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## Prevalence of Diabetes Mellitus among Adults in Rural Field Practice Area Singanodi of Navodaya Medical College, Raichur, Karnataka, India.

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### ABSTRACT

Diabetes Mellitus is a major public health problem, causing significant morbidity and mortality. Diabetes Mellitus is an important chronic disease both in terms of the number of persons affected and the considerable associated morbidity and early mortality. Diabetes afflicts large numbers of people of all social conditions throughout the world. The Aim of the study was to determine the prevalence of diabetes mellitus in rural Indian population aged 30 and above. The present study was a cross sectional study carried out in village Singanodi, which is designated as rural field practice area of Community Medicine Department, Navodaya Medical College. It has a population coverage of 14,200. The study include all subjects who were aged 30 years and above. The Prevalence of diabetes was 15% among the rural population aged 30 or above. There was no significant difference in prevalence rates among men and women (13.7% v/s 15.1%). The prevalence of Diabetes in the age group of 30–40 years was 3%, it was also noted that there upward trend in diabetes prevalence with increasing age in both males and females, in the age groups 40 – 49 years (6%) and 50 – 59 years (32%). The age group with the age 60 years and above (44%). This difference was found to be statistically significant... Hindus were 88(14%) and among Muslims 4 (16%). This difference was not statistically significant. Married 79 (13%) followed by unmarried study group was 6(2%), widow 5(3.5%) and divorces 2(2%) this difference was statistically significant. were highest among Graduates 11(32%), and as the educational qualification increased the proportion of Diabetes Mellitus was found to be increasing was statistically significant. Prevalence of diabetes was more among professionals 12(37%) then unskilled occupation 46(9%). class I, class II, class III, class IV and class V socioeconomic status was 50%, 26%,30%,7% and 9% respectively. this difference was statistically significant. Prevalence of diabetes is high in rural population and need to be addressed by primary and secondary prevention of diabetes.

**Keywords:** Diabetes; Fasting Blood Glucose; Rural prevalence; Complication.

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## INTRODUCTION

The prevalence of Diabetes is rapidly rising all over the globe at an alarming rate[1]. It is important to note that the rise in prevalence is seen in all six inhabited continents of the globe. Approximately 5% of the world's population suffers from Diabetes. The WHO estimated the global burden of diabetes at 135 million cases in 1995, in a worldwide adult population of under 4 billion and has projected that there will be 299 million cases by the year 2025.

Although there is an increase in the prevalence of Type 1 Diabetes also, the major driver of the epidemic is the more common form of diabetes, namely Type 2 Diabetes, which accounts for more than 90% of all diabetes cases. The global prevalence of Diabetes will be raised from 171 million in the year 2000 to 366 million by the year 2030. As a consequence of the epidemiological transition due to increasing urbanization and associated lifestyle changes, this increase will be greatest in the developing world.

Nowhere is the Diabetes epidemic more pronounced than in India. India leads the world with largest number of diabetic subjects (32 million in 2000), earning the dubious distinction of being termed the "Diabetes Capital of the World". According to the Diabetes Atlas 2006, published by the International Diabetes Federation, the number of people with diabetes in India is around 40.9 million (2007), and is expected to rise to 69.9 million by 2025.

Diabetes Mellitus is a pan metabolic disorder of multiple etiologies, principally characterized by chronic or sustained hyperglycemia along with disturbances of carbohydrate, fat and protein metabolism[2]. A syndrome rather than a disease entity, diabetes is a chronic debilitating condition in which there is deficiency in the action of insulin (a hormone that controls glucose, fat and amino acid metabolism)[3], which may result from either a quantitative deficiency of insulin or resistance to insulin action or a combination of both. These individuals who are unaware of their disease status are left untreated resulting in chronic hyperglycemia which may lead to microvascular as well as macrovascular complications like ischemic heart disease, stroke, peripheral vascular disease, retinopathy, nephropathy, peripheral neuropathy, cataract, diabetic foot etc[4,5]. Hence it is necessary to detect the large pool of undiagnosed diabetic and prediabetic subjects and offer early therapy to these individuals Thus diabetes owes its importance to the fact that it is a silent killer. It leads to a large number of serious sequelae which are disabling, besides drastically reducing the quality of life[6]. With a high genetic predisposition and high susceptibility to environmental insults, Indians face a higher risk of diabetes and its associated complications [7]. In the absence of an efficient non communicable disease surveillance system, the only reliable method of obtaining disease estimates is to conduct field studies. Epidemiological studies are thus needed to have a baseline against which future trends in prevalence and risk-factor levels can be assessed, and preventive strategies planned.

## MATERIAL AND METHOD

### Study Area

- The present study was carried out in village Singanodi, which is designated as rural field practice area of Community Medicine Department, Navodaya Medical College.
- It has population coverage of 14,200

### Study Population

The study population include all subjects who were aged 30 years and above. This population serves as denominator to know the prevalence of diabetes.

### Study Design

The present study was a population based cross sectional study.

### Diagnostic Criteria 50

Value of diagnosis of study using ERBA CHEM 5 Semi Auto Analyzer by Trinders method.

**Inclusion Criteria**

All subjects who were aged 30yrs and above in the study area.

**Exclusion Criteria**

All subjects who were aged below 30 years in the study area.

**Sample Size**

The population of sample size aged 30 yrs and above is 35.8%. The sample size in our study area with a total population of 14200 was estimated as 5083. In the present study a total of 643 people were screened, by using a prevalence of 13% and allowable error with 20%.

$$N = Z^2 P Q / D^2$$

$$N = 1.962 \times 13 \times (100-13) / 20^2$$

$$N = 643$$

**Method of data collection**

The data was collected by house to house visit, those people who were aged 30 yrs and above were interviewed using pre designed and pre tested proforma. This was followed by detailed Clinical examination, Anthropometric measurements and investigations.

**Duration of Study**

The study was conducted for a study of one year (ie from 1st March 2012 to 28th Feb 2013).

**RESULTS**

**Table 1 A: Distribution according to age and sex of study subjects**

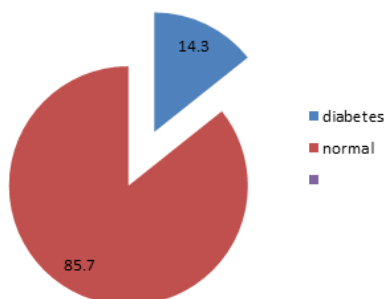
Age in years	Male		Female		Total	
	No.	%	No	%	No	%
30-39	135	35.0	105	40.9	240	37.3
40-49	139	36.0	83	32.3	222	34.5
50-59	73	18.9	34	13.2	107	16.6
>60	39	10.1	35	13.6	74	11.5
total	386	100	257	100	643	100

Religion	No	Percentage (%)
Hindu	618	96.1
Muslim	25	3.9
<b>Marital status</b>		
Married	601	93.5
Unmarried	21	3.3
Widow	15	2.3
Divorce	7	1.1
<b>Type of family</b>		
Nuclear	262	40.7
Joint	308	47.9
Extended	73	11.4
<b>Education</b>	No	Percentage
Illiterate	326	50.7
Primary	128	19.9
High school	96	14.9
PUC/diploma	57	8.9
Graduate	34	5.3
Post graduate	2	0.3
<b>Socioeconomic status</b>	No	Percentage
Class I	18	2.8
Class II	78	12.1
Class III	60	9.3
Class IV	161	25.0
Class V	326	50.7

**Table 2: Distribution of the Study population based on Prevalence of diabetes**

Prevalence	No	Percentage
Diabetes	92	14.3
Normal	551	85.7
Total	643	100.0

**Prevalence of Diabetes Mellitus**



**Table 3: Association between Age and Diabetes Mellitus**

	Normal		Diabetes mellitus		Chi square	P value	Inference
	No	%	No	%			
<b>Age in year</b>					X = 117.061	P= 0.0000 (<0.05)	Statistically significant.
30-39	231	97	9	3			
40-49	207	94	15	6			
50-59	72	68	35	32			
>60	41	56	33	44			
Total	551	85	92	15			
<b>Sex</b>					χ <sup>2</sup> = 0.263	P = 0.6084 (>0.05)	not significant
Male	333	86.3	53	13.7			
Female	218	84.9	39	15.1			
<b>Religion</b>					χ <sup>2</sup> = 0.061	P = 0.8056 (>0.05)	not significant
Hindu	530	86	88	14			
Muslim	21	84	4	16			
<b>Marital status</b>					χ <sup>2</sup> = 10.542	P= 0.0145 (<0.05)	statistically significant
Married	522	87	79	13			
Unmarried	15	98	6	2			
Widow	9	96.5	5	3.5			
Divorce	5	98	2	2			
<b>Occupation</b>					χ <sup>2</sup> = 32.949	P< 0.001 (<0.05)	Statistically significant
Unskilled	423	91	46	9			
Semiskilled	40	79	11	21			
Skilled	19	76	6	24			
Business	49	75	17	25			
Professional	20	63	12	37			
<b>Socioeconomic status</b>					χ <sup>2</sup> = 52.412	P< 0.001 (<0.05)	Statistically significant
Class I	9	50	9	50			
Class II	57	74	21	26			
Class III	42	70	18	30			
Class IV	149	93	12	7			
Class V	294	91	32	9			
<b>Education</b>					χ <sup>2</sup> = 12.139	P=0.0329 (<0.05)	statistically significant
Illiterate	283	87	43	13			
literate	268	85	49	15.45			

Table 1: Shows that 386(60.03%) were males and 257(39.97) were females. 240(37.3%) were in age group of 30-39 years, 222 (34.5%) were in age group of 40-49 years. 107(16.6%) were in age group of 50-59 years and 74(11.5%) subjects were in age group above 60 years.

Among 380 males 135(35%) were in age group of 30-39 years. 139(36%) were in age group of 40-49 years. 73(18.9%) were in age group of 50-59 years and 39(10.1%) subjects were in age group above 60 years. Among 257 females 105(40.9%) were in age group of 30-39 years.83(32.3%) were in age group of 40-49 years. 34(13.2%) were in age group of 50-59 years and 35(13.6%) subjects were in age group above 60 years.618(96.1%) were Hindus and 25(3.9%) were Muslims, no Christian and other religion subjects were

found in our study area. 643,601(93.5%) were married, 21(3.3%) were unmarried, 15(2.3%) were Widow, 7(1.1%) were divorce. 643, 262 (40.7%) were from nuclear family, 308(47.9%) were from joint family and 73(11.4%) were from extended family. 326(50.7%) were illiterate, 128(19.9%) were educated upto primary level, 96(14.9%) were educated upto high school, 57(8.9%) were educated upto PUC/Diploma, 34(5.3%) had studied upto graduation and 2(0.3%) were postgraduate. 18(2.1%), 78 (12.1%), 60 (9.3%), 161 (25%), 326 (50.7%) belonging to class I, class II, class III, class IV, class V. respectively

Table 2: The above shows that in total population of 643, 92(14.3) were having Diabetes, 551(85.7%) were not having Diabetes.

Table 3: The current study revealed that the prevalence of Diabetes in the age group of 30–40 years was 3%. An increasing trend in the prevalence of Diabetes Mellitus was observed with advancing age, in the age groups 40 – 49 years (6%) and 50 – 59 years (32%). The age group with the age 60 years and above (44%). This difference was found to be statistically significant. 53(13.7%) males and 39(15.1%) females were having Diabetes Mellitus, it was found that prevalence among females was more than in males. However this difference was not statistically significant. Hindus were 88(14%) and among Muslims 4 (16%). This difference was not statistically significant. Married 79 (13%) followed by unmarried study group was 6(2%), widow 5(3.5%) and divorces 2(2%). this difference was statistically significant. Prevalence was highest among Graduates 11(32%), and as the educational qualification increased the proportion of Diabetes Mellitus was found to be increasing among primary 16(12%), secondary 12 (12%), PUC 9 (15%), post graduates 1(0.5%) and illiterate 43(13%) This difference was statistically significant. It was seen that professionals were suffering from diabetes mellitus then unskilled workers, professionals that is 12(37%) followed by business class 17 (25%), skilled occupation 6(24%), semi skilled occupation 11(21%), unskilled occupation 46(9%). class I, class II, class III, class IV and class V socioeconomic status was 50%, 26%, 30%, 7% and 9% respectively. this difference was statistically significant

## DISCUSSION

The present epidemiological cross-sectional study was conducted in village Singanodi which is a rural field practice area of Community Medicine Department, Navodaya Medical College, Raichur. This study consisting of 643 subjects aged 30 years and above was undertaken to know prevalence of Diabetes and to study its risk factors.

### Prevalence of Diabetes Mellitus

The present study showed that prevalence of diabetes was 15% (92 diabetics) and 551 (85.7%) were diagnosed as normal subjects during our study.

A study conducted by Dhadwal et al [1] in Shimla revealed that overall prevalence ( $\geq 40$  years) was 4.86%, out of which 65.52% were known diabetics and 34.48% were newly detected. In a study conducted by Patadin et al [8] it was found that the prevalence of diabetes and TGT in subjects  $\geq 40$  years was 4.9% and 6.6% respectively. Yet another study conducted by Zargar et al [9] in Kashmir valley showed prevalence of diabetes and TGT in subjects 40 years and above was 4.25% and 8.09% respectively. Similarly a study conducted in rural area of Nagpur by Kokiwar et al [10] district showed overall prevalence of diabetes was 3.67%. Thus, many studies done in different rural areas of India have shown prevalence between 2-6%.

### Age and Diabetes Mellitus

In the present study highest prevalence (44 %) was in age group of  $>60$  years and above. And lowest prevalence (3%) was found in 30-39 years of age group. Thus, we found an upward trend in Diabetes prevalence with increasing age. It was true in both males and females. A study done by Mohan et al [11] found that the prevalence of diabetes at age  $<30$  years was 0.6%, at age 31-40 years : 4.8%, at 41-50 years : 15.2%, at 51-60 years : 22.9%, at 61-70 years : 34.2% and in those  $>70$  years of age, 22.4% had diabetes. Prevalence of diabetes thus increased with increase in age until 70 years (trend chi square - 119.4,  $p < 0.001$ ). The prevalence of undiagnosed diabetes and known diabetes also increased with increase age until 70 years. Increasing age was significantly associated diabetes mellitus.

Similar pattern was observed by Dhadwal D et al [1] in his study, that prevalence of diabetes increased with age. It was 2.57% among 40-49yrs age group, 5.47% in 50-59 yrs age group, and it increased to 7.11% in 60 yrs and above age group. Increase in prevalence with age is well documented and this could be attributed to the accumulated effects of various risk factors.

### **Sex and Diabetes Mellitus**

The present study showed that prevalence of diabetes in males and females was 13.7% and 15.1% respectively. Similarly study conducted by Dhadwal et al [1] in Shimla showed prevalence of diabetes was 5.17% in males and 4.38% in females. But in another study ; showed prevalence of diabetes in male and female was 4.58% and 2.66% respectively. Significant difference in prevalence rates among males and females was observed ( $P < 0.05$ ).

### **Educational status and Diabetes Mellitus**

Maximum prevalence of Diabetes was in study population with professional graduates 32 %.Minimum prevalence was among post graduates(0.5%). It was found in the present study that educational level was not significantly associated with Diabetes Mellitus.Also in a study done by Hamit Acemoglu et al[4] the prevalence of type 2 DM was 4.96% in illiterate persons 2.87% among people who graduated from primary or secondary schools and 3.36% among those who graduated from high school or university .No significant association between educational status and diabetes ( $P = 0.08$ ).

### **Socioeconomic Class and Diabetes mellitus**

In the present study maximum prevalence was in Class- I (50%) and minimum prevalence (7%) in Class-V. In our study, significant association between socioeconomic class and diabetes mellitus was established ( $P < 0.001$ ) The National Urban Diabetes Survey was done by Ramachandran et al[6] also revealed that monthly income of an individual was positively related to risk to diabetes mellitus ( $p < 0.0001$ ). Prevalence of diabetes among less than 5000, 5000-10000 and more than 10000 per month earners was 12.5%, 18.5% and 21.6% respectively Kokiwar et al[10] also found that prevalence was high in those belonging to upper socioeconomic classes (23.68%) as compared to lower socioeconomic status (8.96%) ( $p < 0.001$ ).Similarly Mohan et al [11] found that Subjects with negative family history of Diabetes but belonged to higher SES had higher risk for glucose intolerance compared to subjects of lower SES and no family history (OR - 3.86,  $p < 0.0001$ ). Also Subjects belonging to higher socio-economic status (SES) and who also had a positive family history of Diabetes had five times greater prevalence of glucose intolerance compared to subjects from lower socioeconomic status and no family history (OR - 3.86  $p < 0.0001$ ). It was observed that as socioeconomic status increases, the risk of Diabetes increases. This could be due to, as the person's income increases they are more likely to engage in sedentary lifestyle. On the other hand persons with low socioeconomic status are more likely to eat the traditional diet and engage in increases physical activity in their daily life as a part of their occupational or to earn their livelihood.

### **Diabetes Mellitus in Relation to the Type of Occupation**

In the present study prevalence of diabetes was higher in professionals (37%) and clerical work. businessmen (25%). Lowest prevalence (9%) was in unskilled occupation. So we noticed upward trend in diabetes, prevalence as the occupational status increased. And also occupation was significantly associated with abnormal glucose tolerance ( $P < 0.05$ ). The National Urban Diabetes Survey conducted by Ramachandran et al[6] in India showed a higher prevalence of diabetes among the persons doing office jobs compared to those doing unskilled jobs. (10.6% vs 15.5%;  $p < 0.001$ ).

### **Diabetes mellitus and type of Religion**

Our study revealed the prevalence of diabetes in Hindu community was 14% and in Muslim community prevalence was 16%. It was found that religion was not significantly associated with diabetes mellitus.

## CONCLUSION

- The prevalence of Diabetes was 15 % among rural population aged 30yrs and above.
- There was no significant difference in prevalence rates among men and women. It was also noted that there was upward trend in Diabetes prevalence with increasing age in both males and females.
- The present study also found positive association between the age, increasing age, high socioeconomic status, occupation, physical activity, family history of Diabetes, and BMI, alcohol, tobacco were significantly associated with
- Diabetes Mellitus.
- It was also that religion, sex, marital status, education level, HTN, waist circumference; types of diet were not significantly associated with Diabetes Mellitus.
- Primary prevention is possible by modifying the environmental factors influencing diabetogenesis such as obesity, diet and physical activity. Long term studies have shown that beneficial effects of life style modifications on reducing the risk of Diabetes.
- India is going to face big challenge posed by the prevalence of Diabetes and its complications unless steps are taken to implement the primary and secondary prevention of Diabetes. It's necessary to identify the risk factors for Diabetes and also for vascular complications.

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