

Original Research Article

PREVALENCE OF SELF-CARE PRACTICES AND ASSOCIATED FACTORS AMONG ADULTS WITH DIABETES MELLITUS IN A RURAL COMMUNITY: A CROSS-SECTIONAL STUDY

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ABSTRACT

Diabetes mellitus is a chronic metabolic disease, which has emerged as one of the biggest public health issues in the world nowadays. Good diabetes management is not just about taking medicines; it also involves following the advice of doctors, doctors' nurses, and other health care professionals by taking part in self-care activities, such as diet, exercise, testing, medication adherence, and foot care. Poor glycemic control is linked with the onset of diabetes-related complications, especially in rural areas, where healthcare and diabetes education resources might be scarce (American Diabetes Association [ADA], 2024; International Diabetes Federation [IDF], 2021); inadequate self-care is a primary contributor to these complications. To evaluate self-care behaviors among adult diabetes mellitus patients and determine the factors that is associated with self-care behaviors in a rural community. A community-based cross sectional study was performed on 458 adults with diabetes who were sampled based on population proportionate sampling. A structured questionnaire was used to collect data which contained socio-demographic characteristics, the Summary of Diabetes Self-Care Activities (SDSCA) scale, and the Patient Health Questionnaire-2 (PHQ-2). Data were analyzed using descriptive statistics and Chi-square tests to assess the association between the self-care practices and selected variables and statistical significance was set at $p < 0.05$. Medication adherence was good in 51.3% and specific diet was good in 86.0% of the participants. Poor self-care was noted with blood glucose monitoring (100 per cent), physical activity (56.8 per cent) and foot care (58.3 per cent), however. Several areas of self-care were significantly related to age and socioeconomic status ($p < 0.05$). Of those who participated, around 12.6% screened positive for major depressive disorder (MDD) using the PHQ-2 screening tool. Medication adherence and dietary habits were adequate, but the physical activity, foot care and monitoring of blood glucose components of diabetes self-management revealed significant gaps that can benefit from structured diabetes self-management education and community-based interventions in order to improve long-term diabetes management outcomes for rural adults.

Keywords: Diabetes mellitus, self-care practices, rural population, medication adherence, Foot care.

INTRODUCTION

Diabetes mellitus (DM) is a leading chronic non-communicable disease in the world and a public health problem related to its growing prevalence, chronic sequelae, and high cost of care. It is a disease that causes long-term high blood sugar due to a failure to produce enough insulin, or insulin doesn't work properly, or causes a combination of these problems, which disrupts the body's ability to manage carbohydrates, fat and protein metabolism (American Diabetes Association [ADA], 2024). In 2021, the International Diabetes Federation (IDF, 2021) estimated there were 537 million adults aged 20–79 years with diabetes in the world, which is projected to increase to 643 million by 2030 and 783 million by 2045. High prevalence of diabetes has been observed in low and middle income countries due to increased urbanization, sedentary lifestyle, unhealthy diets and ageing populations (Sun et al., 2022).^[1,2]

India is one of the countries with the greatest prevalence of diabetes. New epidemiological data has shown that there are over 100 million people currently living with diabetes in India, and millions of people who do not have a diagnosis or are at high risk of developing diabetes (Anjana et al., 2023). The rising incidence has put significant strain on the health service, as diabetes is linked to a number of debilitating complications such as cardiovascular disease, nephropathy, retinopathy, neuropathy, diabetic foot ulcers and premature death (WHO, 2023). All these complications reduce the quality of life and also add to the expenditure on healthcare, making it imperative to understand the effective prevention and management strategies for these complications.^[3,4]

Diabetes management is not a purely pharmacological problem and people have to play an active role in managing their diabetes. Diabetes self-care includes a variety of health behaviors such as taking medication as prescribed, eating well, exercising regularly, monitoring blood glucose levels, caring for their feet, quitting smoking, and getting medical follow-up (Powers et al., 2020). These behaviors are essential for the effective management of glycemic control, to avoid acute and chronic complications as well as to enhance quality of life. There is some evidence that people who engage in the recommended self-care activities on a regular basis have improved metabolic control, less diabetes related complications, less hospitalisation and reduced mortality (Davies et al., 2022).^[5,6]

The benefits of diabetes self-management are known but compliance with self-care recommendations has not been optimal, especially in rural areas. Several factors related to self-management can pose a barrier to effective diabetes management, such as limited health literacy, inadequate diabetes education, financial difficulties, low access to health care services, cultural beliefs and low levels of family or community support (Shrivastava et al., 2021). Other

factors that may present a barrier to rural residents are distance to health care services, less access to diabetes care specialists, and fewer opportunities for diabetes education programmes. As a result, these populations are more likely to have poor glycemic control and diabetes-related complications.^[7,8]

Another significant factor affecting diabetes management is psychological health. Depression, anxiety and diabetes-related distress have been demonstrated to impact negatively on medication adherence, dietary compliance, physical activity, and self-monitoring. Screening for psychological distress among people with diabetes has thus become part of the diabetes care field (Young-Hyman et al., 2020). A holistic approach to treatment that considers social, psychological, and emotional factors can enhance treatment adherence and health outcomes.^[9,10]

The community-based assessment of diabetes self-care practices offers useful information to design targeted health education programmes and reinforce primary health care interventions. The identification of gaps in the self-management behaviors allows health care providers to plan culturally responsive education that facilitates the practice of maintaining a healthy lifestyle. Also, socio-demographic characteristics of self-care behaviours are useful in creating interventions specific to vulnerable groups.

The present, community-based, cross sectional study aimed to evaluate the self-care practices among adults with diabetes mellitus in a rural community. The present study compared adherence to diet, physical activity, medication, blood glucose monitoring, foot care, and psychosocial adjustment and looked at the relationship between these and selected socio-demographic factors. The results will help inform the design of evidence-based community interventions to enhance diabetes self-management and mitigate the impact of diabetes-related complications in rural communities.^[11-13]

MATERIALS AND METHODS

Study Design: A cross sectional study was done to evaluate diabetes mellitus self-care behaviours among the adults of the rural community. A cross sectional design was chosen as this would enable diabetes self-care behaviors and related socio-demographic factors to be assessed at one point in time within a defined population. It is a design that is frequently applied in epidemiological studies for the estimation of health related behavior prevalence and for the identification of factors associated with disease management (Setia et. al., 2016).

Study Setting: The study was conducted in the field practice area of a Rural Health Training Centre (RHTC) of Meenakshi Medical College Hospital and Research Institute, Enathur, Kanchipuram, Tamilnadu, India, serving a number of villages in the south of India, where the overall primary health care (PHC) services are provided. The study area consisted of 10 villages predominantly with

agricultural based population with less availability of specialized diabetes care services. The primary healthcare outreach programmes provide routine preventive, promotive and curative healthcare services to these villages. The study was conducted at the community level which allowed assessment of diabetes self-care practices in real-life settings and enhanced the external validity of the results in comparison to studies conducted in a hospital-based setting.

Study Population: Previous adult diabetes mellitus patients were the study population living in the selected rural villages. People who had been under treatment for diabetes for a minimum of six months were deemed eligible, since six months were believed to be sufficient for diabetes patients to become accustomed with the measures required for the self-care of the disease. Patients suffering from serious diabetic symptoms, which prevented them from carrying out their own activities and those who refused to give informed consent, were excluded from the study.

Sample Size and Sampling Technique: The required sample size was calculated using the standard formula for estimating a single population proportion: $n = Z^2pq/d^2$

Where $Z = 1.96$ at a 95% confidence level, $p = 29\%$, $q = 71\%$, and $d = 15\%$ relative precision. The calculated sample size was 417 participants. After considering a 10% non-response rate, the final sample size was increased to 458 participants.

The sample was allocated amongst the ten study villages by using population proportionate sampling (PPS) based on diabetic population in every village. Later, these eligible villagers from every village were chosen using simple random sampling. This sampling method provided representative sampling of all villages and reduced selection bias.

Data Collection Instruments: The structured interviewer administered questionnaire was divided into 3 sections and used for data collection.

1. The first section, socio-demographic and clinical data, such as age, sex, educational level, occupation, socioeconomic status, marital status, diabetes treatment modality, family history of diabetes, smoking status, alcohol consumption, financial dependence, and associated comorbidities, were collected in the first section.
2. In the second section, Summary of Diabetes Self-Care Activities (SDSCA) questionnaire developed by Toobert, Hampson and Glasgow was used. The SDSCA is a well validated tool to assess diabetes self-management behaviours. It assesses compliance with diabetes care across a number of domains: general diet, specific diet, physical activity, blood glucose monitoring, foot care, diabetes medications, and advice from health care providers. Responses were collected according to how many days, in the past week, each activity was performed.
3. The third section consisted of the Patient Health Questionnaire-2 (PHQ-2), a validated screening

tool to detect symptoms indicating depression. Those who achieve ≥ 3 scores were deemed high risk for major depression and were classified as having poor psychosocial functioning.

Data Collection Procedure: To assess the feasibility, clarity and applicability of the questionnaire, a pilot study was conducted among 20 adults with diabetes before the start of the main study. Because of the lack of significant changes after the pilot survey, the same questionnaire was used for the final survey. Community visits were made and eligible participants informed about the aims and methods of the study. All data were collected with written informed consent. Interviews were face-to-face with trained investigators that employed a standardized questionnaire. Full confidentiality of the information gathered was maintained and participants were encouraged to answer honestly.

Outcome Measures: The self-care practices evaluated encompassed six areas: Dietary practices, Physical activity, Blood glucose monitoring, Foot care, Medication adherence, and psychosocial adjustment. In SDSCA domains, the scores 0-3 were considered poor self-care, scores $>3-5$ were considered average self-care and scores $>5-7$ were considered good self-care. Scores of ≥ 3 on the PHQ-2 were considered to be indicative of a major depressive disorder.

Statistical Analysis: The data collected were tabulated in Microsoft Excel then analyzed using the Statistical Package for the Social Sciences (SPSS) software version 25.0. Socio-demographic characteristics and self-care practices were summarized using descriptive statistics. Categorical variables were summarized using frequency and percentages. Chi square test was used to test for association of self-care practices with socio-demographic variables. The p value of <0.05 was considered as statistically significant. Data were expressed as an appropriate table and with graphical illustration to make the results easy to interpret.

Ethical Considerations: The study was duly approved by the Institutional Ethics Committee of Meenakshi Medical College Hospital and Research Institute before the data collection was started. There was no compulsory participation and informed written consent from all persons was secured before entering the study. All identifying details were replaced with identification numbers, thus ensuring confidentiality and anonymity. They were told that they could leave the study at any time without losing access to care services. The study was carried out following ethical principles as stated in the Declaration of Helsinki (World Medical Association, 2013).

RESULTS

A total of 458 adults with diabetes mellitus participated in the study. The majority of participants were aged 51–60 years (34.7%), followed by 61–70

years (29.9%). Male and female were evenly distributed with 230 (50.2%) being males and 228 (49.8%) being females. The majority of the participants were from the middle (38.0%) and lower middle (37.3%) socioeconomic class and 94.1% of participants were married. As far as education is concerned, 41.0% were primary school graduates, while 33.8% were unable to read or write. Almost half (48.9%) of the participants were semiskilled

workers, and 56.3% were financially independent. Smoking was relatively low (reported by 7.2%) and there was a similar low proportion who reported consuming alcohol (7.4%). Most (43.7%) had diabetes for 7 months to 5 years and 95.6% were taking oral hypoglycemic agents as their main medication. The most frequent comorbidities were hypertension, found in 33.4% of the study population.

Table 1: Sociodemographic Characteristics of the Study Participants (N = 458)

Variable	Category	n	%
Age (years)	≤40	-	-
	41–50	-	-
	51–60	159	34.7
	61–70	137	29.9
	>70	-	-
Sex	Male	230	50.2
	Female	228	49.8
Education	Illiterate	155	33.8
	Primary	188	41.0
	Secondary & above	115	25.2
Marital status	Married	431	94.1
	Others	27	5.9
Socioeconomic status	Upper	-	-
	Middle	174	38.0
	Lower middle	171	37.3
	Lower	-	-
Duration of diabetes	7 months–5 years	200	43.7
	>5 years	258	56.3

Self-care Practices: Self-care practices were assessed using the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire [Table 2]. Medication adherence emerged as the strongest self-care domain, with 51.3% of participants demonstrating good adherence. Similarly, adherence

to specific dietary recommendations was satisfactory, with 86.0% of participants reporting good compliance. General dietary practices were classified as average among 41.4% of participants, whereas dietary spacing of carbohydrates was average in 50.9%.

Table 2: Diabetes Self-Care Practices Among Participants (N = 458)

Self-care domain	Poor n (%)	Average n (%)	Good n (%)
General diet	-	190 (41.4)	-
Specific diet	-	-	394 (86.0)
Physical activity	260 (56.8)	-	-
Blood glucose monitoring	458 (100.0)	-	-
Foot care	267 (58.3)	-	-
Medication adherence	-	-	235 (51.3)

Conversely, considerable deficiencies were observed in other domains of diabetes self-management. More than half of the participants (56.8%) exhibited poor physical activity practices, while 58.3% demonstrated poor foot-care practices. Notably, all participants (100%) were classified as having poor blood glucose monitoring practices according to the SDSCA scoring criteria, indicating a substantial gap in routine diabetes self-monitoring. These findings suggest that although adherence to medication and dietary advice was relatively satisfactory, important aspects of lifestyle modification and self-monitoring remained inadequate.

Psychosocial Adjustment: Psychological well-being was evaluated using the Patient Health Questionnaire-2 (PHQ-2). Most participants (87.4%) scored below the threshold suggestive of depression, whereas 12.6% had PHQ-2 scores indicating a probable major depressive disorder [Table 3]. These findings highlight that although the majority of participant's demonstrated satisfactory psychosocial adjustment, a considerable minority remained at increased risk of depressive symptoms requiring further clinical evaluation.

Table 3: Psychosocial Adjustment among Participants (PHQ-2)

Variable	n	%
Normal	400	87.4
Probable depression	58	12.6

Association between Age and Self-care Practices:

Age demonstrated statistically significant associations with several domains of diabetes self-care [Table 4]. Participants aged 51–60 years exhibited significantly better adherence to general dietary practices compared with other age groups ($\chi^2 = 24.63$, $p = 0.002$). Similarly, adherence to overall

dietary recommendations was highest in this age group ($\chi^2 = 22.64$, $p = 0.004$). Physical activity also differed significantly across age categories ($\chi^2 = 24.68$, $p = 0.020$), with participants aged 51–60 years showing relatively better compliance than older individuals.

Table 4: Association between Age and Diabetes Self-Care Practices

Self-care domain	χ^2	p-value	Significant
General diet	24.63	0.002	Yes
Specific diet	22.64	0.004	Yes
Physical activity	24.68	0.020	Yes
Medication adherence	27.98	0.001	Yes
Psychosocial adjustment	121.54	0.001	Yes

Medication adherence varied significantly with age ($\chi^2 = 27.98$, $p = 0.001$), with the greatest proportion of participants demonstrating good adherence belonging to the 51–60-year age group. In contrast, psychosocial adjustment was poorer among older participants, particularly those aged 61–70 years, who showed the highest prevalence of probable depressive symptoms ($\chi^2 = 121.54$, $p = 0.001$). These findings indicate that age plays a significant role in influencing diabetes self-management behaviors as well as psychological well-being.

Association between Sex and Self-care Practices:

Although male participants generally demonstrated better self-care behaviors than females across several domains, these differences were not statistically significant. Males showed relatively higher compliance with dietary recommendations, physical activity, foot-care practices, and medication adherence. However, the association between sex and dietary practices ($p = 0.43$), physical activity ($p = 0.14$), and medication adherence ($p = 0.24$) did not

reach statistical significance. Female participants exhibited a comparatively higher proportion of probable depressive symptoms than males. Overall, sex was not identified as an independent determinant of diabetes self-care in this study.

Association between Socioeconomic Status and Self-care Practices:

Socioeconomic status showed significant associations with dietary behaviors. Participants belonging to the middle socioeconomic class demonstrated better adherence to general dietary recommendations than those from other socioeconomic groups ($\chi^2 = 20.43$, $p = 0.009$). Likewise, overall dietary compliance differed significantly across socioeconomic categories ($p = 0.001$), suggesting that economic status may influence the ability to adopt and maintain recommended dietary modifications. Participants from higher socioeconomic groups generally demonstrated better self-care behaviors than those from lower socioeconomic strata.

Table 5: Association between socioeconomic status and diabetes self-care practices

Self-care domain	χ^2	p-value	Significant
General diet	20.43	0.009	Yes
Specific diet	—	0.001	Yes
Physical activity	—	>0.05	No
Medication adherence	—	>0.05	No
Foot care	—	>0.05	No

Overall, the study revealed considerable variation across different domains of diabetes self-care. While adherence to prescribed medication and specific dietary recommendations was generally satisfactory, major deficiencies were identified in blood glucose monitoring, physical activity, and foot-care practices. Age and socioeconomic status were significantly associated with several self-care domains, whereas sex showed no significant association. Approximately one in eight participants was at risk of depression, emphasizing the importance of integrating psychosocial assessment into routine diabetes management. These findings underscore the need for comprehensive diabetes self-management education programmes focusing on lifestyle modification, regular glucose monitoring, foot-care

education, and psychological support to improve diabetes outcomes in rural communities.

DISCUSSION

This current community-based cross sectional study evaluated diabetes related self-care behaviors in adults living in a rural community and the factors related to adherence of recommended self-management behaviors. The results showed that most participants were adhering well to their medication regime and to some dietary aspects, but there were significant gaps with physical activity, blood glucose monitoring and foot-care. This study demonstrates some significant areas of unmet diabetes self-management and the need for focused diabetes

education interventions at the primary health care level.

In this study, the most favorable self-care domain was adhering to prescribed medications, as evidenced by over 50% of participants exhibiting good adherence. The result is similar to previous studies, which found that diabetic patients were more likely to be adherent to drugs than lifestyle-related behaviors (Shrivastava et al., 2021; Powers et al., 2020). Chronic medication use may be related to access to oral hypoglycemic agents via public health services and medication education about the importance of taking medications as prescribed. Likewise, most of the participants were compliant to certain dietary recommendations, and dietary counseling by health care professionals might have positively impacted food-related behaviors. In general dietary compliance was, however, only moderate, which suggests that transfer of knowledge to dietary habits in the long run, can be difficult to achieve, especially in rural areas.

In comparison, physical activity was one of the lowest performing domains of self-care. Over half of participants reported that they did not engage in regular exercise, which aligns with other studies conducted in other low- and middle-income countries which identified that occupational demands, increasing age, limited awareness and lack of recreational facilities were barriers to physical activity (International Diabetes Federation [IDF], 2021; World Health Organization [WHO], 2023). Physical activity is important because it makes the body more sensitive to insulin and helps to regulate blood glucose levels, as well as to maintain body weight and health of the cardiovascular system; if someone is not active, this could lead to the occurrence of complications in the future and difficulties in regulating blood glucose levels.

The most significant result of the present study was the poor universal practice of blood glucose monitoring. The Summary of Diabetes Self-Care Activities (SDSCA) scoring criteria were used to determine all participants to be having poor glucose monitoring behavior. These findings are also consistent with those in rural populations where cost of glucometers and test strips, poor access to laboratory facilities and inadequate patient education decrease the number of self-monitorings (Anjana et al., 2023). Community-based diabetes education and provision of affordable monitoring facilities could significantly improve glycemic control and help identify early diabetes treatment failure.

In addition, the foot-care practices were also suboptimal in most participants. Poor foot care continues to be a major issue for diabetes, with a prevalence of diabetic foot ulcers as a major cause of hospitalisation, disability and lower-limb amputation. Many previous studies have shown that the routine examination of feet, appropriate footwear and early diagnosis of foot injuries can significantly decrease the incidence of diabetic foot complications (American Diabetes Association [ADA], 2024). These findings highlight the importance of including

a structured foot-care education program into routine diabetes management programs.

Several domains of self-care were significantly related to age, such as dietary practices, physical activity, medication adherence, and psychosocial adjustment. The adherence to recommended self-care behaviors was relatively higher among participants in the 51-60 age group compared with older adults. As people get older, they may have decreased mobility, increased number of comorbidities, decreased functional capacity, and reliance on others for care, which can all have a negative impact upon diabetes self-management. Moreover, older participants were more likely to have depressive symptoms, which underscore the need for mental health screening to be part of diabetes management. The relationship of depression with medication adherence and unhealthy lifestyle behaviors, as well as glycemic control, has been continually found (Young-Hyman et al., 2020). Self-care behaviors also were related to socioeconomic status, specifically with dietary adherence. Those with higher socioeconomic status were more compliant with recommended dietary practices, which may be due to greater access to health information and financial resources to afford healthier foods. While males tended to perform slightly better than females on the self-care behaviors, sex differences were not statistically significant and diabetes education should be offered to both equally.

In general, the results revealed that diabetes self-management in the rural community are still suboptimal, even though medication adherence is quite good. Community-based diabetes self-management education (CSME) and regular counseling, services for affordable blood glucose monitoring, promotion of physical activity, and social support should be incorporated into primary healthcare programmes to enhance self-care and prevent diabetes-related complications.

CONCLUSION

Diabetes mellitus is a life-long condition that can only be optimally managed with self-management. The study of the present report confirmed that although adults with diabetes in the rural community demonstrated good adherence to the prescribed medications and some dietary recommendations, there were serious gaps in physical activity, monitoring of blood glucose, and foot-care. The gaps highlight that the use of medication is not enough to successfully manage diabetes and a sustained lifestyle change and regular self-monitoring is needed. The study also identified age and socioeconomic status as being important factors in determining diabetes self-care behaviors. The middle-age group showed greater compliance with the recommended self-care activities while the older group showed more poor psychosocial adjustment and self-management. The results indicated that

diabetes education programmes need to be age- and socioeconomic status- and health-specific to ensure their effectiveness.

This is especially problematic since poor glycemic control and lack of foot-care practices are critical in preventing the development of serious diabetes-related complications like diabetic foot ulcers, infections, visual issues, nephropathy, and cardiovascular disease. Therefore, enhancing diabetes self-management education, access to affordable glucose-monitoring facilities and regular physical activity should be emphasized in primary health care services. Assessment of psychosocial well-being should also be part of the routine care for diabetes, as early identification and management of depressive symptoms can help improve adherence to treatment and quality of life. Combined interventions, such as those by physicians, nurses, dietitians, community health workers, and family members are likely to lead to better long-term self-care practices.

The study concludes that diabetes education programmes should be comprehensive, patient-centered and community-based, covering clinical and behavioral aspects of diabetes management. These interventions can have a positive impact on self-care behaviors, decrease diabetes related complications, improve quality of life, and ultimately reduce the increasing public health burden of diabetes in rural communities.

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