Barriers To Self-Care Behaviors Among Type 2 Diabetes Patients Residing in Rural and Urban Field Practice Areas of Belagavi, India

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A B S T R A C T

Background: Various studies show that carrying out self-care behaviors has many barriers making overall diabetes self-management difficult. This study analyzed the barriers to self-care behaviors in rural and urban population, which can be used for planning targeted community-based interventions.

Methodology: This community based cross-sectional study was carried out between September 2022 and December 2023 among 346 diabetes patients residing in rural and urban field practice areas of Belagavi using a validated questionnaire. Collected data was entered using Microsoft Excel and analyzed in SPSS software.

Results: The mean and standard deviation of the age of the participants was 60.24 ± 12.77 and 55.76 ± 12.72 years in rural and urban area, respectively. Out of 346 participants, 69.9% were females, 84.1% were Hindu, 28.6% had completed primary school, 52.6% were homemaker, 85.5% were married, and 32.9% belonged to Class III socio-economic class. The mean and standard deviation of the total barrier score was 120.32 ± 51.143 and 125.64 ± 48.893 for rural and urban, respectively. The maximum barrier score was for blood glucose monitoring barrier. The Spearman's correlation coefficient of (-0.386) with $p<0.001$*** was found out between total barrier scores and self-care behavior scores which indicates negative correlation between total barrier score and self-care levels.

Conclusion: Barriers to self-care behaviors is high in both rural and urban areas. Target-specific counseling and follow-up are needed to remove these barriers, and to have an effective practicing of self-care behaviors.

Keywords: Diabetes, Self-care, Barriers, Rural, Urban

INTRODUCTION

Diabetes mellitus (DM), along with other non-communicable diseases (NCDs), is on the rise, worldwide. In 2014, 8.5% of adults had diabetes; by 2019, diabetes was the direct cause of 1.5 million deaths, and 48% of all deaths due to diabetes occurred before the age of 70 years.[1] India, in particular, is facing an epidemiological transition, with a rapid increase in the prevalence of NCDs.[2] As per the Indian Council of Medical Research – India Diabetes (ICMR INDIAB) study, the prevalence of diabetes in India is 10.1 crores.[3]

Efficient treatment of type-2 diabetes mellitus (T2DM) calls for a multi-pronged approach. Apart from drugs self-care is also very important for successful treatment outcome. Self-care behaviors include healthy coping, healthy eating, being physically active, regular monitoring of blood glucose, adherence to medications, problem solving and reducing risks.[4] Various important bodies stress on the importance of self-care behaviors in controlling T2DM.[5]

However, many studies show that carrying out self-care behaviors has many barriers and overall diabetes self-management is difficult.[6-10] Though the barriers can be classified at various levels like individual, community, socio-cultural, economic, environmental, psychological etc., the commonly observed barriers are classified thus: diet barriers, medication barriers, blood glucose monitoring barriers and exercise barriers.[11]

This study compared the barriers related to self-care behaviors between rural and urban populations, which could be used for planning targeted community-based interventions.

METHODOLOGY

Data of Patients diagnosed with T2DM residing in rural (Kinaye) and urban (Ashok Nagar) field practice areas of Belagavi, obtained from respective NCD registers. This was a community-based comparative cross-sectional study conducted between September 2022 and December 2023.

Sample Size and Sampling technique: The sample size was calculated using G-Power software by considering: effect size, d= 0.35, alpha, α = 0.05, power (1-β) = 0.90 (β=0.10), with ratio 1:1, the sample size was 346, 173 in each place, i.e., 173 in rural area and 173 in urban area.

Four field practice areas are covered under Jawaharlal Nehru Medical College, KAHER in Belagavi- two in urban areas: Rukmini Nagar and Ashok Nagar, and two in rural areas: Vantamuri and Kinaye. The urban field practice area of Ashok Nagar and rural field practice area of Kinaye were chosen by simple random sampling by the lottery method. The Primary Health Center - Kinaye has 9 sub centres – Desur, Karle, Khadarwadi, Kinaye, Macche-I, Macche-II, Peeranwadi, Santibastwad, Waghwade. From these the sub center Peeranwadi was chosen randomly by lottery method.

For the selection of study participants, systematic sampling method was used, where a random sample, with a fixed periodic interval, is selected from a larger population.

For Rural Area: Peeranwadi has a total population of 12,831, out of which the total diabetic population is 608. Peeranwadi has a total of 2149 houses. The details of diabetic patients' households were obtained from the Community Health Officers (CHO).

The sample size for rural field practice area was 173 and the sampling interval was 3. A random number (5) was chosen. The study was started with 5th house of the field practice area of sub center Peeranwadi under PHC Kinaye and thereafter every 3rd house was chosen till the complete sample size was obtained. If selected household had no participant satisfying the inclusion criteria, the next household was included in the study.

For Urban Area: The total diabetic population in UHC Ashok Nagar is 419 and it has a total of 1200 houses. The details of diabetic patients' households were obtained from the Health Worker Female.

Th sample size for urban field practice area was 173, and the sampling interval was 2. A random number (5) was chosen. The study was started with 5th house of the field practice area of UHC Ashok Nagar and thereafter every 2nd house was chosen till the complete sample size was obtained. If selected household had no participant satisfying the inclusion criteria, the next household was included in the study.

Eligibility criteria: Men and women who have been diagnosed with T2DM by a certified physician with the duration of illness of minimum 1 year and residing in the field practice areas for a minimum of 1 year were included in the study.

Patients with T2DM with acute febrile illness and/or bed-ridden, patients with T2DM diagnosed with end-stage renal disease, cardiovascular or cerebrovascular disease within 1 month from the date of interview were excluded from the study.

Study tools: After obtaining informed consent from the patients, information regarding self-care activities was collected using the "revised version of summary diabetes self-care activities questionnaire" (SDSCA). The SDSCA has undergone two sets of validations, one with three studies (Toobert & Glasgow, 1994), and one with seven studies (Toobert, Hampson, & Glasgow, 2000).[12] The revised SDSCA consists of five self-care behaviors: diet, exercise, blood sugar testing, smoking, and foot care. Under each section, the participants were asked to respond how often they practiced the self-care behaviors in the past seven days. The scoring was done on an ordinal scale of 0–7 based on the participants' responses. Prior to the onset of the present study, the questionnaire was

translated into Kannada, and pre-tested with a small group of participants with T2DM and necessary modifications, as needed, were made in terms of comprehensibility by the participants and content of the questionnaire.

After obtaining informed consent from the patients, information regarding barriers to self-care activities was collected using the "Personal Diabetes Questionnaire" (PDQ). It is a validated questionnaire.[11] The PDQ is defined as "a useful measure of diabetes self-care behaviors and related perceptions and barriers." The questionnaire is found to be reliable, valid and feasible through various studies. Based on this questionnaire data about diabetes self-management barriers can be obtained which may help in guided patient care. For the purpose of this study the barriers aspect of the questionnaire is chosen, and an additional section 'foot-care barriers' has been added in the line of the questionnaire. In total, it contains 5 sections each containing a self-care behavior. The questionnaire has been pre-tested among small group of patients with diabetes and was found to be suitable in terms of comprehensibility by the participants and content.

Data processing and analysis/statistical analysis: Collected data was entered in Microsoft Excel and analysed by SPSS software.

Ethical Considerations: Ethical clearance was obtained from the Institutional Ethics Committee (Ref No. MDC/JNMCIEC/210). Informed consent was obtained from each participant before collection of data.

RESULTS

The mean and standard deviation of the age of the participants was 60.24 ± 12.77 and 55.76 ± 12.72 years in rural and urban area, respectively. Out of 346 participants, 69.9% were females, 84.1% were Hindu, 28.6% had completed primary school, 52.6% were homemaker, 85.5% were married, and 32.9% belonged to Class III socio-economic class. (Table 1).

The mean and standard deviation of the total barrier score was 120.32 ± 51.143 and 125.64 ± 48.893 for rural and urban, respectively (Table 2). Most of the participants had a score above the mean barrier score in both rural and urban areas (Table 2). The maximum barrier score was for the blood glucose monitoring barrier (Table 3).

Spearman correlation for age and barrier score was found to be not significant (Figure 1). The Spearman's correlation coefficient of (-0.386) with p<0.001*** was found out between total barrier scores and self-care behavior scores which indicates negative correlation between total barrier score and self-care levels (Figure 2).

A comprehensive analysis of key variables has been provided in the supplementary tables and figures.

Table 1: Socio-demographic details

Variable	Rural (%)	Urban (%)
Age (Mean ± SD)	60.24 ± 12.77	55.76 ± 12.72
Gender		
Male	63 (36.4)	41 (23.7)
Female	110 (63.6)	132 (76.3)
Religion		
Hindu	165 (95.4)	126 (72.8)
Muslim	8 (4.6)	46 (26.6)
Others	0 (0)	1 (0.6)
Education status		
No formal schooling	30 (17.3)	33 (19.1)
Less than primary school	7 (4)	6 (3.5)
Primary school completed	57 (32.9)	42 (24.3)
Secondary school completed	32 (18.5)	20 (11.6)
High school completed	14 (8.1)	27 (15.6)
College/ University completed	32 (18.5)	39 (22.5)
Postgraduate degree	1 (0.6)	6 (3.5)
Employment status		
Government Employee	12 (6.9)	22 (12.7)
Non-government Employee	3 (1.7)	21 (12.1)
Self-employed	35 (19.8)	21 (11.9)
Homemaker	92 (53.2)	90 (52)
Retired	31 (17.9)	19 (11)
Marital Status		
Single	10 (5.8)	1 (0.6)
Married	141 (81.5)	155 (89.6)
Separated / Divorced	0 (0)	3 (1.7)
Widowed / Widower	22 (12.7)	14 (8.1)
Socioeconomic class		
Class I	11 (6.4)	17 (9.8)
Class II	39 (22.5)	50 (28.9)
Class III	49 (28.3)	65 (37.6)
Class IV	41 (23.7)	31 (17.9)
Class V	33 (19.1)	10 (5.8)

Table 2: Barrier score of participants

Barrier score	Rural (n=173)	Urban (n=173)	Total (%)
Mean ± SD	120.32 ± 51.143	125.64 ± 48.893	123.17 ± 50.107
Score below mean	76 (43.9)	77 (44.5)	153 (44.2)
Score above mean	97 (56.1)	96 (55.5)	193 (55.8)

Table 3: Distribution of participants according to mean barrier score

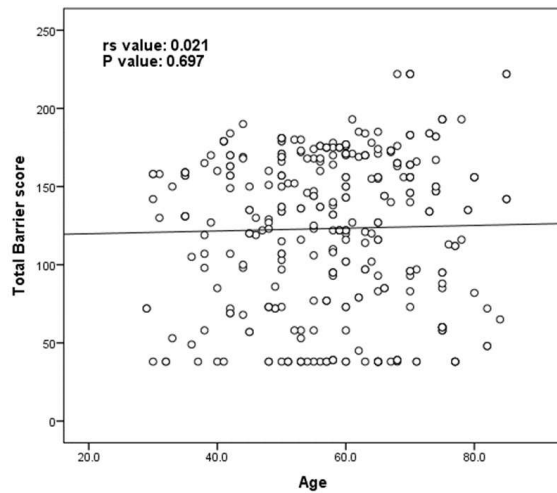| Individual barriers	Rural (Mean ± SD)	Urban (Mean ± SD)
Diet barrier	25.03±12.746	26.30±12.994
Medication barrier	29.66±15.049	29.67±12.951
Blood glucose monitor barrier	30.03±13.618	31.14±12.543
Exercise barrier	25.03±12.670	23.53±12.065
Footcare barrier	10.57±6.321	14.99±9.537

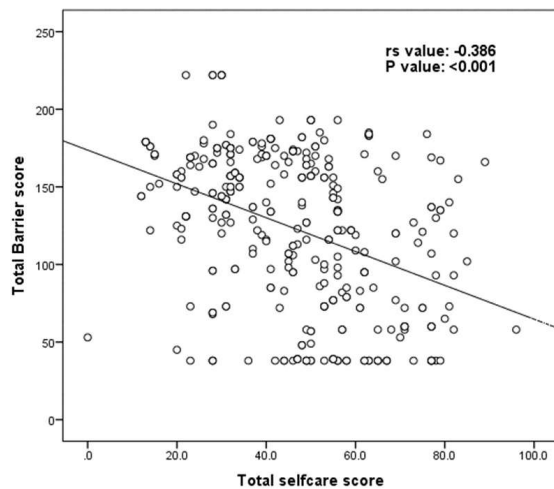**Figure 1: Correlation graph between age and total barrier score**

Figure 2: Correlation graph showing negative correlation between total barrier scores and self-care scores

DISCUSSION

In the present study, the mean ± standard deviation of barrier scores for rural area was 120.32 ± 51.143, and in the urban area it was 125.64 ± 48.893. Overall, it was 123.17 ± 50.107. Jafari S et al.[13] reported that among their study participants the mean barrier score was 150.63 ± 50.7. Ghosh A et al.[14] reported an overall barrier score of 134 ± 30.

In the present study, no significant difference was found in rural and urban areas. In both areas of residence, the maximum barrier scores were for the blood glucose monitoring barrier – 30.03 in rural and 31.14 in urban. The lowest barrier score was for footcare – 10.57 in rural and 14.99 in urban.

Different studies report different barriers, but the majority of the barriers were found to be medication adherence, lack of diet control, irregular exercise/physical activity, and improper glucose moni-

toring, and, a study by BGS et al. found out that 18.9% of their participants were part of the very-high-risk group for development of diabetic foot related complications.[15-19]

Blood glucose monitoring requires purchasing and using glucometer and strips, which are usually self-operated and are often expensive. Also, people may not be comfortable to prick themselves to check the blood glucose level. These might be the reasons for the increased blood glucose monitoring barrier scores in the present study.

The low score for footcare barrier may be attributed to the prevailing socio-cultural practices in the country. In both Hindu and Muslim traditions, the two major religions in India and in the present study, it is a practice to wash the feet regularly, before entering the house, before/after eating, before prayer etc. These ingrained habits would have made the people to follow these self-care behaviors as part of their routine life without any difficulties, and hence the low score.

In the present study, the Spearman's correlation coefficient of (-0.386) with p<0.001*** was found out between total barrier scores and self-care behavior scores which indicates moderate negative correlation between total barrier score and self-care levels. This indicates that as self-care behaviors score increases, barrier scores tend to decrease.

Ghosh A et al in their study report strong inter-relationships among all self-care components. They also found that the relationship was high for exercise, glucose testing and medications (39-62%).[14] These findings are in line with the present study.

STRENGTHS

While most studies on diabetes are done in hospitals, diabetic clinics/care centres, this community based comparative cross-sectional study collected data at the ground level in the community - from the field practice areas of Kinaye (rural) and Ashok Nagar (urban), using systematic sampling technique, which is a major strength of the present study. This adds to the external validity of the study and increases the generalisability of the results. This study is a first of its kind in India which assessed and compared the self-care behaviors and its barriers in urban and rural areas. It adds to the evidence that self-care behaviors are better in urban area in comparison to rural area, emphasising the need for target-specific interventions.

The study used two standard validated questionnaires to collect the data, with proper scoring to evaluate and present the results in a comprehensive manner, finding out associations and correlations between the variables. Moreover, the data collection period was used as an opportunity to educate the patients regarding the need for self-care behaviors, thereby increasing awareness.

LIMITATIONS

Firstly, the collected data is self-reported information, which has a potential for self-reporting bias and also white coat bias, leading participants to provide answers they perceive as correct and not what they actually practice. This limitation could impact the accuracy of the collected information.

The nature of the questionnaire is such that it collects self-care behaviors practiced in the last seven days and extrapolating it to the person's overall practice. Though care has been taken in exclusion criteria to remove such people who may have acute febrile illness and/or bed-ridden, or diagnosed with cardiovascular disease, renal disease, or cerebrovascular disease within 1 month from the date of interview, which may hamper their practice of self-care behaviors, there is still a chance for the persons to not practice good self-care behaviors in the past 7 days due to various other reasons, which is a limitation.

Finally, the cross-sectional type of the study itself is a limitation, where data is collected at one point of time. Further studies of a follow-up nature are required to more comprehensively analyze the objectives.

These limitations have to be considered when interpreting the findings. Addressing these limitations in future research could further advance the holistic and comprehensive management strategies of T2DM.

CONCLUSION

Prevalence of barriers to self-care behaviors is high in both rural and urban areas. Barriers to self-care behaviors are significantly associated with the self-care levels. Persons with poor self-care levels tend to have higher mean barrier scores, and those who have good self-care levels tend to have lower mean barrier scores. Barriers to self-care behaviors are significantly correlated with self-care levels- as self-care behaviors score increases, barrier scores tend to decrease.

Recommendations: Target-specific counseling and follow-up are needed to remove these barriers, and to have an effective practicing of self-care behaviors, which will lead to an overall good comprehensive management of type 2 diabetes mellitus.

Individual Authors' Contributions: RK: substantial inputs in design and conduction of study, approving final version; **STR:** substantial role in the conduction of study, writing the article

Availability of Data: All data available within the article and with the author upon request.

No use of generative AI tools: This article was prepared without the use of generative AI tools for content creation, analysis, or data generation. All findings and interpretations are based solely on the authors' independent work and expertise.

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