Original Article

Self-care practices among type II diabetics in rural area of Kancheepuram district, Tamil Nadu

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Abstract

Introduction: Type 2 diabetes mellitus is one of the most prevalent noncommunicable diseases in India. The acute and chronic complications of diabetes impact the physical, mental, and social well-being of the patients, thereby, placing a major burden on the health care system. Studies have shown that adequate self-care practices among the patients will facilitate good glycemic control and prevent complications. **Objectives:** To study the patterns of self-care practice among diabetic patients and the factors associated with them. **Methods:** This descriptive cross-sectional study was carried out among 250 diabetics in the rural field practice area of a Tertiary Medical College and Hospital in Chennai. The participants were interviewed on their diabetic status and various components of self-care practices adopted from The Summary of Diabetes Self-care Activities (SDSCA) Measure. Adherence to medication was assessed by using Morisky Medication Adherence Scale-4 (MMAS-4). **Results:** Our study observed that the overall prevalence of good self-care practices was very low (5.6%). Moderate self-care practices were prevalent in 42% of the study participants whereas the majority (52.4%) of the study population had poor self-care practices. In our study, the association between self-care activity with educational status and occupation was found to be statistically significant. Adherence was high for blood sugar testing (75.2%) and medication (70.4%) in the study population whereas adherence for foot care was poor (17.6%). **Conclusion:** Our study emphasized on the need for knowledge and awareness to be provided in rural areas regarding diabetes care management and self-care practices. Structured programs need to be planned to improve the attitude and practices of diabetic patients to promote better compliance towards diet, exercise, adherence to drugs, and appropriate foot care.

Keywords: Footcare, overweight, rural, self-care, type 2 diabetes

Introduction

According to the International Diabetes Federation estimates, around 451 million people worldwide had diabetes mellitus (DM) in 2017 and this number is expected to rise to 693 million by 2045.[1] India being a developing country has been facing the threat of both communicable and noncommunicable diseases in recent times. Among noncommunicable diseases, the prevalence of type 2 DM has been steadily increasing in the past few decades. India is home to 72.9 million people with diabetes and is estimated to have the second-highest number of cases of DM in the world after China in 2017.[1]

Type 2 DM is a lifestyle disorder resulting due to insulin resistance. This insulin resistance is precipitated by improper lifestyle practices like intake of high carbohydrate-rich diet, reduced intake of fruits and vegetables, lack of adequate exercises and physical activity. The disease manifests as a chronic metabolic disorder resulting in persistent hyperglycemia and its damage to

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various organs and tissues. A tight metabolic control achieved through lifestyle modification, regular medication, and periodic follow-up can go a long way in preventing complications of the disease.[2]

Self-care practices include regular monitoring of blood glucose levels, adherence to medication and diet, regular exercise, and periodic foot examination.[3] Several studies in the past have proven that healthy self-care practices significantly aided in reducing the glucose levels and have improved the overall quality of life among the diabetics.[4] Patients with good knowledge and good health care practices have higher chances of achieving good glycemic control and reduce cardiovascular risk and vice versa.[5]

As the overwhelming majority of the day to daycare in diabetes is handled by patients and their families there is an imminent need for reliable and valid measures for self-care management of diabetes.[6] In addition, the treatment expenses for complications and diabetic management increase every year and diabetes cost at least 548 billion US dollars in healthcare expenditure in 2013 which was roughly around 11% of total health spending on adults.[7]

Prudent and sensible care taken by the patient and families for diabetics and general health and well-being will go a long way in minimizing this financial burden for the individual family and the community at large.

The increase in the prevalence of diabetes is attributed to the increase in the prevalence of its risk factors namely, obesity, smoking, alcohol intake. There are several regional variations with in the country and the National Urban Diabetes Survey NUDS reveal the highest prevalence in Hyderabad (16.6%) followed by Chennai (13.5%) and Bangalore (12.4%). Though lifestyle changes are rampant in urban and semi-urban population diabetes is fast catching up even in rural areas. There are very few studies that have been done to access the prevalence and pattern of diabetes in rural areas. Nevertheless, the existing data shows that rural India is also catching up in the diabetic epidemic. A study done in Andhra Pradesh showed that the prevalence of diabetes in rural areas in 2005 was 13.2%.[8] In another study done in rural sonipath showed a prevalence of 19.36% among males and 16.98% among females.[9]

Risk factors influencing the glycemic control

Type 2 DM is the predominant form of diabetes caused by genetic factors related to impact insulin secretion, insulin resistance and environmental factors. Of the several environmental factors obesity has a significant pathophysiological mechanism which acts by the following steps:

1. Augmentation of adipose tissue mass, resulting in liquid oxidation.
2. Insulin resistance mediated by glucose storage and oxidation.
3. Excess of unused glycogen, resulting in the prevention of further glucose storage.
4. Complete beta-cell exhaustion.[10]

Self-care practices for preventing DM

Considering the chronicity, and impact of diabetes on physical, physiological, and physiological well-being, preventive strategies are advocated for the management of the DM. The effectiveness of diabetic control depends solely upon the self-care taken by the individual and the family members. The principal aim of secondary treatment is to maintain blood glucose levels within the normal levels and also to maintain an ideal to body weight. It is essential to monitor the glucose levels at periodic intervals with the help of the glycosylated hemoglobin and home based glucose monitoring. Several interventions have proven to be effective which include lifestyle interventions, glycemic control, blood pressure control, annual eye examinations, Periodic foot care examinations, etc., There are seven principles proven to be effective with diabetes management: healthy eating, being active, monitoring, taking medication, problem solving, healthy coping, and reduced the risks. Of these seven principles, dietary intake, physical activity, medication adherence, and periodic health checkups are usually accessed in the primary care settings to know about the self-care practices.[2] Globally diabetes results in USD 727 billion being spent yearly by people with diabetes only on health care, which corresponds to one for every 8 dollars spent on health care.[1]

Self-care practices are defined as a set of behavior practices by people with diabetes in order to successfully manage the disease on their own.[11] These self-care practices are found to have an association with the glycemic control and thereby reduce the incidence of complications occurring due to DM.[12]

Convincing pieces of evidence show that when the patient carry out self-care practices in the systematic and correct manner with repeated reinforcement of health education, they can improve the blood sugar control. Moreover, studies reveal that though diabetics have good adherence to drugs but poor knowledge of complications and poor practices related to blood sugar monitoring and lifestyle modification.[13] There are very few studies done to explore the self-care practices pattern in rural areas and, therefore, the growing need to assess this practice pattern in rural areas in order to formulate policy regarding the self-care practices for diabetic patients.

Aims and Objectives

Based on this background, the study was carried out in the rural area of Kancheepuram district in Tamil Nadu with the following objectives.

1. To evaluate self-care practices among diabetic patients in the rural population of Kancheepuram.
2. To determine the association between self-care practices and blood sugar levels among the study population.

Methodology

Study design

This is a community-based cross-sectional study.

Study area

The rural field practice area of a Tertiary Medical College and Hospital in Chennai.

Study duration

4 months. (June to September 2018)

Study Population

Inclusion criteria

Type 2 diabetic patients who are more than 18 years of age with duration of illness of a minimum of 1 year and those who are willing to participate in the study.

Exclusion criteria

Pregnant women, newly diagnosed diabetics (less than 1-year-old), and those who are not willing to participate in the study.

Sample size calculation

Based on the prevalence of self-care practice activities (45%) in diabetic patients. The sample size was calculated to be 239 with a relative precision of 15%, a non-response rate of 10%, and a confidence interval of 95%. The minimum required sample size came as 239 which was rounded off to 250.

Sampling method

Simple random sampling method.

Study Participants

Sampling technique

The rural field practice area of the Tertiary Medical College and Hospital in Chennai covers a population of 28,494 which includes seven villages**.** Out of the seven villages, one village was randomly selected by simple random sampling. The list of eligible participants was obtained from the rural health and training center records, Kelambakkam. By using a random number table, the study population was selected until the desired sample size of 250 is reached.

Data collection tools

A structured interview schedule was used to obtain data regarding the background characteristics, diabetic profile, including duration of diabetes, etc., Self-care practices were assessed based on key questions regarding dietary habits, physical activity, blood sugar testing, adherence to medications, foot care, and smoking adopted from The Summary of Diabetes Self-care Activities (SDSCA) Measure.[14] Adherence to medication was assessed using Morisky Medication Adherence Scale-4 (MMAS-4).[15] A score of "1" was given for the presence of the following components and "0" was given for the absence of the same. The questions were as follows:

1. Weekly consumption of carbohydrates ≤2 times a week
2. Weekly consumption of fats ≤2 times a week
3. Weekly consumption of fruits and raw vegetables ≥5 times a week
4. Weekly foot examination ≥5 times a week
5. Weekly exercise regimen ≥5 times a week
6. Absence of smoking
7. Periodic blood sugar testing once in 3 months

The subjects were questioned regarding the adherence to medication based on the MMAS-4 and were given a score of 1–4. The questions comprised

1. Never forgotten to taken medicines
2. Never careless about medicines
3. Do not stop taking medicines if the participant feels worse
4. Do not stop taking medicines if the participant does not have any symptoms

Overall scoring of the self-care practices is derived as a cumulative score of SDSCA (score 0 to 7) and MMAS-4 scale thus giving a maximum score of 11. The subjects were then categorized into three groups based on their total self-care scores into:

1. Poor (0–4),
2. Moderate (5–7) and,
3. Good (8–11) self-care.

Clinical examination was carried out to measure the height and weight to calculate the body mass index. BMI was graded as per WHO classification of BMI for Asians.[16]

Random blood sugar was estimated using a standardized glucometer. A random blood sugar of >180 was considered as uncontrolled DM.[17,18]

Ethical approval and informed consent

Ethical approval was obtained from the institutional ethics committee prior to the commencement of the study. Each participant was explained in detail and informed consent was obtained prior to the data collection.

Data analysis

Data was entered and analyzed using SPSS ver. 20 software. The prevalence of self-care practices was expressed as percentages. A Chi-square test was used to analyze the association between various risk factors and scores. A *P* value <0.05 was considered statistically significant.

Results

Table 1 shows the distribution of demographic characteristics of subjects in the study population. Among the 250 total study subjects, 137 subjects (54.8%) were males and 113 subjects (45.2%) were females. The majority of the study participants belonged to age >50 years (78.8%). The education level of the participants was high school level in 26% of the participants. The majority

Table 1: Demographic variables of the study group

Characteristics	Frequency (*n*=250)	Percentage (%)
Age (in years)		
<50	53	21.2
>50	197	78.8
Sex		
Males	137	54.8
Females	113	45.2
Education		
Illiterate	56	22.4
Primary	51	20.4
Middle school	46	18.4
High school	65	26.0
Higher secondary/diploma	16	6.4
Graduation	13	5.2
Post-graduation	3	1.2
Occupation		
Unemployed	113	45.2
Unskilled	52	20.8
Semiskilled	37	14.8
Skilled	39	15.6
Clerical	7	2.8
Executive/professional	2	0.8
Socioeconomic status		
Upper	0	0
Upper middle	22	8.8
Lower middle	181	72.4
Upper lower	35	14.0
Lower	12	4.8
Religion		
Hindu	189	75.6
Christian	43	17.2
Muslim	18	7.2
Marital status		
Married	243	97.2
Unmarried	7	2.8

of the participants were unemployed (45.2%) and belonged to lower-middle socioeconomic status (72.4%).

The clinical profile of the study participants is given in Table 2. It was observed that 62% of the study participants had diabetes for more than 5 years and the control of diabetes status was present only in 37.6%. The majority of the participants were obese >25 kg/m^2 (58%).

The prevalence of self-care practices is given in Table 3. It was observed that the majority of the participants consumed carbohydrates >2 days in a week (75.2%) and the consumption of fruits and vegetables was <4 days in 72% of the participants.

The weekly foot examination was evaluated and 82.4% examined their foot <5 days a week and did not follow exercise regimen beyond 5 days a week (80.8%). Smoking history was present in 21.6% and periodic blood sugar testing beyond 3 months was present in 75.2%.

Table 2: Clinical profile of the study participants

Parameter	Frequency (*n*=250)	Percentage (%)
Duration of diabetes		
<5 years	95	38.0
≥5 years	155	62.0
Diabetic status		
Controlled (<180 mg/dL)	94	37.6
Uncontrolled (>180 mg/dL)	156	62.4
Body mass index		
Underweight(<18.49)	2	0.8
Normal(18.5-22.9)	54	21.6
Overweight(23-24.9)	49	19.6
Obese (>25)	145	58.0

The adherence to medication was elicited using the MMAS-4 scale. It was observed that 70.4% of the study population had high medication adherence (score 1 and 2), while 29.6% of the study population had low medication adherence (score 3 and 4).

Table 4 shows the domain-wise distribution of self-care practices in our study population. The majority of the patients were comfortable checking the blood sugars regularly (75.2%), and medication (70.4%) and only 17.6% were checking their feet regularly, 19.2% were doing exercise regularly, and 35.2% were adherent to the diet recommendations. Maximum adherence was seen for blood sugar testing (75.2%) and the least adherence was seen for foot care (17.6%).

The overall scoring of self-care practices is given in Table 5. Good self-care practices were present in 5.6% of the participants, while a moderate score was obtained in 42% of the participants. The majority of the participants (52.4%) had a very poor self-care practice.

The association between factors influencing self-care practices and the scores is given in Table 6. It was observed that random blood sugar levels >180 mg/dL had a significant impact on the scores ($P < 0.05$). Education and occupation also significantly influenced the scores of self-care practice ($P < 0.05$).

Discussion

This cross-sectional study was conducted in the rural field practice area of a Tertiary Medical College and Hospital in Chennai and mainly focused on the self-care practices among type 2 diabetics. Our study observed that the overall prevalence of good self-care practices was very low (5.6%). Moderate self-care practices were prevalent in 42% of the study participants and the majority of the study population had poor self-care practices (52.6%). In a similar study conducted in Iran,[19] the majority of diabetic patients had a poor score of self-care (63.6% [243]) of subjects, 31.7% (121) had average and 4.7% (18) had good self-care practices.

Among the various aspects of self-care practices, consumption of carbohydrates was high in our study (>70%). In our

Table 3: Prevalence of self-care practices among the study participants

Parameter	Frequency (*n*=250)	Percentage* (%)
Weekly consumption of carbohydrates?		
0-2 days	62	24.8
>2 days	188	75.2
Weekly consumption of fats?		
0-2 days	133	53.2
>2 days	117	46.8
Weekly consumption of fruits and raw vegetables?		
0-4 days	180	72.0
5-7 days	70	28.0
Weekly foot examination?		
0-4 days	206	82.4
5-7 days	44	17.6
Weekly exercise regime?		
0-4 days	80.8	202
5-7 days	19.2	48
Smoking history		
Present	54	21.6
Absent	196	78.4
Periodic blood sugar testing done over past 3 months	188	75.2
Adherence to medications (MMAS-4 scale)		
High adherence(1+2)	176	70.4
Low adherence (3+4)	74	29.6

*The percentages will not total to 100

Table 4: Domain-wise distribution of self-care practices among the study participants

Self-care practices domains (*n*=250)	Satisfactory	Unsatisfactory
Diet	88 (35.2)	162 (64.8)
Exercise	48 (19.2)	202 (80.8)
Footcare	44 (17.6)	206 (82.4)
Medication adherence	176 (70.4)	74 (29.6)
Regular blood sugar check-ups	188 (75.2)	62 (24.8)

Table 5: Self-care practices scoring among the study participants

Score	Frequency(*n*=250)	Percentage(%)
Poor (0-4)	131	52.4
Moderate (5-7)	105	42.0
Good (8-11)	14	5.6

study, satisfactory diet practice was found in only 35.2% of study participants, which is less when compared with other studies (45.9%,[20] 41%[21]) conducted in South India.

Adherence to medication was 70.4% in our study population. Similar findings were reported in studies conducted by Garg *et al.*[22] (72.3%) and Goyal *et al.*[23] (71.4%). A study done by Selvaraj *et al.* showed that the prevalence of diabetic medication adherence was 95%, which was significantly higher compared to our study.[24] The regional and rural-urban differences could have been the reason for this difference.

75.2% of the study population had satisfactory blood sugar monitoring which is similar to the results reported by Selvaraj *et al.*[24] and study done in Mangalore.[20]

In the study population, apart from the daily living activities, only 48 (19.2%) were doing regular exercise and 203 (79.3%) participants were not doing regular exercise. This is lesser than the results of other similar studies done in West Bengal[22] and Mangalore.[20]This might be due to a lack of knowledge on the difference between physical activity and daily living activities and lack of access to recreational centers in the area. Similar findings were observed in studies conducted in India by Gopichandran *et al.*[14]

In the domain of foot care, only 17.6% of the study population were checking their feet regularly. Our study results in foot care are lower than other studies done in West Bengal[22] and Uttar Pradesh.[23] A study done in Ethiopia found that the majority (82.9%) of the study population practiced adequate foot care.[25]

Our study explored the factors influencing the level of self-care practices among the study participants. The present study found that there was a significant association between self-care activity with educational status and occupation. A study done by Suguna *et al.*[17] and Tang *et al.*[26] found that higher educational status was associated with better self-care.

It was observed that education and occupation played a major role in influencing the self-care practices. The upper-lower socioeconomic class was significantly at increased risk of poor self-care practices compared to the other groups ($P < 0.05$). The results of our study correlated well with the study of Garg *et al.*[22]

Our study elucidated the role of socioeconomic status in influencing self-care practices. It can be assumed that people in lower economic status have lesser access to appropriate information regarding diabetes care and management. Apart from language being a barrier, the attitude toward diabetic management needs to be modified and strengthened in these social groups. Therefore the inevitable preliminary step in diabetes management is to provide adequate knowledge regarding the importance of self-care practices. Several studies have proven that level of knowledge is directly proportional to self-care practices and this has been found to be statistically significant.[3]

The differences in self-care practices seen in our study could be due to a higher proportion of illiterate and unemployed participants present in our study. Overall our study showed a poor self-care practice in relation to diet, foot care and exercises. This could have arisen because of the lack of awareness and knowledge regarding diabetic care in rural areas.

Conclusion

Our study emphasized on the need for knowledge and awareness to be provided in rural areas regarding diabetes care management

Table 6: Factors influencing self-care practices among the study participants:

Factor	Scores *n* (%)			Chi sq	*P*
	Poor	Average	good		
Random blood sugar (mg/dL)					
>180	25 (26.6)	60 (63.8)	9 (9.6)	40.484	0.0001
<180	106 (67.9)	45 (28.8)	5 (3.2)		
Education					
Illiterate	34 (60.7)	20 (35.7)	2 (3.6)	28.844	0.004
Primary	26 (51)	22 (43.1)	3 (5.9)		
Middle school	25 (54.3)	20 (43.5)	1 (2.2)		
High school	36 (55.4)	25 (38.5)	4 (6.2)		
Higher secondary/diploma	8 (50)	4 (25)	4 (25)		
Graduation	2 (15.4)	11 (84.6)	0 (0)		
Post graduation	0 (0)	3 (100)	0 (0)		
Occupation					
Unemployed	68 (60.2)	42 (37.2)	3 (2.7)	25.569	0.04
Unskilled	26 (50)	22 (42.3)	4 (7.7)		
Semiskilled	17 (45.9)	19 (51.4)	1 (2.7)		
Skilled	20 (51.3)	13 (33.3)	6 (15.4)		
Clerical	0 (0)	7 (100)	0 (0)		
Executive/professional	0 (0)	2 (100)	0 (0)		

and self-care practices. Poor lifestyle practices and poor adherence to medications are indicators of lack of appropriate outreach activities by the health team in rural areas. There is a greater need for periodic evaluation and risk identification where the health worker is expected to make door-to-door visits to assess, monitor, and educate regarding the self-care practices. It is essential for the doctors at the primary health care level to educate the patients on diet, exercise and foot care practices to each patient at the time of diagnosis. Unfortunately, in the existing scenario of primary health care, the doctors of primary health care face the huge challenges of tackling patients by giving due attention. This can be easily sorted out by giving counseling services where the doctors can educate the health workers and they, in turn, can educate the public. Structured programs need to be planned to improve the attitude and practices of diabetic patients to promote better compliance towards diet, exercise, adherence to drugs and appropriate foot care.

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Conflicts of interest

There are no conflicts of interest.

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