged up to 35 yrs and 36-45 yrs was higher in urban population (18.0% and 40.0%) as compared to rural population (0% and 32.0%). Proportion of newly diagnosed T2DM patients aged 46-55 yrs, 55-65 yrs and >65 yrs was higher in rural population (26.0%, 36.0% and 6.0%) as compared to urban population (16.0%, 24.0% and 2.0%) and this difference was found to be statistically significant. It was observed that age of urban patients ranged between 30-66 yrs while that of rural patients ranged between 40-70 yrs, this indicate that urban patients were diagnosed T2DM at early age (46.70$\pm$10.41 yrs) as compared to rural patients (53.44$\pm$8.77 yrs) and this difference was found to be statistically significant (p<0.001). (Fig: 1) Out of 100 patients, 45 (45.0%) were females and 55.0% were males. Though, proportion of females from rural setup was high (46.0%) as compared to urban setup (44.0%) but this difference was not found to be statistically significant (p=0.841). (Table:2)

In Group I, maximum number of patients were housewives (44%) followed by farmers/laborers (30%), businessperson/shopkeepers (22%) and officers/ teachers (4%). In Group II, maximum number of patients were businessperson/ shopkeepers (38%), housewives (34%), mechanic/ driver (skilled labour) (16%), officer/teacher (10%) and farmer/labourer (unskilled labourer) (2%) respectively. Statistically, the difference between two groups was significant (p<0.001). (Table: 2) Majority of study population (87.0%) was not found with any chronic disease. Prevalence of chronic diseases in Group II (10.0%) was lower as compared to Group I (16.0%). Proportional differences in prevalence of past history of other chronic diseases such as CAD, CVA, TB in both the groups was not found to be statistically significant (p=0.236). (Fig: 2A)

Figure 2 A:
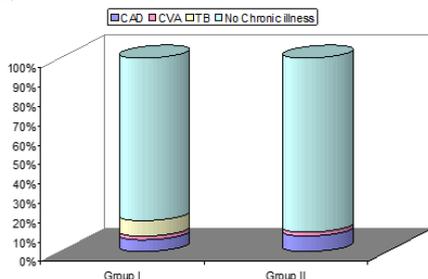
Majority of patients of both the groups were leading sedentary physical activity (Group I 54.0%; Group II 60.0%). Higher proportion of patients from rural set up (30.0%) as compared to Urban set up (2.0%) were involved in heavy physical activity while proportion of patients with moderate physical activity level were higher in Group II (38.0%) as compared to Group I (16.0%). Difference in proportion of patients leading moderate and heavy physical activity in both the groups was found to be statistically significant (p<0.001). (Fig: 2B)

Fig: 2B
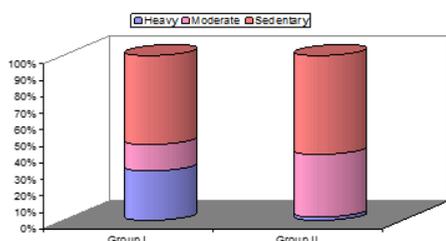
Majority of patients of Group II had family history of DM (52.0%) while only 24.0% patients of Group I had family history of DM. Family history of CAD was found in 8.0% of Group I and 6.0% patients of Group II. Family history of CVA was not found in any patient of Group I (0.0%) and 3 (6.0%) patients of Group II. (Fig 2C)

Fig: 2C
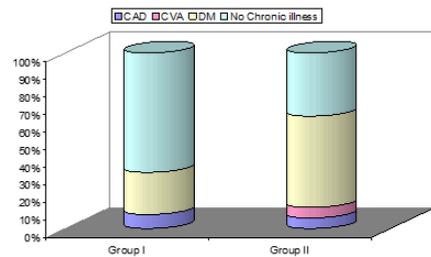
Majority of patients in both the groups had no adverse personal habit (Group I 54.0% and Group II 58.0%). Though proportional differences in prevalence of smoking and tobacco consumption in both the groups exist but this difference was not found to be statistically significant. (Fig: 2D)

Fig: 2D
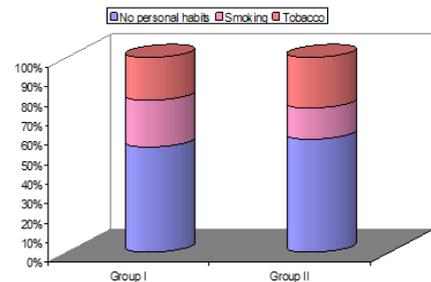
For all the parameters mean value of Group II females was higher as compared to Group I females and the difference between two groups was also significant statistically for all the parameters except height.

Table 3: Comparison of Blood Sugar Levels in Study Population

Blood Sugar levels	Group I		Group II		Statistical Significance	
	Mean	SD	Mean	SD	't'	'p'
Fasting (mg/dl)	197.60	82.32	185.88	58.10	0.822	0.413
Post prandial (mg/dl)	287.32	82.97	281.62	53.52	0.408	0.684
HbA1c (%)	7.58	0.99	7.86	1.08	-1.364	0.176

Figure 3
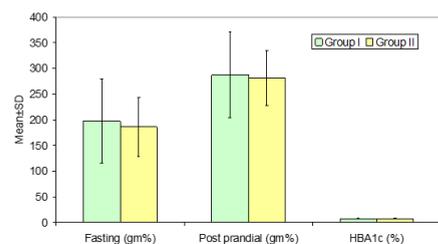
Though, fasting and post-prandial blood sugar levels of Group I (197.60$\pm$82.32 & 287.32$\pm$82.97 mg/dl) were found to be raised as compared to Group II (185.88$\pm$58.10 mg/dl & 281.62$\pm$53.52 mg/dl) but these differences were not found to be statistically significant (p=0.413; p=0.684). Though HbA1c of Group II (7.86$\pm$1.08%) was found to be higher than that of Group I (7.58$\pm$0.99 %) but this difference was not found to be statistically significant (p=0.176). (Table:3, Fig:3)

Systolic blood pressure of study population ranged between 100 and 210 with a mean of 140.11$\pm$22.20. Though systolic blood pressure of Group I (142.80$\pm$22.99 mm Hg) was found to be higher than Group II (137.40$\pm$21.28 mm Hg) but this difference was not found to be

statistically significant (p=0.224). (Table: 4) Diastolic blood pressure of study population ranged between 60 and 120 with a mean of 85.52±11.73. Though diastolic blood pressure of Group I (85.84±10.71 mm Hg) was found to be higher than Group II (85.20±12.78 mm Hg) but this difference was not found to be statistically significant (p=0.787). (Table:4)

Table 4: Comparison of Blood Pressure Variables in Study Population

	Mean	S.D.	Minimum	Maximum
Systolic blood pressure				
Group I	142.80	22.99	100	210
Group II	137.40	21.28	100	180
Total	140.11	22.20	100	210
	't'=1.224; p=0.224			
Diastolic blood pressure				
Group I	85.84	10.71	70	120
Group II	85.20	12.78	60	110
Total	85.52	11.73	60	120
	't'=0.271; p=0.787			

DISCUSSION

Diabetes is a disease that has evolved into a global epidemic. The epidemic proportions of DM can be estimated by the fact that it has started to affect the population which was considered to be otherwise at lower risk. One of the reasons for this is fast changes in lifestyle. Rural India, which was until recently considered to be less affected by this chronic disease has started to show a secular growth trend in terms of increasing prevalence and registration of new cases**.**[8] Reason for enrolling only newly diagnosed patients was first of all to identify the risk factors in view of newly diagnosed disease and also to clarify the delay in diagnosis of disease in rural environment, if any, in view of difference in prevalence of sometime-related diabetic complications.

Among different demographic variables, age emerged as a significant point of difference between two groups with majority of newly diagnosed patients from urban group being aged ≤45 years at the time of diagnosis (n=29; 58%) as compared to majority of patients from rural group being >45 years of age at the time of diagnosis (n=34; 64%). A mean difference of more than 7 years was observed between two groups with respect to age at diagnosis. This finding has two implications : (1) the diagnosis was made late in rural group as compared to urban group, (2) the protective role of rural environment helped to delay the manifestation of disease by more than 7 years. The first assumptions of ours is backed by the findings of Dong et al (2005)[9] who observed a higher rate of undiagnosed diagnosis of DM in rural group as compared to urban group. Keeping in view the poor healthcare facilities in rural settings, this could be a logical conclusion. The second assumption of ours gets thrust from the findings of Deo et al (2006)[10] who found that compared to general risk factors in urban population, increase in age is one of the significant factors affecting the T2DM prevalence in rural environment. Although, age itself is a reported risk factor for increased prevalence of T2DM yet in present study, a significant difference in age of two groups was observed based on environment.

In both rural as well as urban groups, majority of patients were males. Statistically, no significant difference was observed between two groups with respect to gender. Although, in epidemiological studies from India no difference in gender wise prevalence of diabetes has been reported[6] yet some studies carried out at tertiary care centers have shown almost equal proportion of females and males.[11] Few studies indicate ethnicity specific gender bias in prevalence of T2DM.[12, 13, 14] The findings in present study are similar to the findings of Shera et al (2007) who in a nationwide survey in Pakistan reported a higher prevalence of type 2 diabetes in men as compared to women.[13] However, in context to South Asians living in California, Choi et al (2013) reported the risk of type 2 diabetes to be 4.7 times higher in women as compared to men.[14] However, keeping in view of the national epidemiological studies, we consider the difference in gender proportion in present study to have its origin in difference in healthcare seeking behaviour of Indian women especially in context with an underprivileged population of rural and semiurban areas.

In present study, in rural area, housewives, farmers/labourers and businessmen/shopkeepers comprised the main affected occupational groups in that order, however, in urban area shopkeepers/businessmen,

housewives and skilled labourers comprised the main affected occupational groups in that order. Statistically, there was a significant difference between two groups with respect to occupational profile. Although farmers/labourers comprise an occupational group that is traditionally considered to have lower life-style related diabetic activity owing to their heavy activity profile yet the presence of these rural occupational groups as the major constituent of rural diabetic patients, it seems this traditional belief needs to be changed. Considering the heavy mechanization of farming and agriculture, it seems that activity profile related with these occupations is also changing and so is their proportion in affected population.

In present study, past medical history was almost nil in both the groups. With respect to physical activity level, the proportion of patients with heavy to moderate activity profile was significantly higher in rural group as compared to urban group. This could be one of the reasons for delayed onset of diabetes, in case increased physical activity is considered to have a positive impact on time of manifestation of diabetes, a finding reported in literature. [15,16]

CONCLUSION

Age of newly diagnosed T2DM patients ranged from 30 to 70 years. Mean age of patients from rural area was 53.44±8.77 years which was significantly higher as compared to that of urban area (46.70±10.41 years) (p<0.001). Majority of patients irrespective of group were males. No significant difference in gender of patients between two groups was observed (p=0.841). In rural area, housewives, farmers/labourers and businessmen/shopkeepers comprised the main affected occupational groups in that order, however, in urban area shopkeepers/businessmen, housewives and skilled labourers comprised the main affected occupational groups in that order. Statistically, there was a significant difference between two groups with respect to occupational profile. Majority of patients irrespective of group did not have a relevant medical history (CAD, CVA and TB). Though majority of patients in both the groups had a sedentary lifestyle yet in rural area, proportion of patients with heavy activity profile was significantly higher as compared to that of urban group (p<0.001). No significant difference between two groups was observed with respect to blood sugar (fasting and Post prandial) and HbA1c levels of two groups. There was no significant difference between two groups with respect to blood pressure levels. The findings of present study showed that rural patients, mainly housewives and patients with heavy activity profile present were found less diabetic.

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