

SCREENING FOR DIABETES MELLITUS AND ITS RISK FACTORS IN A RURAL VILLAGE OF VISAKHAPATNAM DISTRICT, ANDHRA PRADESH

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ABSTRACT

Background: Diabetes mellitus, one of the oldest diseases of mankind, is increasing in prevalence, and undergoing transition as a disease of urban to disease of rural areas.

Aims & Objectives: The study aims to screen the study population for diabetes mellitus and its risk factors in a village.

Materials and Methods: A community based cross-sectional study was conducted in a village (Chuchukonda) of Visakhapatnam district. Systematic random sampling was done and every 10th household of the village was screened. All the members of the household were examined clinically and subjected for fasting blood sugar and postprandial blood sugar.

Results: Total population covered was 260, of which 134 were males and 126 were females. Majority (87%) belong to backward community, and 50% were illiterates. 16% lead sedentary life. 12% of the males were alcoholics. 19% were overweight and 48% had chronic energy deficiency. Majority of the study population had mixed diet. 13 (5%) from the study population were tested positive for diabetes. Among those testing positives, median age of diabetics was 40.5 years. 69.2% had symptoms of diabetes mellitus. 15% had family history of diabetes mellitus, 38.5% had hypertension, 23% were overweight, 31% of diabetics were sedentary and 38.5% had other co morbid illnesses.

Conclusion: 13 (5%) from the study population tested positive for diabetes. Among those testing positive, median age of diabetics was 40.5yrs. 69.2% had the symptoms of diabetes mellitus, 15% had family history of diabetes mellitus and 38.5% had hypertension. Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use could prevent or delay the onset of diabetes.

Key Words: Diabetes Mellitus; Rural Areas; Screening; Risk Factors; Hypertension; Body Mass Index

Introduction

Diabetes is a condition primarily defined by the level of hyperglycemia giving rise to risk of micro vascular damage (retinopathy, nephropathy and neuropathy). It is associated with reduced life expectancy, significant morbidity due to specific diabetes related micro vascular complications, increased risk of macro vascular complications (ischemic heart disease, stroke and peripheral vascular disease), and diminished quality of life.^[1]

Diabetes is finally being recognized as a global epidemic with the potential to cause a worldwide healthcare crisis. Globally 346 million people currently have diabetes, which is estimated to double by 2030. The International Diabetes Federation (IDF) currently states that the top 5 countries with the highest amount of diabetic patients are China, India, United States, Russia and Brazil.^[2] Diabetes mellitus (DM) ranks twelfth in all-cause mortality worldwide.^[3] One percent of Disability Adjusted Life Years (DALY) is contributed by diabetes mellitus.^[4]

Over 30 million have now been diagnosed with diabetes

in India. Diabetes is also beginning to appear much earlier in life in India, meaning that chronic long-term complications are becoming more common. The implications for the Indian healthcare system are enormous.^[5] In India, multi-centric studies have shown prevalence of diabetes as 5.4% urban and 3.4% rural in 2004.^[6]

Diabetes mellitus is multi-factorial disease; main risk factors include modifiable variables like Body Mass Index (BMI), physical inactivity, diet, infections and non-modifiable variables like age and family history of diabetes mellitus.^[7] The WHO has stressed on research on diabetes epidemiology, which in turn, would be helpful in carrying out appropriate interventions.^[8]

Diabetes mellitus is increasing in prevalence and undergoing transition as disease of urban to disease of rural areas. Hence, this study was conducted in rural areas. The study aims to screen the study population for diabetes mellitus and its risk factors in a village.

Materials and Methods

A community based cross-sectional study was conducted

in a village (Chuchukonda) of Visakhapatnam district. Systematic random sampling was done. Every 10th household of the village was screened. All the members of the household were examined clinically and subjected to fasting blood sugar and postprandial blood sugar by using glucometer. To measure blood glucose for epidemiological purpose, WHO recommends glucometer.^[9] After informed consent, the interviews were made in the evening. Then, they were briefed about fasting blood glucose testing to be conducted in the next morning. The subjects were convinced to be on overnight fasting (minimum 8 hrs). Next morning, after confirming fasting, blood glucose was measured. Then, 75 gm powdered glucose, in a glass of water, was given to participants to estimate the postprandial blood sugar after 2 hours. Clinical examination was done using the pre tested questionnaire. It included socio demographic factors like age, sex, religion, social status, education, occupation, family income, number of members of the family, anthropological assessment, clinical examination, complaints, history of previous illness, personal history, diet, smoking, alcohol, history of intake of medicines, family history of diabetes mellitus, general examination, vital data, systemic examination, complications of diabetes mellitus and any other significant illness and diagnosis.

Data was entered in Microsoft Excel and analyzed using Epi-info Software. Appropriate tests of significance were used, wherever necessary. Suitable diagrams were also drawn for representing the data.

Results

A community based cross sectional study was conducted in Chuchukonda, a village of Visakhapatnam district. The village consisted of a population of 2,467, in which 468 families were recognized. Out of these, 52 families were randomly selected and every individual of the family was screened for diabetes mellitus, and its risk factors. The total population screened was 260, of which 134 were males and 126 were females. Majority of the study population was illiterates (50%), backward community (87%), unskilled worker (62.3%), and nearly one third were of lower social class (32.8%).

The Family history of diabetes among the study population was 20.7%. History of past illness related to diabetes such as mumps, recurrent abdominal pain, and steatorrhea were present in 14.2% subjects. History of various symptoms related to diabetes like polyurea, polyphagia, polydipsia and others were in 31.9%.

Table-1: Distribution of diabetes according to socio demographic profile

Socio Demographic profile		Diabetes Present (n= 13)	Diabetes Absent (n= 247)
Age (Years)	≤ 20	3 (23.1%)	74 (30%)
	21 - 40	3 (23.1%)	89 (36%)
	41 - 60	5 (38.5%)	58 (23.5%)
	> 60	2 (15.3%)	26 (10.5%)
Gender	Females	6 (46.2%)	120 (48.6%)
	Males	7 (53.8%)	127 (51.4%)
Education	Illiterates	5 (38.5%)	125 (50.6%)
	Primary	1 (7.7%)	37 (15%)
	Middle	2 (15.3%)	38 (15.4%)
	High	4 (30.8%)	40 (16.2%)
	Intermediate/ITI	0 (0%)	5 (2%)
	Graduate	1 (7.7%)	2 (0.8%)
Occupation	Semi profession	1 (7.7%)	10 (4%)
	Clerical, farm, shop owner	3 (23.1%)	14 (5.7%)
	Skilled workers	3 (23.1%)	24 (9.7%)
	Unskilled workers	2 (15.3%)	160 (64.8%)
	Unemployed	4 (30.8%)	39 (15.8%)
	Socio-economic status	Upper class	4 (30.8%)
Socio-economic status	Upper middle	2 (15.3%)	31 (12.6%)
	Middle	3 (23.1%)	61 (24.7%)
	Lower middle	2 (15.3%)	62 (25%)
	Lower	2 (15.3%)	83 (33.6%)

Table-2: Distribution of diabetes according to clinical assessment

Variables		Diabetes Present (n= 13)	Diabetes Absent (n= 247)
Family History	Present	2 (15.3%)	52 (21%)
	Absent	11 (84.7%)	195 (79%)
Past Illness	Present	1 (7.7%)	36 (14.6%)
	Absent	12 (92.3%)	211 (85.4%)
Symptoms	Present	9 (69.2%)	74 (30%)
	Absent	4 (30.8%)	173 (70%)
Type of Diet	Vegetarian	0 (0%)	14 (5.7%)
	Mixed	13 (100%)	233 (94.3%)
Physical Activity	Active	9 (69.2%)	208 (84.2%)
	Sedentary	4 (30.8%)	39 (15.8%)
Alcoholism	Alcoholics	0 (0%)	17 (6.9%)
	Non Alcoholics	13 (100%)	230 (93.1%)
Co-morbid illness	Present	5 (38.5%)	27 (10.9%)
	Absent	8 (61.5%)	220 (89.1%)
Use of Medicines	Present	1 (7.7%)	3 (1.2%)
	Absent	12 (92.3%)	244 (98.8%)
Body Mass Index	Underweight (<18.5)	7 (53.8%)	121 (49%)
	Normal (18.5-24.9)	3 (23.1%)	79 (32%)
	Overweight (25-29.9)	1 (7.7%)	22 (8.9%)
	Obese (>30)	2 (15.3%)	25 (10.1%)
Hypertension	Normal	8 (61.5%)	203 (82%)
	High normal	0 (0%)	22 (9%)
	Hypertensive	5 (38.5%)	22 (9%)

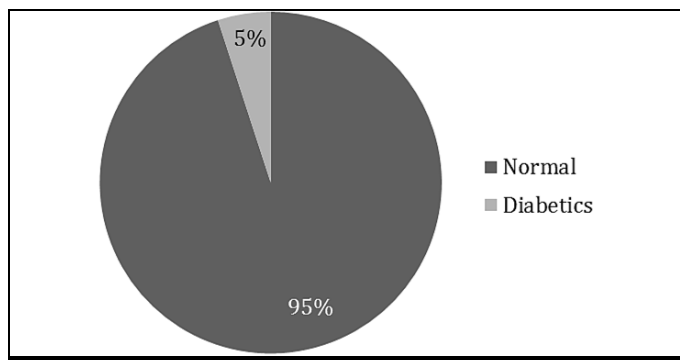


Figure-1: Prevalence of diabetes in the study population

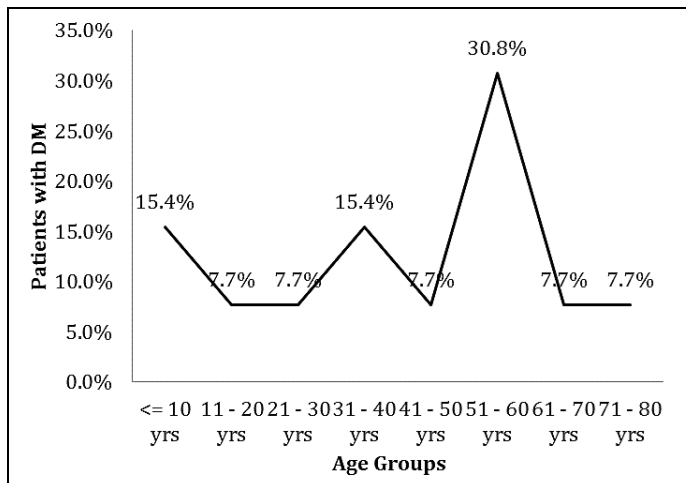


Figure-2: Distribution of diabetes according to age

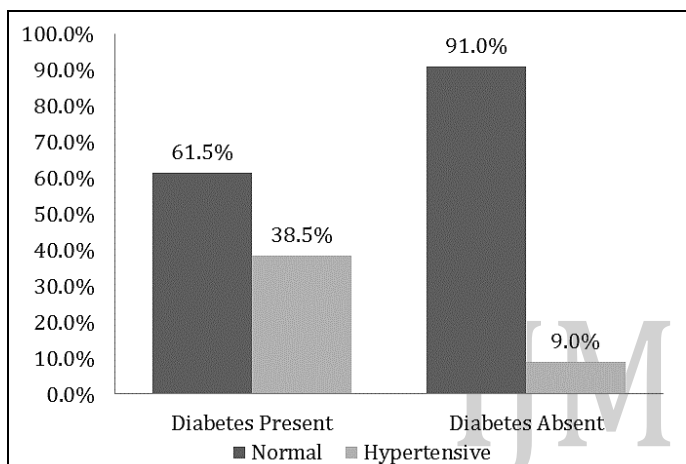


Figure-3: Distribution of Diabetes According to Blood Pressure

Majority of the study population had mixed diet (94.6%). 16% led sedentary life, 12% of the males were alcoholics, 10.4% were obese and 48% had chronic energy deficiency. 10.4% had hypertension. 12.3% had significant associated illness like heart diseases, stroke and other illness. 13 subjects (5%) of the study population tested positive for diabetes.

The prevalence of diabetes in the study population is illustrated in figure 1. 5% of the study population was diagnosed positive for both fasting blood sugar and postprandial blood sugar. These included both the new and old cases of diabetes indicating the prevalence of diabetes was 5%.

Table-1 shows the distribution of diabetes according to socio demographic profile. 13 (5%) of the study population tested positive for diabetes. The prevalence of diabetes ranged high in the age group of 41-60 years. There was no significant difference in the prevalence of diabetes among males (53.8%) and females (46.2%). The prevalence of diabetes was high in Illiterates (38.5%),

followed by high School pass outs (30.8%). But in graduates, the prevalence of diabetes was again lower (7.7%). The prevalence of diabetes was high in unemployed (30.8%) and upper social class (30.8%).

The Distribution of diabetes according to age is shown figure-2. The prevalence of diabetes ranged high in the age group of 51 -60 years. Among those who tested positive for diabetes, median age was 40.5 yrs.

The Distribution of diabetes according to clinical assessment is shown in table - 2. Among the diabetics, 15.3% had family history of diabetes mellitus, 7.7% had past illness related to diabetes, 69.2% had symptoms of diabetes mellitus. 30.8% of diabetics were sedentary, whereas in non-diabetics, it was 15.8%. 38.5% had comorbid illnesses. Among the diabetics, 23% were overweight. The prevalence of diabetes was high in underweight i.e. 53.8%. 38.5% of diabetics had hypertension whereas in non-diabetics, hypertension was 9%.

38.5% of diabetics had hypertension, whereas in non-diabetics, hypertension was 9%. The difference in the distribution of blood pressure among the diabetics (38.5%) and non-diabetics (9%) was shown in figure 3. This difference was significant at 95% confidence interval ($z = 2.16$; $\chi^2 = 11.579$; $d.f. = 1$; $P < 0.001$).

Discussion

The Prevalence of diabetes is increasing day by day in our country. The prevalence of diabetes was high in urban Indian population. Now it is also rising in rural areas. With this background, the present study was conducted in village.

5% of study population was diagnosed positive for both fasting blood sugar and postprandial blood sugar. These include both the new and old cases of diabetes indicating the prevalence of diabetes in our study was 5%. In India, multi-centric studies showed prevalence of diabetes as 5.4% urban and 3.4% rural in 2004.^[6] A study conducted by Sanjay Kumar et al [2010] in a rural area of Tamilnadu showed that the prevalence of diabetes among 1936 respondents was 5.99%.^[10] C. Muninarayana et al [2010] in a study among rural Tamaka, Kolar, found that the prevalence of diabetes among 311 adults was 10%.^[11] The prevalence of diabetes among 306 persons, above the age of 45 yrs, in the rural Wardha, was 8.49%.^[12] The prevalence of diabetes ranged from 3.4% - 10% in various studies due

to different places and different populations.

All age groups were included in the study. The highest prevalence of diabetes ranged in the age group 51 – 60yrs. Among those who tested positive for diabetes, median age was 40.5 yrs. Most of the studies revealed that the proportion of people diagnosed with diabetes mellitus increase with increasing age groups.^[12,13]

Various studies show that there is no significant difference in the prevalence of diabetes among males and females. Similarly, in our study, there was no significant difference in the prevalence of diabetes among males (53.8%) and females (46.2%).^[12-14]

The prevalence of diabetes was high in Illiterates (38.5%), followed by high school studies (30.8%). But in graduates the prevalence of diabetes was again lower (7.7%). There was no significant association between different levels of education. In a study conducted by C. Muninarayana et al [2010] et al, in a Rural Tamaka among 311 subjects, the prevalence of diabetes was high among matriculates (48.9%), Illiterates (29.03%) and in graduates (22.58%).^[11] In a study conducted by Sanjay Kumar et al [2010], in a rural area of Tamilnadu, there was a decrease in prevalence with increase in educational status.^[10] Low education status may imply lesser awareness, lesser opportunity for prevention/control. On the other hand, the higher educational status may influence through the life style factors.

In this study the prevalence of diabetes was high in unemployed (30.8%). In unemployed, most of the individuals were retired, lead sedentary life style and also aged above 60 yrs which might have led to the increased prevalence of diabetes. In a study conducted by C. Muninarayana et al [2010] in a Rural Tamaka among 311 subjects, the prevalence of diabetes was high among skilled workers due to combined effect of physical activity and work related stress.^[11]

The prevalence of diabetes was high in upper social class (30.8%). Similar findings of higher prevalence in the higher income group, was found in a study by Shobha Malini D et al (2009).^[15] Socio economic status was not independently associated with prevalence of diabetes. Probably this association was due to other variables like diet, BMI and physical activity.

Among the diabetics, 15.3% gave family history of

diabetes mellitus. Sumanth et al in their study of risk factors of diabetes mellitus in rural Puducherry, found that odds of diabetes among those, who had family history of diabetes, were at 3.8 times compared those without family history of diabetes.^[14] 12.1% had Family history of diabetes mellitus in a study conducted by Sanjay Kumar et al [2010] in a rural area of Tamilnadu.^[10] In a study conducted by Shobha Malini D et Al 2009, among working women in Berhampur, elicited a very high family history of diabetes mellitus i.e. 58%.^[15] The family history of diabetes could be important public health tool in predicting development of diabetes and useful in prevention of diabetes.

30.8% of diabetics were sedentary, whereas in non-diabetics, it was 15.8% in this study. Nazli M. Khatib et al [2008], in their study, found that sedentary lifestyle increases the risk of diabetes mellitus among 306 persons above the age of 45 yrs in a rural Wardha.^[12]

BMI was a significant independent predictor of development of diabetes. Most of the studies supported the evidence that among Asians, even at lower BMI, there were 4 times higher odds of diabetes. The Studies revealed that as the BMI increases, the proportion of diabetes also increases.^[10,12,15,16] Hence early identification of high BMI, would give opportunity for primary prevention and early diagnosis of the diabetes. But in this study significant association was not found. Among the diabetics, 23% were overweight. The prevalence of diabetes was high in underweight i.e. 53.8%.

Among the diabetics 38.5% were diagnosed with hypertension. There was significant difference in the distribution of blood pressure among the diabetics (38.5%) and non-diabetics (9%). This difference was significant at 95% confidence interval ($z = 2.16$; $\chi^2 = 11.579$; d.f. = 1; $P < 0.001$). Similar findings were found in other studies conducted by Nazli M et al^[12] and Shobha Malini D et al^[15] and Todkar SS et al^[17].

Conclusion

13 (5%) subjects from the study population tested positive for diabetes. Among the test positives, median age of diabetics was 40.5yrs. 70% had symptoms of diabetes mellitus, 15% had family history of diabetes mellitus, 38.5% had hypertension, 23% were overweight, 31% of diabetics were sedentary and 38.5% had other co morbid illness.

A country like India, with its large burden of diabetes and vulnerability to chronic complications, must evolve strategies for primary prevention of diabetes and its complications. Early screening and therapeutic interventions are the first steps towards achieving this goal. The prevention of diabetes is possible by influencing the environmental factors such as obesity, diet and physical activity. Life style changes/ interventions and drugs are the current strategies that exist to prevent or reduce the onset of diabetes. Hence, intervention strategies like “Eat less, Eat on time and Walk more” have to be inculcated to save our children and youth from developing diabetes.

LIMITATIONS OF STUDY

Due to time and financial constraints, screening of individuals was done in randomly selected households and not the whole village. Further investigations regarding the physical illness and complications of diabetes mellitus were also not done. Subjective bias might have occurred while eliciting history.

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