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Social Medicine

A Mixed Methods Study of Self-Care Behavior in Patients of Type 2 Diabetes Mellitus Availing Out-Patient Services in A Hilly Tribal Area of Ahmednagar District of Maharashtra in India

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Abstract	Original Research Article

Background: Management of Diabetes in tribal populations who have lower access to education and health care services poses unique challenges. Understanding patterns at local level will help implement comprehensive primary care services better. **Objectives:** To record self-care behaviors and identify barriers to self-care among tribal diabetics. **Material and Methods:** A triangulation (Quant + Qual) mixed-methods study was undertaken in 124 patients with type 2 Diabetes mellitus attending tribal health clinics in Bhandardara and Rajur in Akole taluka between April 2019 to April 2020. Socio-demographic profile, clinical history, Diabetes Self-Management Questionnaire (DSMQ) scores, and themes from Focus group discussion with patients were analyzed. **Results:** There was negative correlation between all domains of self-care with age. Being married correlated with better diet management (ρ= 0.344, p=0.001), physical activity (ρ= 0.184, p=0.04), and health service utilization (ρ= 0.274, p=0.002). Tobacco consumption was reported by 66.9% of patients and 74.49% of patients reported alcohol consumption. Presence of addictions showed negative correlation with all domains of self-care behaviors. **Conclusion:** Patients have led a relatively active lifestyle and are willing to comply with advice. Areas that need special attention are high prevalence of addictions, lack of foot care, lack of knowledge, depression & lack of supportive care. Family circumstances and socio-cultural factors need to be taken into account. Supportive care, family involvement in diet planning, improving health service utilization by addressing health beliefs, availability of time and money, competing priorities, perceived quality of care, and patient's expectations from care providers. Efforts to improve community participation and inclusive care will foster confidence among patients to avail of services.
Keywords: Self-care behaviors, Type 2 Diabetes mellitus, Tribal, India, Mixed method.

INTRODUCTION

Diabetes mellitus constitutes a sizable portion of the disease burden of every nation and has a great socio-economic cost. According to WHO, the prevalence of diabetes is predicted to double globally from 463 million in 2020 to 700 million in 2045 with a maximum increase in India [1]. It is predicted that by 2030 diabetes mellitus may afflict up to 79.4 million individuals in India [2]. There is also strong evidence that Indians have a greater degree of insulin resistance and a stronger genetic predisposition to diabetes [3]. Anyone with diabetes has to make multiple daily choices about the management of their condition, such as appropriate dietary intake, physical activity, and adherence to drugs, often with minimal input from a healthcare professional [4]. The tribal populations have lower access to education and health care services as compared to the urban population. This poses unique challenges in the management of diabetes in a tribal population.

Our study area is a part of the Western Ghats (*Sahyadri Mountains*) of Maharashtra state of India. The tribal population in this area includes Mahadev Koli, Thakars, Bhils, and Ramoshies. The Centre for Social Medicine runs Tribal Health and Research Clinics (THRC) at Bhandardara and Rajur villages. Seeing an increase in the number of patients with diabetes, it was felt that structured comprehensive need-based primary care services should be provided to the patients. A need for baseline data for planning intervention was felt. Since there were no similar studies from the area, we aimed to understand the

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pattern of self-care behaviors and barriers to self-care in the study area. The intension was to gain insights into formulating need-based strategies to provide comprehensive primary care for diabetic patients.

MATERIALS AND METHODS

A triangulation (Quant + Qual) mixed-methods study was undertaken in patients with type 2 Diabetes mellitus attending tribal health clinics in Bhandardara and Rajur in Akole taluka from April 2019 to April 2020. Prior institutional ethics approval was obtained (Reg. No: PIMS/CSM/RC/2019/06). Written informed consent was taken from all patients before accrual.

Assuming a prevalence of Diabetes in the community to be 9% based on previous studies the minimum sample size for 95% confidence levels was calculated to be 124 [5-7]. A subset of 08 patients from this sample additionally participated in the qualitative assessment.

Qualitative component involved Focus Group Discussion (FGD) in a group of patients that attended the outpatient clinic at Rajur. The questions addressed the felt needs and impediments to self-care among the tribal T2DM patients. Themes and sub-themes were isolated to identify common problems. Quantitative data were obtained by a questionnaire that was administered by the investigators themselves and it included information on the socio-demographic profile,

brief clinical history, and Diabetes Self-Management Questionnaire.

Diabetes Self-Management Questionnaire (DSMQ) is a 16 item questionnaire to assess self-care activities. The scale has four subscales Glucose Management (GM), Dietary Control (DC), Physical Activity (PA), and Health-Care Use (HU). It also has a 'Sum Scale' (SS) as a global measure of self-care. Overall internal consistency was good (Cronbach's alpha=0.84). Consistencies of the subscales were acceptable (GM: 0.77; DC: 0.77; PA: 0.76; HU: 0.60). The DSMQ scales have shown significant convergent correlations with their parallel SDSCA scales and HbA1c. The scale has been previously used in Indian population [8].

Since most of the data was discreet, descriptive statistical analysis employed percentage values. Wherever applicable non-parametric correlation was used to assess the association between study variables and self-management scores.

RESULTS

The study area was remote hilly and sparsely populated therefore the data was collected at tribal health clinics as they provided access point to diagnosed patients. It was felt that instead of a cross sectional quantitative study design a mixed method study would be better to address the research question.

Table-1: Socio-Demographic and Clinical Profile of Patients

Study Variable	No. of Patients (n=124)	Percentage
Age Group (years)		
26-45	30	24.2
46-65	71	57.3
Above 65	23	18.5
Sex		
Females	42	33.9
Males	82	66.1
Religion		
Hindu	122	98.4
Muslim	2	1.6
Marital Status		
Married	95	76.6
Widow/Widower	18	14.5
Single	8	6.5
Divorced/Separated	3	2.4
Family Type		
Joint	64	51.6
Nuclear	53	42.7
Other	7	5.6
Education		
Illiterate	15	12.1
Literate but Not educated	14	11.3
Primary Education	36	29.0
Middle School	13	10.5
High School	31	25.0

Diploma/ Vocational training	8	6.5
Graduate and Above	7	5.6
Occupation		
Homemaker	41	33.1
Farmer	24	19.4
Clerical work/ Shop owner	23	18.5
Unemployed	9	7.3
Skilled worker	9	7.3
Seasonal laborers/ Unskilled worker	8	6.5
Retired	6	4.8
Professional	4	3.2
Income Modified BG Prasad Scale, 2018 (Per capita per month)		
Class 1 (6574 & above)	12	9.7
Class 2 (3287-6573)	12	9.7
Class 3 (1972-3286)	15	12.1
Class 4 (986-1971)	58	46.8
Class 5 (985 & below)	27	21.8
Duration Since Diagnosis		
Less than 1 year	6	4.8
1 to 3 years	45	36.2
3 to 6years	36	29.1
6 to 10 years	25	20.2
10 years or more	12	9.7
Comorbidities Present	37	29.8
H/o Complications	15	12.1
Tobacco Consumption		
Daily	83	66.9
Occasionally	3	2.4
Never	38	30.7
Alcohol Consumption		
Daily	18	14.5
Weekly	20	16.1
Occasionally	30	24.19
Never	33	26.61
Regular blood sugar check-up		
Monthly	4	3.2
Once in 3 months	15	12.1
Once in 6 months	32	25.8
Once a year	64	51.6
Hardly ever	9	7.3
Reported Exercise	98	79
Follow a Diet Plan	47	37.9
Recent episodes of Hypoglycaemia	47	37.9
Latest Blood Sugar Levels		
<126	45	36.3
126-140	23	18.5
141-180	14	11.3
180-250	26	21.0
Above 250	16	12.9
Concomitant Hypertension	28	22.6
Recent hospitalization for diabetes	34	27.4

Table 1 showed, 24.2% of patients were between the ages of 26 to 45 years, 57.3% of patients belonged 46 to 65 years age group, and 18.5% were above 65 years of age. There were a significant proportion of patients with early-onset diabetes. Studies have found relatively early onset of Type 2 diabetes in Indian patients and better compliance among recently diagnosed diabetics [9]. There was a negative correlation between age and self-care behaviour. Glucose Monitoring ($\rho= -0.346$, 0.001), Diet Monitoring ($\rho= -0.278$, p=0.003), Physical Activity ($\rho= -0.395$, p=0.001), Health Services Utilization ($\rho= -0.195$, p= 0.030), Sum Score ($\rho= -0.216$, p=0.002).

The majority (76.6%) were married whereas, 23.4% were single (unmarried, widowed, divorced, or separated). Being married correlated with better diet management (ρ= 0.344, p=0.001), physical activity (ρ= 0.184, p=0.04), and health service utilization (ρ= 0.274, p=0.002) scores. Those belonging to nuclear families showed better monitoring of diet (ρ= 0.294, p=0.004) as well as glucose (ρ= 0.344, p=0.001).

Regular exercise was reported by 98(79%) patients however they were not able to furnish the details. Physical activity was higher in younger as compared to older patients and scores were comparable in males and females. The level of education had a negative correlation with physical activity (ρ=-0.227, p=0.011) but a positive correlation with health service utilization (ρ= 0.299, p=0.001). Physical activity had a weak negative correlation with income (ρ=-0.214, p=0.017).

Table-2: Summary Findings of Focus Group Discussion

Themes	Sub Themes	Responses
Positive Behaviours	Active Daily Life	*We are active. We do our daily work well.*
	Willingness to listen	*Doctors tell for our good only.* *Willingness to act (?)*
Negative Behaviours	Addictions	*Tobacco chewing and alcohol consumption is part of life. We are too used to it.*
	No Foot Care	*We don't have any special footwear or take any precautions regarding foot care*
Barriers In Self Care	Lack of knowledge and awareness	*We take all the medicines but we don't know what else to do except reduce sweets*
	Family circumstances	*Who will take us to the hospital so frequently and give special treatment? Others have work too.*
	Lack of supportive care and depression	*It is going to be this way only.*
Felt Needs	Family Counselling and Diet Planning	*You tell my daughter in law what to cook and how to cook. She does the cooking.*
	Access to health care	*Elderly cannot travel to get medications*
	Home-based care/ Follow up reminders	*Would be great if we get care at home or some other reminders for checkup*

Daily tobacco consumption was reported by 66.9% of patients either as beedi, cigarettes, chewing tobacco, or mishri use. Similarly, 74.49% of patients reported alcohol consumption. Presence of addictions showed negative correlation with all domains of self-care behaviors. Glucose Monitoring (ρ=-0.263, p= 0.016), Diet Monitoring (ρ=-0.286, p=0.049), Physical Activity (ρ=-0.192, p=0.012), Health Services Utilization (ρ=-0.179, p=0.047), Sum Score (ρ=-0.171, p=0.002).

Most patients have lived with Diabetes for some time and have adjusted to the disease to a certain extent. Around 37(29.8%) patients had other co-morbidities like hypertension and ASCVDs. Comorbidities, complications, and polypharmacy complicate diabetes self-care, 27.4% also was recently hospitalized due to disease and 12.1% already had complications due to T2DM. (Table 1) Forty-seven (37.9%) reported episodes of hypoglycemia indicating poor self-management either due to improper dosage, lack of uniformity in daily activities, or unplanned fasting. Only those who followed up regularly at the center underwent regular testing. Occupation had a negative correlation with glucose monitoring (ρ=-0.236, p= 0.008), health service utilization (ρ=-0.233, p= 0.009) and sum score (ρ=-0.193, p=0.032). Those whose occupation entailed staying at home had better glucose monitoring and health service utilization as compared to occupations that involved working away from home or variable office hours. Glucose Management was better in younger patients and poorer in patients with comorbidities, patients who consumed alcohol or used tobacco, had jobs that required staying away from home. Those married and living in smaller families could manage glucose better as compared to those who lived alone or had larger families.

DISCUSSION

As people age, their health status, support systems, physical and mental abilities, and nutritional requirements change [10]. As dependency increases self-care becomes more difficult. We found a negative correlation between all domains of self-care with age. In the Indian scenario, dependency on the family can be turned into an advantage by training younger family members and spouse who can prove better caregivers. Tribal and rural youth have relatively poor prospects of employment [11]. Training them as educators can prove mutually beneficial by providing gainful employment and locally available and acceptable care givers. This can compensate for the dearth of doctors working in tribal areas [12].

Our study sample had 66.1% male and 33.9% females. We did not find sex-wise disparity in self-management. However, a study from Gujarat reported males performing better in all domains of self-care [13]. It stands to reason that men have better health service utilization, but they also have a higher prevalence of addictions and a higher risk of ASCVDs, occupational stress, and variations in daily routine which lead to poor glycemic control. It has also been noted that social structure can lead to gender differences in reporting of symptoms, perceptions of wellness, and food habits and gender-specific behavior change communication strategies need to be utilized [14]. Dietary Practices showed that most patients ate whatever food was cooked at home with the only reduction in quantity without any change in quality. Dietary practices have a close bearing on what is locally available. A carbohydrate-rich diet with rice and millets was a staple to the Akole region. It was noted that the patients, especially the elderly had little control over what was being cooked at home and ate the food with the rest of the family. Therefore it was felt that all members of the family including the women who cooked the food needed to be educated about diet, not only to improve glycemic control in the patients, but also to reduce risk in non-diabetic members. Lawton *et al*. in their study titled '*We should change ourselves, but we can't*' emphasize the need to prescribe culturally appropriate acceptable and feasible dietary interventions.[15]Similar interventions have also found to be effective in K-DAPP and CDMP MUM trials in India [16, 17].

The tribal people indeed lead a more active lifestyle but most report activities of daily living as exercise and many are not able to engage in any form of physical exertion outside the work environment. Chamukuttan Snehlata *et al*. found the risk associated with diabetes and cardiovascular diseases occurs at lower levels of BMI in Asian Indians when compared with white population. This is attributed to body fat distribution; Asian Indians tend to have more visceral adipose tissue, causing higher insulin resistance, despite having lean BMI [18]. Having a seemingly normal BMI can be deceptive among tribal Indians, and they must be counseled to improve physical activity [19]. Both tobacco and alcohol consumption are known to be detrimental to the control of Diabetes. The practice has social sanction to a certain extent and therefore willingness to quit is low. The high prevalence of these behaviors needs to be reduced to improve self-management. De-addiction should be a component of integrated diabetes care. Occupational settings can be utilized to identify cases and give health education [20].

Glucose self-monitoring may not be a feasible intervention in all tribal patients at this stage but health worker assisted monitoring needs to be promoted. There is need of intensive IEC activity which will improve compliance [21]. The National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS) has made provision of providing glucometers to ASHA workers who cater to a population of 700 people in the tribal area [22]. Proper implementation of this program can ensure a regular door to door glucose monitoring. After the up-gradation of Sub centers to Health and Wellness centers, the Community Health Officers (CHOs) and local tribal youth should be trained as educators to ensure Comprehensive Primary Care provision [23, 24].

Educated younger individuals without addictions who could travel to health centers easily without economic hardship to themselves or family had better health service utilization. Older uneducated individuals with addictions did not utilize health services as often. They could not themselves come to the center or could not get a family member to spare time to bring them to the center as often. These individuals are also the ones with poor glycemic control and who need services the most. If the patient cannot come to the centers, the centers must go to the patients. This emphasizes the need for a dedicated registry of patients with non-communicable diseases at the local level. The availability of anti-diabetic medications at health centers will ensure regular follow up. Blood Glucose, HbA1c, and other testing facilities should be made readily available. Linkages are being established with our specialty hospital for 6 monthly and annual check-ups. Digital health initiatives may also prove helpful.

Areas that need special attention are high prevalence of addictions, foot care, lack of knowledge, depression & supportive care. Family circumstances and socio-cultural factors need to be taken into account and supportive care, family diet planning and access to health care interventions must be made available accordingly. Health awareness and beliefs, availability of time and money, competing priorities, perceived quality of care, and expectations from care providers all play a role. We must test and implement comprehensive diabetes care services for tribal diabetics. Efforts to improve community participation and inclusive care will foster confidence among patients to avail of services.

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