A community-based study on knowledge of diabetes mellitus among adults in a rural population of Kerala

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ABSTRACT
Background: Worldwide India leads in diabetes mellitus and within India Kerala tops the list. Keeping in view increasing the burden of diabetes mellitus in Kerala, it is highly important to know about the awareness of the disease among the general population to chalk out culturally appropriate and need oriented educational strategies.
Objective: The objective of this study is to assess the knowledge of diabetes mellitus in a rural populace of Kerala.
Materials and Methods: A descriptive cross-sectional study was undertaken in a rural Panchayat of District Ernakulam of Kerala wherein 343 adults were randomly interviewed from six randomly selected wards. The interview schedule had 23 items on knowledge which was assessed in four domains including general awareness of diabetes mellitus, its risk factors, complications, and lifestyle modifications. Each item was given a score. Maximum possible score was 23. Knowledge score of <9 was considered as poor, 9–17 as average and above 17 was taken as good. Data were analyzed using SPSS version 11. Descriptive analysis was done for sociodemographic variables, and t-test and ANOVA were used to ascertain the level of significance of predictors of awareness.
Results and Conclusion: Mean age of the participants was 47.7 ± 15.74 years with more than half (55.7%) having completed their high school education. Mean knowledge score was 15.6. Being diabetic, having completed high school education and with family history of diabetes had significantly better knowledge score ($P < 0.05$). Educating the community on risk factors is the key strategy for the prevention of diabetes and delaying the onset of disease among high-risk individuals.

Key Words: Diabetes mellitus, Kerala, knowledge

Introduction
India leads the world in alarming epidemic of diabetes mellitus with the highest number of 50.8 million diabetics followed by China and United States.[1] Rapid epidemiological transition in India with increased urbanization and westernization has contributed to a substantial rise in diabetes.[2] Prevalence estimates of diabetes in India ranges from 5.6% to 12.4% in urban areas and 2.4% to 2.7% in rural areas.[3] This difference not only exists across rural urban divide but also across the Indian states because different states in India are at diverse stages of demographic transition.[4] A community-based cross-sectional survey in urban Kerala recorded the highest prevalence of 19.5% in India.[5] As Kerala has the highest proportion of ageing population in India, the prevalence of diabetes mellitus is highest in Kerala.[1] In addition, drastic change in living standard of people in Kerala over last two decades has also significantly contributed to it.[6]

It is now being considerably agreed that knowledge of diabetes mellitus and its risk factors and preventive
lifestyle among population will likely have a substantial benefit in the prevention of disease.\[5\] Unfortunately, there is inadequate awareness about the real dimension of the problem among the general public. There is also lack of awareness about existing intervention for prevention of disease.\[8\] Keeping in view increasing burden of diabetes mellitus in Kerala, it is highly important to know about the awareness of the disease among general population to chalk out culturally appropriate and need oriented educational strategies. Even though ample literature on the prevalence of diabetes mellitus is available from Kerala, but to our knowledge, no comprehensive study on knowledge about diabetes mellitus has been undertaken so far. With this perspective, a community-based study was undertaken with the objective of assessing the awareness of diabetes mellitus, its risk factors, treatment, complications, and role of lifestyle modifications in controlling diabetes in a rural population in Kerala.

Materials and Methods

A community-based cross-sectional study was done in Cheranallor Panchayat (self-administration unit) of district Ernakulum, Kerala. Six wards were randomly chosen from 16 wards of the Panchayat. From the selected wards, 190 houses were randomly visited. Adults aged 20 years and above, who were willing and available at the time of visit were interviewed. A total of 343 individuals were interviewed. For any house with more than one eligible person, interview was carried out separately to avoid family influence. In addition to baseline data on sociodemographic characteristics and family history of diabetes mellitus, the questionnaire covered different aspects of diabetes mellitus. Besides, inquiry about diabetes status (self-reported) was made. Socioeconomic status was assessed by Prasad’s Social Scale.\[9\] There were a total of 23 questions, four on general awareness of diabetes mellitus, six on risk factors, six on treatment and complications, and five on lifestyle modifications. All 23 questions were scored. The possible response for closed question was “yes” or “no” and “don’t know.” Score one was awarded to response “yes,” and zero for “no” and “don’t know.” For open-ended questions, scores were graded. Maximum possible score was 23. Knowledge score of <9 was considered as poor, 9–17 as average and above 17 was taken as good. Data were analyzed using SPSS version 11 (SPSS Inc., Chicago, USA). Descriptive analysis was done for sociodemographic variables and t-test and ANOVA were used to ascertain the level of significance of predictors of awareness.

Results

Sociodemographic profile

A total of 343 individuals were interviewed. The mean age of the respondents was 47.74 years ± 15.74 standard deviation. Respondents were predominantly females, 242 (74.6%). Over half of the respondents, 191 (55.7%) had high school and higher secondary education. 136 (38.5%) were below poverty line. Among 343 respondents, 79 (23%) reported (self) to have diabetes and 146 (42.6%) had a family history of diabetes mellitus. Sociodemographic details are given in Table 1.

Table 1: Sociodemographic characteristics of study population (n=343)

| Variable                                | n (%)     |
|-----------------------------------------|-----------|
| Age (years)                             |           |
| <30                                      | 52 (15.16) |
| 30-50                                    | 129 (37.61) |
| 50-70                                    | 123 (35.86) |
| >70                                      | 39 (11.37)  |
| Sex                                      |           |
| Male                                     | 101 (29.4) |
| Female                                   | 242 (70.6) |
| Education                                |           |
| Primary and below                        | 31 (9.03) |
| Middle                                   | 43 (12.54) |
| High school and high secondary           | 191 (55.69) |
| Graduation and above                     | 78 (22.74) |
| Religion                                 |           |
| Christian                                | 245 (71.4) |
| Hindu                                    | 98 (28.6) |
| Per capita monthly income (in rupees)    |           |
| >10,000                                  | 1 (0.29)  |
| 5000-9999                                | 24 (07.0) |
| 3000-4999                                | 56 (16.3) |
| 1500-2999                                | 78 (22.7) |
| 500-1499                                 | 52 (15.2) |
| <500                                     | 132 (38.5) |
| Occupation                               |           |
| Professional/skilled                     | 94 (27.4) |
| Unskilled                                | 10 (2.9)  |
| Home makers/students                     | 214 (62.4) |
| Retired/unemployed                       | 25 (7.3)  |
| Type of family                           |           |
| Nuclear                                  | 219 (63.8) |
| Joint                                    | 124 (36.2) |
| Self-reported diabetes                   |           |
| Yes                                      | 79 (23.0) |
| No                                       | 264 (77.0) |
| Family history of diabetes               |           |
| Yes                                      | 146 (42.6) |
| No                                       | 197 (57.4) |


General awareness on diabetes mellitus
Awareness on different aspects of diabetes mellitus is shown in Table 2. It is interesting to note that even though 333 (97.1%) of the respondents had heard of the condition diabetes, only 297 (89.2%) could define it correctly. Out of 79 diabetics, only 58 (73.4%) could specify it correctly. On age group affected in diabetes, only 117 (34.1%) said that all ages could be affected, and among diabetics, 39.2% could answer it correctly.

Awareness on risk factors, symptoms, and complications
The most common risk factor identified by respondents was diet 197 (57.4%) followed by heredity 59 (17.2%), stress 27 (7.8%), physical inactivity 17 (4.9%), alcohol intake 16 (4.6%), and obesity 12 (3.5%). Among diabetic population 20 (25.3%) were unaware of risk factors.

Fatigue was the most common symptom identified 173 (50.4%), followed by polydypsia 94 (27.4%), polyphagia 58 (16.9%), polyuria 42 (12.2%), and loss of weight 9 (2.6%). Among self-reported diabetic respondents, 9 (11.4%) were either unaware of the symptoms or the responses were incorrect.

Regarding complications, 277 (80.8%) respondents were aware that diabetes can lead to complications or can affect various organs in the body. However, on further inquiry, 150 (43.7%) of them could not specify any complication or the responses were incorrect. Among complications, the kidney was cited by 105 (30.6%), eyes 82 (23.9%), and heart 61 (23.1%) only a few 22 (6.4%) were aware of neurological complication. Surprisingly, among diabetic respondents, 27 (34.1%) were unaware of any of the complications.

Awareness on prevention and treatment
Regarding prevention 248 (72.3%) knew that diabetes can be prevented, however, among diabetic subjects only 53 (67.1%) were aware of the preventive aspects. When asked about treatment, 307 (89.1%) said that treatment is available for diabetes but lifelong, and regular intake of medicine was known to 140 (40.8%) only. Even among diabetic respondents, 35 (44.3%) were unaware of the fact that treatment for diabetes is lifelong and regular.

Table 2: Awareness on diabetes mellitus

| Variable                        | Yes (%) | No (%) | Don’t know (%) |
|---------------------------------|---------|--------|----------------|
| Heard of diabetes               | 333 (97.1) | 10 (2.9) | -              |
| Risk of getting diabetes        | 270 (78.7) | 25 (7.3) | 48 (14)        |
| (if parents are diabetic)       |          |        |                |
| Person to person transmission   | 27 (7.9) | 275 (80.1) | 41 (12)        |
| Preventable                     | 248 (72.3) | 55 (16) | 40 (11.7)      |
| Complications                   | 277 (80.8) | 9 (2.6) | 57 (16.6)      |
| Diet modification               | 319 (93) | 4 (1.2) | 20 (5.8)       |
| Abstinence from smoking         | 263 (76.7) | 36 (10.5) | 44 (12.8)     |
| Abstinence from alcohol         | 262 (76.4) | 37 (10.8) | 44 (12.8)     |
| Need for exercise               | 302 (88) | 11 (3.3) | 30 (8.7)       |
| Need for foot care              | 283 (82.5) | 11 (3.2) | 49 (14.3)      |

Awareness on lifestyle modifications among study subjects
Different dietary modifications listed by respondents included reduced intake of sugar and sweets by 169 (64%), decreased intake of starchy food such as potato, beetroot 34 (12.8%), and increased intake of vegetable and fruits by 124 (42.8%).

About three-fourths of the respondents felt that intake of alcohol 263 (76.7%) and smoking 262 (76.4%) should be avoided by patients with diabetes mellitus. Among diabetic subjects 16 (20.2%) of them were not aware of it. The importance of exercise and foot care was known to 302 (88%) and 283 (82.5%), respectively.

Knowledge score
The mean knowledge score of the respondents was 15.06 (maximum possible score 23). Overall significant difference in knowledge was seen among diabetic and nondiabetic respondents, and also in case of respondents with and without family history of diabetes ($P < 0.05$).

Influence of certain sociodemographic variables was also assessed. A significant difference in awareness was seen across different age groups ($P < 0.05$). Awareness also increased with education ($P < 0.05$). However, no significant difference in knowledge was observed when comparison was made for gender, occupation, and socioeconomic status ($P > 0.05$). Results are shown in Table 3.

Discussion
Knowledge is a logical prerequisite for the intentional performance of health-related behavior. As knowledge accumulates, changes in attitudes are initiated and over a period it results in behavior change. Knowledge of diabetes is of paramount importance in determining intended behavior such as lifestyle modifications and adherence to treatment. The present study was undertaken to assess knowledge about various domains of diabetes in a rural population of Kerala. Overall awareness was average (15.06 mean knowledge score with 23 maximum possible score), however, certain deficit areas in knowledge were identified which needs to be addressed through an organized community-based awareness
It is well understood that risk factor knowledge is prerequisite for prevention of disease, and inability to recognize risk factors impedes preventive efforts such as adoption of healthy lifestyle.\textsuperscript{[13]} As diabetes prevention is primarily dependent on altering lifestyle and increasing levels of physical activity improving knowledge about the risk factors of diabetes must receive urgent attention.\textsuperscript{[14]} Awareness about risk factors was abysmally poor in the study population as more than one-fourth of the study population (27.1\%) could not identify any of the risk factors for diabetes. Except for diet which was stated by over half of the respondents (57.1\%), other important risk factors such as physical inactivity, obesity, smoking, alcohol was cited by <5\% of respondents. Only 17.2\% of respondents mentioned hereditary as a risk factor for diabetes. The awareness on risk factors was even very less as compared to other population-based studies like Chennai Urban Rural Epidemiology Study conducted among Chennai residents which also demonstrated that <12\% were aware that obesity and physical inactivity could lead to diabetes.\textsuperscript{[14]} Similar observations were reported from Singapore study and a population-based study done in Oman.\textsuperscript{[16]}

It is noteworthy that 24.5\% of respondents were either unaware or gave incorrect responses on being asked about symptoms of diabetes. Our results are in accordance with observations made from population-based study in Oman.\textsuperscript{[16]} It is obvious that inability to recognize symptoms in early stages can adversely affect the outcome of the disease.

Awareness of diabetes-related complications is central to empowering individuals to prevent and manage diabetes.\textsuperscript{[17]} In this study, awareness on complications of diabetes was poor as nearly half (43.7\%) of respondents could not cite any of the complications. It was surprising to see that even among diabetics one-third (34.1\%) were unaware of any of the complications. It was surprising to see that even among diabetics one-third (34.1\%) were unaware of any of the complications. The results are consistent with the findings of studies done elsewhere.\textsuperscript{[11,14,18]} It partly reflects that patients are not sensitized about the complications of diabetes which can have dreadful consequences in terms of mortality and morbidity. Several reasons have been cited for this including lack of time, an inappropriate way of providing information, lack of trained support staff like diabetic educators.\textsuperscript{[14,19]}

Nearly, two-third of subjects knew that diabetes can be prevented. These findings are comparable with the evidence from other studies.\textsuperscript{[14,18]} Recently, conducted large studies have documented the role of preventive measures in control of diabetes.\textsuperscript{[20,21]} Hence, it is the need of the hour to disseminate this message targeting both general as well as high-risk population.
Knowledge on treatment is a primary determinant of adherence to therapy for chronic diseases like diabetes. Disturbingly nearly half of the diabetic respondents (44.3%) were unaware that they have to take medication lifelong and regularly. Similar observation was made by Gulabani et al. among diabetic patients attending a tertiary care setting.[18] This reflects the inadequate role played by health-care professionals in imparting diabetes education to their patients. It is established fact that lack of knowledge on treatment can adversely affect the quality of life of patients as it can lead to early complications and subsequent disability[22] which in turn will increase the burden of disease and imbalance the economy, creating a troublesome situation for countries like India that is already leading the world in terms of diabetic figures.[31]

The study showed that respondents were better aware of lifestyle modifications that are needed in diabetes. More than two-third of diabetic respondents were aware that they should modify their diet, exercise regularly, stop smoking, and abstain from alcohol. However, it needs to be explored whether knowledge translates in their attitude and practice. A comparative study done in South India showed that there exists a large gap between knowledge and action among diabetic patients in terms of drug therapy and lifestyle modifications.[23]

Being diabetic and having a family member with diabetes mellitus were likely to be more aware than their counterparts \( P < 0.05 \). Higher education also had a similar influence on knowledge \( P < 0.05 \). A large cross-sectional study conducted among African American adults suggested that family history of diabetes is associated with better awareness of diabetes.[24] The reason for this difference can be attributed to perceived susceptibility to illness like having family history of diabetes which stimulates individual to seek more information about the disease.[10]

The health machinery of our country is facing immense challenges as a result of diabetes. Different approaches are envisaged which include low-cost primary diabetes screening targeting high-risk population.[25] Pharmacists are now increasingly considered as an important workforce to deliver patient-oriented activity. They can easily deliver education to the diabetic patients which will reduce the workload of treating physician.[26] Another option is to have diabetic educators who have evolved as a special workforce in developed countries to deal with alarming rise in diabetes. Such a cadre of diabetic educators can go a long way in supporting health-care system in delivering effective care to the patients.[27]

Conclusion

As India is fighting against triple burden of disease, Kerala has taken a leap ahead and is at par with most developed nations of the world in terms of health and socioeconomic development which is mainly attributed to high literacy rate, especially female literacy. However, knowledge about diabetes mellitus in the study population reflects the fact that being literate does not necessarily imply that they are equally health conscious. The study indicated that awareness regarding diabetes mellitus was average but in depth knowledge was lacking. Thrust has to be given for educating the community on risk factors as this can prevent the occurrence of diabetes and delay the onset among high-risk individuals. Moreover, knowledge about complications and treatment was less among diabetic respondents. Hence, for achieving successful outcome, it is essential to educate patients on importance of treatment adherence and simultaneously to recognize diabetes-related complications once the disease is diagnosed. Positively, awareness on lifestyle modifications needed in case of diabetes was superior; nonetheless, it needs to be explored whether this is translated into actual practice.

Recommendations

Public awareness and patient empowerment can play a leading role in curbing diabetes and its sequelae which should be given priority. This can be achieved by utilizing existing human resources such as health workers, physician assistants, and social workers. They can be trained to identify high-risk groups in the community and also to impart diabetes education using culturally appropriate behavior change communication strategies. It should not undermine the major role to be played by the doctors, who can easily inspire their patients, as motivation is prerequisite for behavior change. Thus, everyone in the health team can play a crucial role. These measures will definitely pave way to reduce health-care expenditure and indirect costs due to lost productivity.

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Conflicts of interest

There are no conflicts of interest.

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