ORIGINAL ARTICLE

Influence of Social Support on Treatment Adherence and Self-care among Type 2 diabetes mellitus patients in Field Practice Areas of a Tertiary Medical College in Bangalore- A Cross-sectional Study

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ABSTRACT

Background: As a chronic illness, type 2 diabetes necessitates regular self-care. In this context, the social assistance provided is crucial. **Aim and Objective:** To evaluate the levels of social support in type 2 Diabetes Mellitus (T2DM) patients and to identify the influence of social support on treatment adherence and self-care activities. **Methodology**: A cross-sectional study was conducted among 400 T2DM patients in the medical college's field practice areas. Data regarding the sociodemographic details, clinical and treatment history, social support level (Social Support Rating Scale), and management of self-care activities (Summary of Diabetes Self-care activities) were collected. Compiled data was analyzed using IBM SPSS software. Data was interpreted as frequencies, percentages, and means. Association was tested using the Chi-square test and Spearman's correlation. A p-value less than 0.05 was deemed significant. **Results**: There were 53% females and 47% males. Most participants (83.25%) had a moderate level of social support. Medication adherence and blood glucose monitoring were the most practiced self-care practices. Support level was significantly associated with activities of self-care (proper dietary practice, regular physical activity, and foot hygiene). **Conclusion**: More than two-thirds of the patients had a moderate to high social support level, which significantly correlated with self-care activities.

KEYWORDS

Medication Adherence; Social Support; Self-Care; T2DM

INTRODUCTION

T2DM is a life-long medical condition affecting middle-aged and older adults.(1) According to WHO estimates, 7.8% of Indians are estimated to have diabetes. (2) Due to the associated complications, type 2 diabetes lowers the patient's quality of life and causes premature deaths. (3)

The patient, the disease, the treatment, the socioeconomic factors, and the health system are the five factors that the WHO identifies as having an impact on a patient's long-term adherence to a chronic disease treatment plan.(4) Family involvement is crucial in the healing process. Some examples of this include reminding patients to take

their medications on time and keeping an eye on a healthy diabetic diet.(5)

Diabetes self-management refers to a patient's capacity to take charge of their medical care, lifestyle choices, and the psychological effects of their illness. This ability can augment the patient's standard of living and prognosis overall. Thus, support from family, friends, and the community is crucial for managing long-term conditions like diabetes mellitus.(6)

For those who are experiencing self-isolation, lack of access to healthcare, and economic hardship, strengthening social support from personal networks and community organizations is a complementary approach to managing the ill effects of a chronic disease like diabetes.(7) There is sufficient data to conclude that social support helps T2DM patients adhere to self-care routines.(8,9,10) However, as far as we are aware, not many studies have examined the perceived social support of friends, families, community, and healthcare providers in T2DM patients, residing in Karnataka, and how the degrees of social support affect their self-care practices.

Aim and Objective(s):

1. To evaluate the levels of social support in T2DM patients.
2. To identify the impact of this support on treatment adherence and self-care activities.

MATERIAL & METHODS

Study type and study design: A community-based cross-sectional study.

Study setting, population, and duration: The study was carried out among adult T2DM patients, residing in rural and urban areas, receiving health services under the Community Medicine Department of a medical college between February 2021 and August 2022. The service area in rural is the Primary Health Center (PHC) at Sondekoppa, which covers approximately 16000 population, while the urban field practice area is the H Siddaiah Road urban PHC, which covers approximately 43000 population.

Sample size: Using the formula for single population proportion and assuming that 50% of T2DM patients are on social support at a 95% Confidence Interval and 0.05 error margin, the sample size was 384, rounded up to a final sample of 400, to include an equal proportion of rural and urban.

Inclusion criteria: Adults with diagnosed T2DM for at least one year, and those who have been residents of the study area for at least 6 months.

Exclusion criteria: Bedridden and critically ill patients, patients with diagnosed cognitive impairment.

Sampling technique: A purposive sampling technique was followed to ensure an equal sample of 200 participants was selected from urban and rural areas. The urban field practice area, catering to approximately 43000 population, has been divided into 3 sectors, namely Vinobhanagar, Ramanna Garden (sector 1), KS Garden and CKC Garden (sector 2), and HK Garden, RG Garden (sector 3). Three sectors received an equal representation in the sample: 67 samples each from Sectors 1 and 2, and 66 samples from Sector 3. The houses on the street were numbered in a clockwise manner, commencing from the left corner as we entered. Using a random number generator, the first house was chosen. House-to-house visits were then made consecutively to identify the eligible type 2 DM patient. Valid consent was collected and the participants were briefed about objectives of the study. The data was gathered until the sector's target sample was reached. If there were two diabetic patients in a house, one patient was chosen at random and interviewed. The same procedure was carried out for each of the three sectors until the necessary sample size of 200 was obtained.

The rural field practice area, catering to approximately 16000 people, has three sub-centers under the rural PHC: Sondekoppa with 7 villages, Lakkenahalli with 12 villages, and Kittanahalli with 15 villages. Three sub-centers received an equal portion of the sample: 67 samples each from sub-centers 1 and 2, and 66 samples were included from sub-center 3. The data was collected from the sample population in the village by following the same technique as employed for the urban field practice area, till the desired sample size of 200 was reached.

Data collection: Data was collected by house-to-house visits.

The socio-demographic (gender, age, education, occupation, etc) and diabetes-related clinical details (duration of diabetes, type of treatment regimen, complications, co-morbidities, etc) were collected through a pre-validated questionnaire with semi-structured questions. The socioeconomic status was classified as per the modified Kuppuswamy classification.(11)

Social Support Rating Scale (SSRS): The SSRS developed by Xiao (12) is a validated scale to measure social support. It has a total of ten questions that measure social support in three dimensions: three questions each for measuring objective support and support-seeking behavior, and four questions to measure subjective support.

The score can range from 12 to 66. The overall score is divided into low support (value ≤ 22), moderate support (value between 23- 44), and high support (value ≥ 45).

Summary of Diabetes Self-Care Activities Measure (SDSCA) questionnaire: The scale was designed by Toobert (13) and is a quick self-reported questionnaire on self-management of diabetes that asks the weekly frequency of self-management dimensions, like blood-glucose testing, exercise, general and targeted diets, adherence to medication, and foot care. It uses a Likert-type scale (0–7) to indicate how many days a week the specified self-care activity was carried out. There is no classification of the participant as non-adherent or adherent; rather, scores are computed independently for each item, and the mean score for each dimension indicates the degree of adherence.

Ethical clearance: The study commenced after obtaining Institutional Ethical Clearance (ref no: BMCRI/PG/131/2020-21) and in accordance with the Declaration of Helsinki. The confidentiality of the participants was ensured.

Data Analysis: Data was compiled into Microsoft Excel and analyzed using Statistical Package for Social Sciences version 21.0 for Windows (IBM Corp., Armonk, NY). The data was represented in frequencies, percentages, mean, and standard deviation (SD). The chi-square test was used to test the association between sociodemographic and clinical variables with the degree of social support and also to compare the support levels and self-care practices between rural and urban populations. Spearman's correlation tested the association between self-care practices and social support. Statistical significance was determined at p below 0.05.

RESULTS

This study comprised 400 T2DM patients, 200 of whom came from rural and 200 from urban areas. There were 212 (53%) females and 188 (47%) males. The participants' mean age was 57.61±9.99 years (range 30-80 years). The socio-demographic variables have been outlined in (Table 1).

Table 1 Distribution of study participants according to sociodemographic characteristics

Sociodemographic Variables		Female (n, %)	Male (n, %)	Total (n, %)
Age	30-45	21 (40.4)	31(59.6)	52 (13.0)
	46-60	91 (50.0)	91 (50.0)	182 (45.5)
	>60	100 (60.2)	66 (39.8)	166 (41.5)
	Total	212 (53.0)	188 (47.0)	400 (100.0)
Education	Illiterate	126 (63.0)	74 (37.0)	198 (49.5)
	Primary school	57 (48.3)	61 (51.7)	118 (29.5)
	Middle school	11 (45.8)	13 (54.2)	24 (6.0)
	High school	10 (26.3)	28 (73.7)	40 (10.0)
	PUC/Diploma	3 (30.0)	7 (70.0)	10 (2.5)
	Graduate	5 (50.0)	5 (50.0)	10 (2.5)
	Total	212 (53.0)	188 (47.0)	400 (100.0)
Occupation	Professional	1 (25.0)	3 (75.0)	04 (1.0)
	Semi-professional	4 (44.4)	5 (55.6)	09 (2.2)
	Clerical/shop/farmer	2 (33.3)	4 (66.7)	06 (1.5)
	Skilled	8 (29.6)	19 (70.4)	27 (6.7)
	Semi-skilled	5 (7.7)	60 (92.3)	65 (16.3)
	Unskilled	134 (68)	63 (32)	197 (49.3)
	Unemployed	58 (63)	34 (37)	92 (23)
	Total	212 (53.0)	188 (47.0)	400 (100.0)
Socioeconomic status	Lower	68 (72.3)	26 (27.7)	94 (23.5)
	Upper lower	134 (47.4)	149 (52.6)	283 (70.8)
	Lower middle	7 (43.7)	9 (56.3)	16 (4.0)
	Upper middle	3 (42.8)	4 (57.2)	07 (1.7)
	Total	212 (53.0)	188 (47.0)	400 (100.0)
Marital Status	Married	147 (45.8)	174 (54.2)	321 (80.2)
	Unmarried/Divorced/Separated/Widow/ Widower	65 (82.3)	14 (17.7)	79 (19.8)
	Total	212 (53.0)	188 (47.0)	400 (100.0)

More than half (207, 51.8%) of the patients had diabetes mellitus for more than 5 years. The majority, i.e., 369 (92.2%) of the participants were on Oral Hypoglycemic Agents (OHAs), and

complications due to diabetes mellitus were reported in 155 (38.8%) participants. Around 107 (26.7%) participants had a positive family history of T2DM. Around 160 (40%) participants had some associated co-morbidity. The diabetes profile of the participants has been outlined in (Table 2).

Table 2 Distribution of study participants according to Diabetes Mellitus Profile

Diabetes Mellitus Profile		Female (n, %)	Male (n, %)	Total (n, %)
Duration of diabetes	1 year	37 (64.9)	20 (35.1)	57 (14.2)
	>1 to 5 years	69 (50.7)	67 (49.3)	136 (34.0)
	>5 years	106 (51.2)	101 (48.8)	207 (51.8)
	Total	212 (53.0)	188 (47.0)	400 (100.0)
Type of Treatment	Oral Hypo-glycemic agents (OHAs)	197 (53.4)	172 (46.6)	369 (92.2)
	Insulin	4 (50.0)	4 (50.0)	8 (2.0)
	Both OHAs and Insulin	10 (52.6)	9 (47.4)	19 (4.8)
	No medication (lifestyle modifications)	1(25.0)	3 (75.0)	4 (1.0)
	Total	212 (53.0)	188 (47.0)	400 (100.0)
Complications due to DM	Present	89 (57.4)	66 (42.6)	155 (38.8)
	Absent	123 (50.2)	122 (49.8)	245 (61.2)
	Total	212 (53.0)	188 (47.0)	400 (100.0)
Comorbidities	Present	86 (53.75)	74 (46.25)	160 (40.0)
	Absent	126 (52.5)	114 (47.5)	240 (60.0)
	Total	212 (53.0)	188 (47.0)	400 (100.0)
Family history of DM	Present	66 (61.7)	41 (38.3)	107 (26.8)
	Absent	146 (49.8)	147 (50.2)	293 (73.2)
	Total	212 (53.0)	188 (47.0)	400 (100.0)

On assessing the levels of social support by the SSRS questionnaire, it was found that a majority of the participants, i.e., 333 (83.2%) had moderate levels of social support, followed by 61 (15.3%) with high levels, and only 6 (1.5%) with low levels of social support. The mean SSRS score was higher for males (40.85 ± 4.3) as compared to females (39.23 ± 4.8). The levels of support were significantly associated with age group ($p = 0.0005$), education, socioeconomic status ($p < 0.001$), and marital status ($p < 0.00001$). The degrees of support also had a significant association with the duration of diabetes status ($p = 0.027$) and the presence of complications due to diabetes ($p = 0.009$). The associations are depicted in Table 3 and Table 4.

Table 3 Association between sociodemographic variables and levels of social support

Variable		Low Level of support	Moderate Level of support	High Level of support	p-value
Gender	Female [n (%)]	3 (50.0)	182 (54.6)	27 (44.3)	0.3
	Male [n (%)]	3(50.0)	151 (45.4)	34 (55.7)	
	Total [n=400]	6 (1.5)	333 (83.2)	61 (15.3)	
Age group (in years)	30-45 [n (%)]	0 (0.0)	35 (10.6)	17 (27.9)	0.0005
	46-60 [n (%)]	2 (33.3)	149 (44.7)	31 (50.8)	
	>60 [n (%)]	4 (66.7)	149 (44.7)	13 (21.3)	
	Total [n = 400]	6 (1.5)	333 (83.2)	61 (15.3)	
Educational Status	Illiterate [n (%)]	04 (66.7)	176 (52.8)	18 (29.5)	< 0.001
	Primary School [n (%)]	02 (33.3)	107 (32.1)	107 (32.1)	
	Middle School [n (%)]	0 (0.0)	20 (6.00)	4 (6.5)	
	High School [n (%)]	0 (0.0)	27 (8.1)	13 (21.3)	
	PUC/Diploma [n (%)]	0 (0.0)	0 (0.0)	10 (16.4)	
	Graduate [n (%)]	0 (0.0)	03 (0.90)	07 (11.8)	
	Total [n = 400]	6 (1.5)	333 (83.2)	61 (15.3)	
Socioeconomic Status	Lower [n (%)]	03 (50.0)	86 (25.8)	5 (8.2)	< 0.001
	Upper lower [n (%)]	0 (0.0)	03 (0.9)	13 (21.3)	

Variable		Low Level of support	Moderate Level of support	High Level of support	p-value
	Lower middle [n (%)]	03 (50.0)	244(73.3)	36 (59.0)	
	Upper middle [n (%)]	0 (0.0)	0 (0.0)	7 (11.5)	
	Total [n = 400]	6 (1.5)	333 (83.2)	61 (15.3)	
Place of residence	Urban [n (%)]	3 (50.0)	163 (48.9)	33 (54.1)	
	Rural [n (%)]	3 (50.0)	170 (51.1)	28 (45.9)	0.76
	Total [n = 400]	6 (1.5)	333 (83.2)	61 (15.3)	
Marital Status	Married	4 (66.7)	284 (85.3)	33 (54.1)	<
	Unmarried/Divorced/ Separated/Widow/ Widower	2 (33.3)	49 (14.7)	28 (45.9)	0.00001
	Total [n = 400]	6 (1.5)	333 (83.2)	61 (15.3)	

Table 4 Association between Diabetes profile and levels of social support

Variable		Low Level of support	Moderate Level of support	High Level of support	p-value
Duration of Diabetes Mellitus (in years)	1 [n (%)]	01 (16.7)	50 (15.0)	06 (9.8)	
	>1 to 5 [n (%)]	02 (33.3)	102 (30.6)	32 (52.5)	0.027
	> 5 [n (%)]	03 (50.0)	181 (54.4)	23 (37.7)	
	Total [n = 400]	6 (1.5)	333 (83.2)	61 (15.3)	
Complications due to diabetes status	Present [n (%)]	03 (50.0)	139 (41.7)	13 (21.3)	
	Absent [n (%)]	03 (50.0)	194 (58.3)	48 (78.7)	0.009
	Total [n = 400]	6 (1.5)	333 (83.2)	61 (15.3)	
Co-morbidities	Present [n (%)]	02 (33.3)	140 (42.0)	18 (29.5)	
	Absent [n (%)]	04 (66.7)	193 (58.0)	43 (70.5)	0.175
	Total [n = 400]	6 (1.5)	333 (83.2)	61 (15.3)	

In assessing the self-care activities by the SDSCA questionnaire, it was found that adherence to medication and three-monthly monitoring of glucose in blood was the most prevalent self-care activity, with higher mean scores, among the study participants, in contrast to other self-care activities like consumption of healthy diet, foot care, and regular exercise. The mean scores have been outlined in (Table 5).

Table 5: Distribution of study participants according to self-care practices estimated by SDSCA questionnaire

Self-care practices		Mean days per week
Dietary practice	Female	3.79±1.285
	Male	3.58±1.131
Exercise	Female	1.15±1.293
	Male	1.10±1.29
Medication adherence	Female	6.25±0.952
	Male	5.68±0.940
Foot care	Female	4.36±0.088
	Male	4.90±1.175
Blood glucose monitoring (once in 3 months) [N (%)]	Female	197 (52.82%)
	Male	176 (47.18%)

On exploring the correlation between SSRS scores and the elements of self-care practices, it was observed that the level of social support had a positive correlation with the average number of days of practice of following a healthy diet, adherence to medication, and foot care. This association was however not significant statistically (Figures 1,2, and 3). The level of support had a positive correlation with the mean number of days of exercise, and this association was statistically significant ($p < 0.001$) (Figure 4).

Figure 1: Correlation between SSRS score and Mean number of days of healthy dietary practice

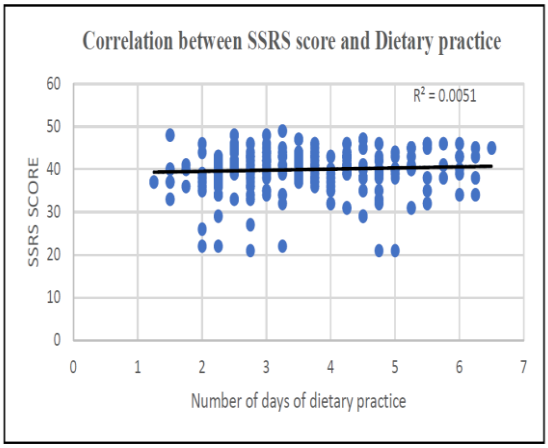


Figure 2: Correlation between SSRS score and Mean number of days of adherence to medication

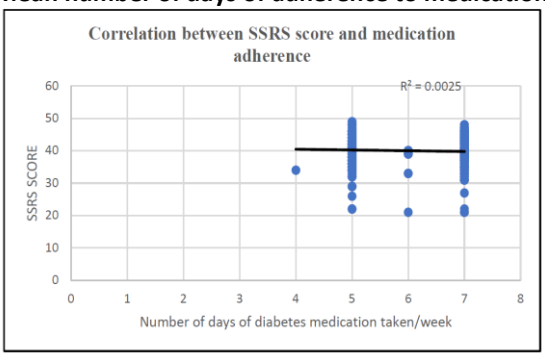


Figure 3: Correlation between SSRS score and Mean number of days of foot care

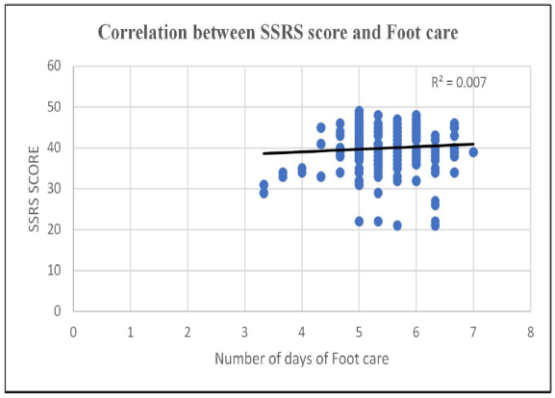
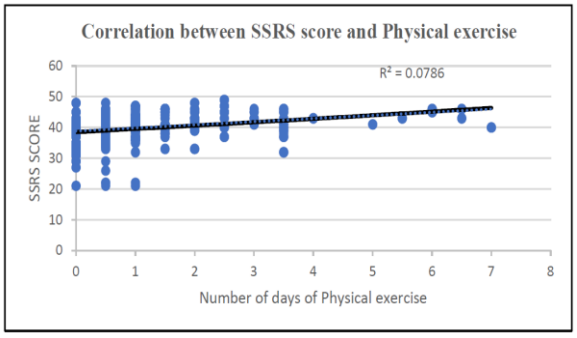


Figure 4: Correlation between SSRS score and Mean number of days of physical exercise



DISCUSSION

Sociodemographic characteristics

Out of 400 study participants, 53% were females and 47% were males. A similar female preponderance was reported by Mohebi S et al in Iran with 67.4% females and 32.6% males.(14) However, S Padmanabha et al reported contrasting findings in their study from Bengaluru, with 59% males and 41% females.(15)

The participants' mean age was 57.61±9.99 years (range 30-80 years). Around 182 (45.5%) participants were in the age group of 46-60 years. Almost half of the sample population were illiterate (198, 49.5%) and unskilled laborers (197, 49.5%). A majority (283, 70.8%) belonged to the upper lower class of socioeconomic status. This was in line with the findings reported by S Padmanabha et al.(15) These findings showed that diabetes mellitus was more prevalent among the middle-aged population, which might be because this age group is usually the working age group exposed to both professional and personal stress. Also, patients belonging to the upper lower class of socioeconomic status were more in number, which could be due to a lower level of knowledge and awareness about the disease among these people.

Around 51.7% of the participants had diabetes mellitus for more than 5 years. A study by Gu L et al(5) from Beijing also reported over half of the participants had diabetes for more than 6 years duration. In comparison, Werfalli et al(16) from South Africa reported the average duration of diabetes status among the study participants was 8 years. This shows that T2DM is a life-long disease that needs lifelong management and support.

Level of social support

Around 83.2% of participants had moderate levels of social support, 15.3% with high levels, and only 1.5% with low levels of social support. The mean SSRS score was higher for males (40.85 ± 4.3) as compared to females (39.23 ± 4.8). This illustrates that social support was present for almost all participants, regardless of their sociodemographic or illness-related characteristics. The levels of social support were statistically significant with age group ($p = 0.0005$), status of education, socioeconomic status ($p < 0.001$), and marital status ($p < 0.00001$). Thus, the younger participants, who were married, with a better level of education, belonging to higher socioeconomic strata, and residing in urban areas had a moderate to high level of social support. This was similar to the report of Mohebi S et al in Iran where social support was higher among younger and married participants.(14) Diabetes management is a lifelong process that warrants continuous vigilance and monitoring. This, alone, can be stressful for diabetes patients. This reiterates the crucial role of social support in managing diabetes, especially in poor-income settings.(17,18) However, Gu L et al found no association between educational status and social support levels, and surprisingly, support was better among illiterates and primary-level graduates. This might be because the proportion of illiterate participants was higher in their study.(5)

The levels of support had a significant association with the duration of diabetes status ($p = 0.027$) and the presence of complications due to diabetes ($p = 0.009$). Participants suffering from diabetes for a longer duration had a higher level of social support.

This finding conflicted with the study findings of Werfalli et al.(16) When comparing the participants who had not experienced complications from their diabetes to those who had, a higher level of support was noted. It demonstrates that complications were more likely to arise in those who had received less support. A person's quality of life is always negatively impacted by the disease due to complications that arise from inadequate management.(19)

Summary of Diabetes Self-care Activities and its relation to social support

Medication adherence (6.25 days in females/week and 5.68 days/week in males) and three-monthly blood glucose monitoring (52.82% in females and 47.18% in males) was practiced most prevalently, with higher mean scores, among the study participants, as compared to other self-care activities like consumption of a healthy diet, foot care, and regular exercise. AlQahtani A et al found the sub-scale results demonstrated comparatively better values in medication adherence (5.39 days per week), implying that participants took their medications as directed on average more than five days per week. The other self-care dimensions include blood glucose monitoring, exercise, diet, and foot care.(20) Al Johani et al also reported higher mean scores for medication adherence (6.26 days per week).(21) A study by Sabbah KA et al in Al Haddah City, Makkah, used the SDSCA to transform the raw score into scaled scores between 0 and 100, which produced similar patterns. The highest index of self-care was adherence to medication (94.7%), then foot care (53.4%), exercise and diet (roughly 41-42%), and monitoring of blood glucose (22.4%).(22) It draws attention to the necessity of stepping up patient education on self-care to see significant improvements in glycemic control.

In this study, the level of support had a positive correlation with the average number of days of practicing a healthy diet, adherence to medication, and foot care. However, this association was not statistically significant. The results demonstrate that the types and levels of support obtained did not affect the participant's ability to take medications. However, a study by Gu L et al(6) found a significant association between medication adherence and support level. The level of support had a positive correlation with the mean number of days of exercise, and this association was statistically significant ($p < 0.001$). This implies the importance of social support for imbibing positive lifestyle modification among diabetes patients, which is pivotal for the management of long-term disease.

It has been established that one of the most important and economical ways to improve diabetes control and self-management practices is through educating patients on self-care.(23) A systematic review examined the influence of different self-management interventions on blood glucose control in T2DM patients, incorporating multiple studies from Saudi Arabia and the Gulf Cooperation Council (GCC) nations. The HbA1c levels improved as a result of most interventions, according to the results.(24) An additional systematic review demonstrated that interventions aimed at enhancing patients' abilities, knowledge, and capacity for self-management were extremely successful in diabetes management. The authors also showed that multidisciplinary teams and adequate duration of intervention were associated with greater efficacy.(25)

Recommendation: Social support is one of the most economical methods of managing type 2 diabetes, so policymakers should take it into account and incorporate it into diabetes preventive initiatives. Health professionals should teach participants and their families about self-care and treatment adherence since they are the patients' main source of diabetes knowledge. One medical professional has to be encouraged to become a diabetic educator at every primary healthcare level. Providing patients with materials, including books, articles, and internet tools, can improve their understanding of their diabetes and make self-management easier.

CONCLUSION

A majority of diabetes patients had moderate to high levels of social support. It was better among younger participants, who were married, with a better educational qualification, belonging to higher socioeconomic strata, and residing in urban areas. Adhering to medication and regular monitoring of blood glucose were the prevalent self-care activities among diabetes patients. There was a positive correlation between support and self-care activity scores. Focus groups and in-depth interviews could be done for a clearer understanding of the idea of social support. This is because the experiences of individuals in treatment and self-management can differ greatly, and perceived social support can be subjective.

RECOMMENDATION

A major public health concern in India, type 2 diabetes mellitus is associated with high rates of

morbidity, mortality, and medical expenses. Designing successful community-based interventions requires an understanding of how social support enhances treatment adherence and self-care practices. This study offers vital information that can improve primary healthcare approaches for diabetes control and influence policy. Millions of patients' quality of life could be improved and the burden of disease could be decreased by strengthening social support networks.

Limitation of the Study

We were unable to evaluate the long-term modifications in social support and their effect on diabetes management since the study was cross-sectional. The alterations in self-care and social support can be monitored through a longitudinal study. Diabetes self-care is complex and influenced by many variables, including mood and other psychological components that were not taken into account in this study. Diabetes treatment aims to achieve glycaemic control, and the standard test for glycaemic control is glycated hemoglobin (HbA1C). We were unable to evaluate the participants' glycemic control due to time and resource constraints.

Relevance of the Study

Particularly in the Indian context, this study contributes to the expanding corpus of research on the psychosocial determinants of managing chronic diseases. The necessity of incorporating social and community-based strategies into diabetes care programs is highlighted by the important role that social support plays in improving treatment adherence and self-care among patients with type 2 diabetes. The results lay the groundwork for creating focused interventions that take advantage of networks within the family and community to enhance diabetes outcomes.

Authors Contribution

All authors have contributed equally.

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Nil

Conflict of Interest

There are no conflicts of interest.

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Declaration of Generative AI and AI Assisted Technologies in the Writing Process

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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