Prevalence of Coronary Heart Disease in Rural Population of Bagalkot, Karnataka, India
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Abstract

**Background:** India is on its march towards having the most number of diabetics worldwide and is aptly called the ‘diabetic capital’ of the world. Limited information on the problem of diabetes in rural North Karnataka has necessitated the need for this study to find the prevalence of type 2 diabetes mellitus. **Methods:** A cross sectional study was conducted in Shirur, a rural field practice area of S. Nijalingappa Medical College, Bagalkot, to study the prevalence of type II diabetes mellitus among individuals aged 20 years and above. The systematic random sampling method was used to draw the sample of 1364 respondents from 6992 eligible individuals. **Results:** The present study revealed the prevalence of Type II diabetes mellitus as 6.52%. Diabetes mellitus was found to be significantly associated with increasing age in both genders (p<0.001) with female predominance. Higher, but not significant prevalence of diabetes mellitus was found among Muslims, Widowed people, illiterate and also among the individuals belonging to higher socioeconomic class. **Conclusions:** Higher prevalence of diabetes mellitus was found in the study in Shirur; a village of North Karnataka is a matter of concern and has to be addressed by regular screening and health education regarding the risk factors and lifestyle modification.

**Keywords:** Type II Diabetes Mellitus, Rural area, Prevalence

INTRODUCTION

Chronic non-communicable diseases are assuming increasing importance among the adult population in both developed and developing countries. Cardiovascular diseases and cancer are at present the leading causes of death in developed countries accounting for 70 to 75% of total deaths. The prevalence of chronic disease is showing an upward trend in most countries, and for several reasons this trend is likely to increase.1

Diabetes Mellitus is a prototypical chronic public health problem. The disease sequel and economic burden of diabetes are extensive owing to its degenerative nature despite the best available treatments. Effective delivery of preventive strategies to delay progression of the disease and its complications are challenging at best, with the persistent need for interventions integrating individual, clinical, system, and society-level approaches that span the full course of life.2

As we enter the new millennium, diabetes mellitus has reached epidemic proportions worldwide. The World Health Organization (WHO) has commented there is ‘an apparent epidemic of diabetes which is strongly related to lifestyle and economic change’.3 The estimates are changing rapidly and showing a rather disturbing state. The total number of people with diabetes was projected to rise from 171 million (2.8%) in 2000 to 366 million (4.4%) in 2030.4 Estimates in 2010 of the total number of people with diabetes was projected to rise from 285 million (6.4%) to 439 million (7.7%) worldwide in 2030.5

Nearly 90 – 95% of diabetics have type-2 diabetes.6

Urban rural differences in the prevalence of diabetes have been consistently reported from India.9 Prevalence is only 0.7% for non-obese, physically active, rural Indians. It reaches 11% for obese, sedentary, urban Indians; and it peaks at 20% in the Ernakulam district of Kerala, one of India’s most urbanized states.7

Karnataka having limited information on the problem of diabetes ranging from 12.4% in Bangalore (2001),7 to 3.8% in rural Mysore (2005)7 and most recently the finding in rural Gulbarga at 19.8% (2011)10 has necessitated this study in rural field practice area of S. Nijalingappa Medical College, Bagalkot to estimate the prevalence of diabetes and also to know
the socio demographic factors associated with the disease, among people aged 20 years and above, at Shirur, a rural field practice area of S. Nijalingappa Medical College, Bagalkot.

**MATERIALS AND METHODS**

A cross-sectional Study was conducted in Shirur, which has a population of 12,350 residing in 2,225 houses served by a total of 14 Anganwadis, as per house to house survey at Shirur. However, when the actual quick enumeration was done for the study purpose, it was possible only to contact 2,042 houses having a population of 10,943. Among them, the population aged 20 years and above was 6,992 (63.89%).

Inclusion criteria for study subjects were all the men and women aged 20 years and above, who were residents of Shirur village from at least last 5 years and the individuals with known history of diabetes or on treatment. Individuals not willing to participate or those who were absent on three repeated visits, pregnant women and those who were known case of type I diabetes mellitus, and cases of secondary diabetes, were excluded.

For a population of 10.943 with a sampling frame of 6,992, and prevalence of 19.78%,\(^9\) and a relative error of 10%, using Open Epi version 2.3.1, a sample size was calculated to be 1275. Using Systematic Random Sampling technique, every 5th person was included, interviewed and checked for exclusion criteria. Thus the effective sample size was found to be 1,364 respondents.

The population enumeration and the sample population were interviewed by house-to-house survey. The help of Anganwadi workers was obtained for initial survey to delineate the areas covered by each Anganwadi. All the houses in each of the Anganwadi were numbered continuously for study purpose. Structured, Close ended questionnaire was used to collect information on the socio demographic profile, which included contact details, age, sex, religion, marital status, education, occupation, and income. The survey was done by the investigator who administered the questionnaire and Data was collected between 6 A.M to 10 A.M on working days covering an average of 10 houses per day.

Motivation and instructions were given on the previous day to stay in fasting state the following day. Oral interview technique was used with a structured, pretested questionnaire to collect information on anthropometry, medical history, physical activity, and diet habits. Two venous blood samples were taken for glucose estimation.

One sample after overnight fast was taken and considered for fasting blood sugar estimation. 75gms glucose mixed in a glass of water was given to each participant and another sample was taken exactly 2 hours later. Participants were requested to refrain from consuming breakfast or any beverages until sample collection was done.

The blood was centrifuged immediately in the field and serum stored in a vaccine day carrier. Blood sugar analysis was done using Stat Sax 3300 Semi auto analyser by glucose oxidase peroxidase method with the kit supplied by Transasia Biomedicals limited (ERBA) in the Central Clinical Lab of H. S. K. Hospital & Research Centre, Bagalkot.

Classification as Type II Diabetes Mellitus was done using recent WHO criteria which diagnoses diabetes as either FBS > 126mg/dL and/or 2-hour plasma glucose > 200 mg/dL.\(^1\)

**Definitions:**

Age of the person was recorded in completed year. Marital Status was recorded as currently married at the time of study, unmarried (participants who were not married) and others which included Widowed (participants whose spouse is dead), Separated (a person who has been voluntarily separated from spouse without obtaining a court order) and Divorced (Person having legally taken divorce from a previous marriage and currently not married to anyone).\(^12\)

The maximum level of educational qualification attained was taken as literacy status which was defined as illiterate and literate.

Illiterate: A person who could not read or write. This category also includes those who could only sign or reproduce some writing mechanically without any meaning.

Literate: Those who had taken formal education. This category also included those who could read or write with meaning but had not taken any formal education in school.\(^13\)

**Socio economic classification:**

Monthly earning of each individual from all the sources was recorded and the agricultural income in the form of crops is converted into present price rates and was taken for calculation of income. B G Prasad classification was used with correction for Socio Economic Classification.\(^14\)

Study protocol was approved by the Institution’s Ethical Committee. Data was analyzed with SPSS version 20. Proportions, Chi square test, odd’s ratio were used wherever relevant.
RESULTS

Out of the 1364 individuals studied, 89 were found to have diabetes; thereby revealing the prevalence of diabetes as 6.52% in Shirur, a rural field practice area of S. Nijalingappa Medical College, Bagalkot. Chi-square test (98.12 for df 5) revealed a very high significant positive association (p<0.001) with age i.e., as age increased, the diabetes prevalence also increased.

Out of the total 1364 respondents, 680 (49.85%) were males and 684 (50.15%) were females. Out of total 89 diabetics, 47 (52.81%) were males and 42 (47.19%) were females. The gender specific prevalence of diabetes was 6.91% in males and 6.14% in females. Chi-square test revealed no association (p>0.05) between gender and diabetes. However, both the sexes also showed a significant increase in Diabetes Mellitus, with increase in age.

There was no statistically significant relation found between Diabetes Mellitus with religion or marital status or literacy status [Table-1]. The prevalence of Diabetes decreases with decrease in Socio economic status [Table-2], but this difference was not found to be statistically significant.

DISCUSSION

Over the past 30 years, 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. It is important to note that the rise in prevalence is seen in all six inhabited continents of the globe. No where is the diabetes epidemic more pronounced than in India.

Diabetes, the new epidemic in India is on the rise as evident by numerous population-based studies published.

In this current study, 1364 respondents of Shirur, a rural field practice area of S. Nijalingappa Medical College, Bagalkot were studied to find the prevalence of diabetes in this region. 89 of the 1364 respondents were found to have diabetes, thereby giving the prevalence of diabetes in this rural area as 6.52%.

To do a comparative analysis on the prevalence of diabetes in the first half of 20th century is difficult as there were no standard criteria for diagnosing diabetes. Most of the earlier studies were based on hospital records and they used glycosuria as the diagnostic criteria. Figure 2 is a compilation of population based studies on the prevalence of diabetes in India from 1989 to 2010. Our results (6.52%) agree with the increasing trend of diabetes mellitus in rural India.

In the present study, age specific prevalence of Diabetes Mellitus was highest (16.29%) among 60-69 years and its increase with age was very highly significant (p< 0.001) revealing that as age increased, the prevalence of Diabetes also increased. Similarly, Deo S et al. reported that the prevalence of diabetes significantly increased with an increase in age (p < 0.01) and Zaman et al. reported that highest prevalence (28.47%) was in the age group of ≥70 years.

Diabetes was found to be similar in males (6.91%) and females (6.14%) in this study. Although percentage was lesser in females, the difference had no statistical significance (p>0.05). Deo S et al. also reported the higher prevalence of diabetes among females (9.9%) as compared to males (9.2%) with the difference not being statistically significant. (p>0.05). However, Zaman FA et al. found that females (22.04%) had statistically significant (p<0.05) higher prevalence of diabetes as compared to males (16.06%).

The age wise prevalence of Diabetes among males and females also showed an increasing trend. The same was reported by Deo S et al. and Zaman FA et al.

The present study revealed no significance (p>0.05) in prevalence of diabetes among Hindus (6.43%) and Muslims (7.28). No respondents belonged to other religion in present study. However, the studies by Vijayakumar G et al. found significantly less (p<0.001) diabetics among Hindus (11.0%) as compared to Muslims (20.2%) and Christians (21.9%) and Rao CR et al. reported found that Muslims [2.47 (1.57 – 3.89)] and Christians [1.91 (1.07 – 3.38)] had significantly higher odds of developing diabetes as compared to Hindus (1.00).

Present study found highest prevalence of diabetes among widowed (8.79%) followed by unmarried (6.43%) and least in married (6.36%) group. The difference between the groups was not statistically significant. (p<0.05). However, Corsi D J et al. found that the prevalence of diabetes was 0.3%, 1.8%, 2.5% and 1.5% among respondents who were single, married, widowed and divorced or separated respectively, the difference observed being statistically significant. (p<0.05)

In present study, it was found that literate people had more prevalence of diabetes (7.07%) as compared to illiterate people.
(5.80%) but the difference was not significant statistically (p>0.05). Muninarayana C et al.\textsuperscript{20} reported prevalence of diabetes in illiterate respondents as 7.09% and in literates as 14.38%, the difference not being statistically significant. (p>0.05).

The current study revealed the prevalence of diabetes to be 8.70% among class I, 6.85% among class II, 6.38% among class III, 6.82% among class IV and 5.56% among class V showing a similar burden in all groups (p>0.05) revealing an increased economic burden for treatment of diabetes even among upper lower and lower categories. However, studies by Kokiwar PR et al.\textsuperscript{21} and Rao CR et al.\textsuperscript{22} showed increasing prevalence of diabetes with increase in socio economic status.

## CONCLUSION

India is in the grip of a diabetes epidemic with increasing prevalence rates in both rural and urban areas as a result of epidemiological transition. A higher prevalence of DM in the present study was found to be significantly associated with following age. However, the study did not reveal any association of DM with sex, marital status, religion, literacy status and level, socio economic status. The higher prevalence of DM in Shirur, a village of North Karnataka, is a matter of concern and has to be addressed by regular screening and health education to create awareness among population and to motivate to modify the risk factors by changing the lifestyle as it is a multifactorial disease. The symptoms of DM even if of a vague type should be investigated thoroughly before labelling the individual not suffering from DM. Further research is required to document the prevalence of DM as well as its determinants and impact of lifestyle modification is recommended.

## REFERENCES


