

Self –care practices among diabetic patients residing in the urban field practice area of a government medical college –a community based –Mixed Method Study

Shaik Salma¹, Krishnaveni Avvaru², Nagendra Naidu Boddepalli³, Helena Kanta^{4}*

ABSTRACT

Introduction

The primary goal of any diabetes treatment is better control of blood sugar levels. Self-care practices were found to be positively correlated with good glycaemic control, reduction of complications, and improvement in quality of life. The objectives of this study is to estimate the prevalence of self-care practices and to explore the facilitating factors and barriers in the self-management of diabetes.

Methodology:

The study was a community-based cross-sectional concurrent mixed method study done among the diabetic individuals residing in the urban field practice area of a Government Medical College (GMC) during October and November 2023 after obtaining approval from the Institutional Ethics Committee. The responses of 126 participants were obtained to assess the prevalence of self-care activities using a semi-structured questionnaire. 15 In-depth interviews (IDI) were conducted to know the practices and barriers to self-management of diabetes using an IDI guide. Each interview/discussion was recorded electronically after obtaining verbal consent. Quantitative data was analysed using a statistical package for social sciences (SPSS) software for descriptive statistics. The audio recordings and the field notes were transcribed and translated into English. The data were analysed thematically and were grouped into a few broad themes and sub-themes.

Results:

The prevalence of self-care practices was high for medication adherence and least for the foot care component. The facilitating factors for increased medication adherence, self-blood glucose monitoring, and changing dietary patterns were increased awareness, fear of complications, and following the doctor's advice. The barriers to decreased foot care component and physical activity were health concerns, lack of awareness, busy work schedules, and cultural factors.

Conclusion:

The prevalence of medication adherence and self-blood glucose monitoring was the highest when compared to foot care practices. Our study results emphasized the need for awareness regarding self-care practices among diabetics.

Key-words: diabetes, diet, foot care, medication adherence, physical activity, self-blood glucose monitoring, self-care practices.

GJMEDPH 2024; Vol. 13, issue 1 | OPEN ACCESS

4*Corresponding author: Helena Kanta, Assistant Professor, Andhra Medical College, Visakhapatnam, Andhra Pradesh (email id- drhelenasundar@gmail.com); 1. Shaik Salma, Final year MBBS student, Andhra Medical College, Visakhapatnam, Andhra Pradesh (email id- shaiksalmadarsi@gmail.com); 2. Krishnaveni Avvaru, Professor and Head of the Department, Andhra Medical College, Visakhapatnam, Andhra Pradesh (email id- drkrishnavenirao@gmail.com); 3. Nagendra Naidu Boddepalli, Associate Professor, Government Medical College, Srikakulam (email id- drnagnaidu@yahoo.co.in)

Conflict of Interest—none | Funding—none

© 2024 The Authors | Open Access article under CC BY-NC-ND 4.0



INTRODUCTION

Diabetes mellitus is reaching potentially epidemic proportions in India. ^[1] The estimated worldwide prevalence of Diabetes among adults aged 20–79 years was 366 million (8.3%) in 2011, and this value is predicted to rise to ~562 million (9.9%) by 2030. ^[2] In 2013, there were 65.1 million people between 20 and 79 years of age with diabetes and this number was predicted to rise to 109 million by 2035 in India. ^[3] International Diabetes Federation (IDF) also reported that the total number of diabetic subjects in India was 41 million in 2006 and that this would rise to 70 million by the year 2025. ^[4] The primary goal of any diabetes treatment is better control of blood sugar levels. Self-care practices are defined as the set of behaviours practiced by people with or at risk of diabetes to successfully manage the disease on their own. ^[5] These practices include regular physical activity, appropriate dietary practices, daily foot care practice compliance with the treatment regimen, and tackling complications such as hypoglycaemic episodes. ^[6] All these behaviours are positively correlated with good glycaemic control, reduction of complications, and improvement in quality of life. However, there are some barriers to adhering to these self-care practices at the community, family, and individual levels. Factors such as gender, illiteracy, lack of health literacy, poor access to health care, and lack of family support mechanisms were found to be associated with poor compliance in diabetes management. ^[7] The objectives of study are to estimate the prevalence of self care practices and to explore the facilitating factors and barriers in the self management of diabetes.

Methodology:

The study was a community-based cross-sectional concurrent type of mixed method study done among diabetic individuals residing in the urban field practice area of Andhra Medical College in South India during October and November 2023 after obtaining approval from the Institutional Ethics Committee. People of age above 18 years diagnosed with Type 2 diabetes for more than 1 year were included in the study. Those who did not give consent for participation and bedridden patients, disabled, and people with acute illness were excluded from the study. A sample size of 126 was calculated to obtain socio-demographic data, diabetic disease profile, and diabetic self-care practices. ^[8] The list of the households with diabetes was obtained from the health workers' Non-Communicable Diseases (NCD) records and the study participants were selected on a simple random sampling technique. Written informed consent was obtained from each participant after explaining the purpose of the study. A face-validated, semi-structured questionnaire was administered to the participants. Among the sample, 15 participants were selected purposively for qualitative responses. In-depth interviews (IDI) were conducted at their residence to know the facilitating factors and barriers to self-management of Diabetes using a pre-prepared IDI guide. Each interview lasted for 12-15 minutes and was recorded electronically after obtaining verbal consent. A field note was taken by a note taker to capture the non-verbal information like facial gestures. A pilot study was done and necessary modifications were made accordingly. The self-care practices and the score for the respective components were shown in table 1.

Table 1: Scoring of self-care practices

Self-care practice	Components	Score	Considered a good self-care practice
Dietary practice	1. changed his meal plan after diagnosis/practicing a healthy diabetic diet	Yes-1, No-0	A score of three and above
	2. at least 2 cups of vegetables every day	Yes-1, No-0	
	3. reduced meat consumption to once a week	Yes-1, No-0	
	4. reduced carbohydrates and sweeteners	Yes-1, No-0	

Physical activity	1. having separate physical activity sessions 2. at least 5 days a week 3. for 30 min each day	Yes-1, No-0 Yes-1, No-0 Yes-1, No-0	A score of two and above
Foot care	1. examining the feet daily 2. washing with soap and water, 3. drying and examining between the toes for any ulcers/callus 4. wearing footwear outside and inside the house	Yes-1, No-0 Yes-1, No-0 Yes-1, No-0 Yes-1, No-0	A score of three and above
Self-blood glucose monitoring	1. he/she knows whether his/her blood glucose levels are under control or not 2. monitoring blood glucose at home or any laboratory as per doctor's advice or at least once in three months 3. have a glucometer/Uri stick at home for blood glucose monitoring	Yes-1, No-0 Yes-1, No-0 Yes-1, No-0	A score of two and above
Medication adherence	1. he/she takes the prescribed medication regularly 2. never misses the doses when he/she is doing well 3. never miss the dose when he/she is not well.	Yes-1, No-0 Yes-1, No-0 Yes-1, No-0	A score of two and above

Analysis of quantitative data was done using statistical package for social sciences (SPSS) software version. 25 for descriptive statistics like mean and standard deviation. The prevalence of self-care practices was expressed as percentages. A Chi-square test was used to analyze the association between various risk factors. A P value <0.05 was considered statistically significant. The audio recordings and the field notes of the qualitative responses were transcribed on the same day. The recorded responses were transcribed verbatim and translated into English. They were validated by going back to the field and reading the transcripts to the participants. The data were analyzed thematically and were grouped into a few broad themes. On analyzing the main themes, new sub-themes and codes have

emerged.

Results:

Out of 126 participants, 64.3% were females. The mean age of the study participants was 56.4 ± 9.9 years with 73% of them aged more than fifty years. The mean duration of study participants with diabetes was 7.47 ± 4.56 years. One and a half quarter of the study participants were suffering with co-morbidities. Most of them were suffering from more than one complication of diabetes. About 79.4% were informed about diabetic self-care management at the time of diagnosis of the disease and only 13.5% were educated regarding the self-care practices in every visit. The socio-demographic details and the diabetic profile of the study participants are shown in Table 2.



Table 2: Socio-demographic details and diabetic profile of the study participants

Variable	Frequency (%)
<i>Age</i>	
≤ 50 years	33 (27)
>50 years	92 (73)
<i>Gender</i>	
Male	45 (35.7)
Female	81 (64.3)
<i>Education</i>	
Illiterate	48 (38.1)
Primary school	4 (3.2)
Middle school	21 (16.7)
High school	26 (20.6)
Intermediate/diploma	15 (11.9)
Graduate	12 (9.5)
<i>Occupation</i>	
Unemployed	70 (55.6)
Unskilled worker	9 (7.1)
Semi-Skilled worker	17 (13.5)
Skilled worker	12 (9.5)
Clerical/shop/farm	14 (11.1)
Semi profession	4 (3.2)
<i>Marital status</i>	
Single	4 (3.2)
Married	115 (91.3)
Widowed	7 (5.6)
<i>Type of family</i>	
Nuclear	75 (59.5)
Joint	20 (15.9)
Three generation	31 (24.6)
<i>Socioeconomic status</i>	
Upper class	101 (80.2)
Upper middle class	19 (15.1)
Middle class	5 (4.0)
Lower middle class	1 (0.8)
<i>Years with diabetes</i>	
≤ 5 years	53 (42.1)
6-10 years	47 (37.3)
>10 years	26 (20.6)
<i>Complications</i>	
Absent	19 (15.1)
Present	107 (84.9)
Diabetic cataract	41 (38.3)
Tingling and numbness in both upper and lower limbs	22 (20.6)
Frequent urinary tract complications	11 (10.3)
<i>Co-existing illnesses</i>	
Absent	30 (23.8)
Present	96 (76.2)

Hypertension
Cardiovascular diseases
Osteoarthritis

62 (64.6)
15 (15.6)
9 (10.3)

Prevalence of the self-care practices among the study participants

The majority of the study participants had a good drug adherence score (98.4%), followed by a good

self-blood glucose monitoring score (84.1%) and a good dietary practice score (80.9%). The lowest score (1.6%) was seen in the foot care component. (Figure 1)

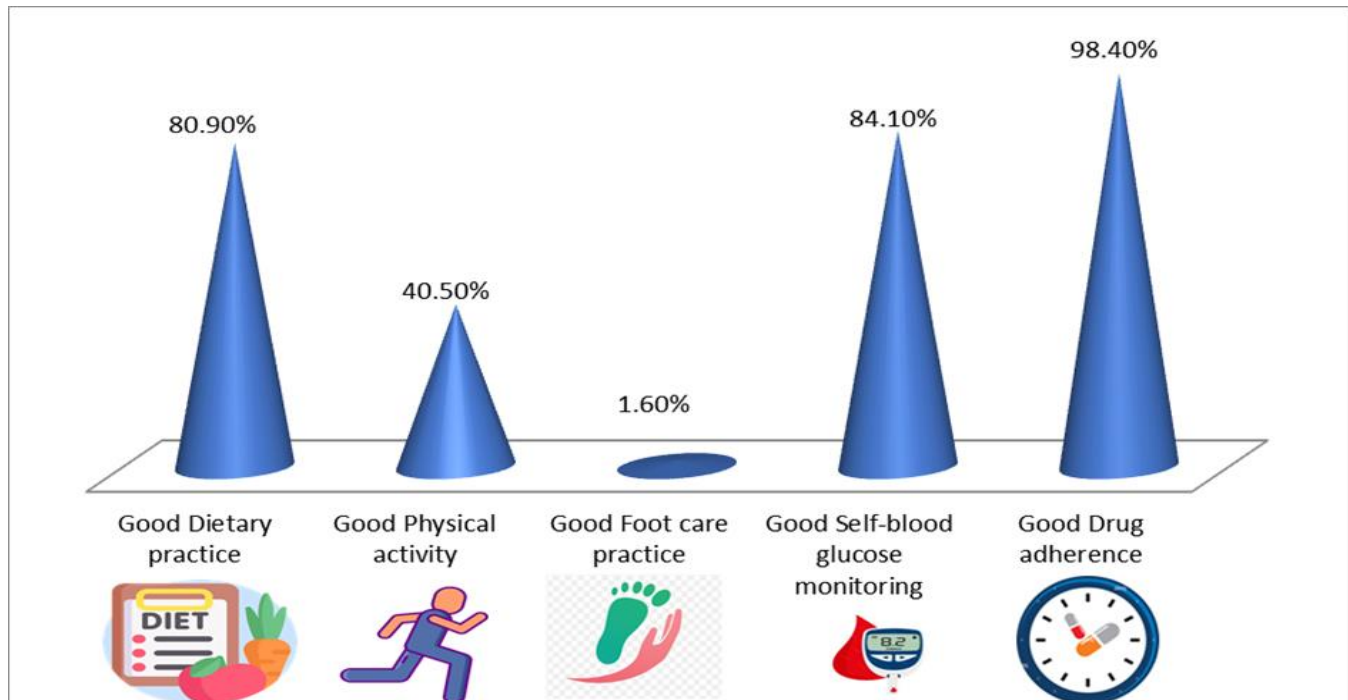


Figure 1: Distribution of self-care practices among the study participants

Regarding the dietary component, more than eighty percent were practicing a healthy diabetic diet or changed their meal pattern after diagnosis (84.9%), having 2 cups of vegetables every day (81.7%), reduced meat consumption to once a week (88.9%) and reduced carbohydrates and sweeteners (81.7%). Regarding the physical activity component, 40.5% were having non-work-related physical activity at least 5 days a week and 30 minutes each day. The most common physical activity done by the participants was walking. Regarding the foot care component, 61.1% were washing their feet with soap and water but very few of them were examining their feet, drying and examining between toes for any ulcers, and wearing footwear inside the

house. Regarding the self-blood glucose monitoring component, 85.7% of the participants were aware of their blood glucose levels, and 96% of the study participants checked their blood glucose levels at least once every 3 months or as per doctor's advice. Very few (20.6%) have a glucometer or Uri sticks at home for their blood glucose monitoring. Regarding the medication adherence component, 98.4% were taking their medications as prescribed by the doctor. None of them missed the doses at any time even when they were feeling well or not. The association between various sociodemographic variables, diabetic variables, and self-care practices is shown in Table 3.

Table 3: Association between Sociodemographic, diabetic variables and self-care practices

Sociodemographic and diabetic	Good Dietary score	Good Physical activity	Good Foot care N (%)	Foot	Good Self-blood glucose monitoring	Good Drug adherence N (%)
-------------------------------	--------------------	------------------------	----------------------	------	------------------------------------	---------------------------

variables	N (%)	N (%)			
Age					
≤50 years	25(24.5%)	17(33.3%)	1(50%)	29(27.4%)	32(25.8%)
>50 years	77(75.5%)	34(66.7%)	1(50%)	77(72.6%)	92(74.2%)
P value	0.440	0.152	0.457	0.589	0.457
Gender					
Male	35(34.3%)	22(43.1%)	1(50%)	41(38.7%)	43(34.7%)
Female	67(64.7%)	29(56.9%)	1(50%)	65(61.3%)	81(65.3%)
P value	0.490	0.186	1.0	0.132	0.126
SES					
Upper	84(82.4%)	41(80.4%)	2(100%)	85(80.2%)	99(79.8%)
Upper middle	13(12.7%)	8(15.7%)	0(0%)	16(15.1%)	19(15.3%)
Middle	4(3.9%)	1(2.0%)	0(0%)	4(3.8%)	5(4.0%)
Lower middle	1(1.0%)	1(2.0%)	0(0%)	1(0.9%)	1(0.8%)
P value	0.484	0.426	0.827	0.939	0.927
Duration of Diabetes					
5 years	41(40.2%)	23(45.1%)	1(50%)	44(41.5%)	53(42.7%)
6-10 years	39(38.2%)	18(35.3%)	1(50%)	39(36.8%)	47(37.9%)
>10 years	22(21.6%)	10(19.6%)	0(0%)	23(21.7%)	24(19.4%)
P value	0.673	0.857	0.625	0.782	0.02
Co-morbidities					
With Co-morbidities	79(77.5%)	34(66.7%)	0	81(76.4%)	94(75.8%)
Without comorbidities	23(22.5%)	17(33.3%)	2(100%)	25(23.6%)	30(24.2%)
P value	0.493	0.038	NA	1.00	1.00
Complications					
With complications	91(89.2%)	41(80.4%)	1(50%)	90(84.9%)	107(86.3%)
Without complications	11(10.8%)	10(19.6%)	1(50%)	16(15.1%)	17(13.7%)
P value	0.067	0.116	0.253	0.305	0.573

As the duration of study participants with diabetes increases, medication adherence decreases. This association is statistically significant with chi square p value <0.02. This may be because of forgetfulness and lack of awareness. Physical activity scores are lower in those without comorbidities than those with comorbidities. This association is statistically significant with a chi-square p-value <0.038. This may be because of the fear of complications due to the presence of co-morbidities. The transcripts of 15 In-Depth Interviews were analyzed thematically and presented here separately for each self-care component.

Dietary practices:

Most of the study participants have changed their

dietary patterns after diagnosis. They have reduced the intake of sweeteners and sugars. Few of them have reduced the quantity of rice during nighttime and increased the intake of tiffin's (chapati) with vegetable curries. Few of them opined that taking the powder form of fenugreek seeds mixed with water in the early morning will reduce blood sugar levels. Many of them opined that fruit intake will increase blood sugar levels so stopped taking fruits after diagnosis of diabetes. Few of the participants did not follow/change their dietary patterns even after diagnosis. The barriers identified were dissatisfaction if not taking rice, a feeling of hunger at night time, and eating rice three times daily became a habit, so I cannot avoid it. A 55-year-old woman when asked about the facilitating factors for practicing a strict

diabetic diet and taking medication on time, replied with wet eyes. "my daughter-in-law left us. my mother and my grandchildren were dependent on me, if something happens to me who will take care of them".

Physical activity practices:

Very few had physical activity away from their regular household work. The physical activity done by most of the participants was walking. The facilitating factors for regular physical activity as opined by some of them were habitual walking even before diagnosis and following doctor's advice.

Foot care practices:

Many of the participants washed their feet with soap and water during regular bathing. Very few examined their feet for ulcers. None of them wore slippers inside the house and also to the nearby shops. Very few of them revealed that they wash their feet and examine them every day as they want to be clean always and they get relief from pain. A forty-year-old man working as a mechanic with a recently amputated leg said-

"I had a rat bite on my toe a month back. I neglected that and it bite me again on the same toe. I don't

know that people with diabetes should check their feet for any injuries. Later the skin started becoming darker and it progressed upwards. That was when I went to the hospital and I landed up in this situation"

Self-blood glucose monitoring:

Most of the participants monitored their blood glucose levels at least once in three months. Only two said that they had checked their blood glucose levels more than a year back. Many of them were utilizing nearby government laboratory services for monitoring their blood sugar levels. Only one participant had a glucometer at home. The perceived barriers to monitoring blood glucose levels for more than a year in a few of the participants were lack of awareness, busy work schedule, and health concerns like not being able to go to the clinic.

Medication adherence:

Except for two, all the other participants were taking regular prescribed medicines. The barriers to non-drug adherence were forgetfulness, the assumption that the blood sugar level might have come to normal, and not affordable to buy medicines. The thematic analysis of the transcripts of the in-depth interviews were shown in table 4.

Table 4: Thematic analysis of the transcripts of fifteen in-depth interviews

Themes	Sub-themes	Codes
Perceived facilitating factors for proper dietary practice	Awareness of the disease	Diabetes is a life-long disease so I should eat a proper diet Maintain healthy life Maintain body weight
	Fear of complications	Fear of complications Fear of getting infections To reduce blood sugar levels
	Dependent family members	Need to be healthy because all my family is dependent on me
	Following advice	Doctor's advice Family members advice
Hindering factors for having physical activity	Health concerns	Knee pain Joint pains Leg injuries Stroke
	Busy work schedule Household chores	More occupational work Household work itself is enough Going to the workplace by walking itself is enough.
Explored barriers to taking proper foot care	Cultural factors Lack of awareness	Hindus doing poojas at home Feeling that there is no need for

	Fear of injury Health issues	examination Our house is always clean so no need for footwear inside the house Fear of fall due to slippage. Not able to bend or sit down to wash feet.
Identified facilitating factors for self-blood glucose monitoring	Anxious	Fear that blood sugar levels might have raised
	Following Advice	Doctor's advice Family advice
	Habit	Habitual testing while going for a doctor's consultation
	Accessible health centre	Nearby hospital
Perceived facilitating factors for medication adherence	Awareness of complications	To reduce blood sugar levels Fear of complications I feel weak if I don't take medicine and cannot do my work
	Family support Following advice	Family members remind me Doctor's advice

DISCUSSION

In our study results, among all self-care components medication adherence was the highest (98.4%). None of them missed the doses. Similar findings were reported in some studies where medication adherence was high. [5,9,6,10] However, our study results were contrary to a study done by Dinesh et al where less than half (48%) of the study participants had medication adherence. [11] The facilitating factors for medication adherence in our study were fear of complications, following strictly the advice of a doctor, and support from family members. Similar responses were observed by Krishnamoorthy et al. [12] Self-blood glucose monitoring in our study is seen in more than one and a half quarter of our study participants. The majority of them monitored their blood glucose levels at least once in three months and this is in contrast to the study done by Shyamsundar Jagdish Raithatha et al. [6] Similar findings were observed in some studies where self-blood glucose monitoring is more. [11,8,10,5,14] The facilitating factors identified for self-blood glucose monitoring in our study were following the advice of doctors and family members, nearby health care centres, and habitual testing before going for a consultation. The barriers identified were similar to the study done by Chittem et al. [13] Practicing a healthy diabetic diet was seen in a majority (80.9%) of our study participants which is similar to the studies done by Kalaiselvi et al and Anitha Rani M and Shriraam V. [5,15] However, some

studies reported low adherence to a diabetic diet. [8,10,14] The facilitating factors for good practice of a healthy diabetic diet in our study were fear of complications, following the advice, and desire to be healthy. Fruits were avoided by many of the study participants because of their sweet taste. A similar opinion was expressed by Ranasinghe et al. [16] The barriers encountered for dietary modifications by some studies were lack of time, financial constraints, inadequate family support, fear of taboos in social gatherings, inability to deviate from traditional food habits, advice from different health personnel at different times or what other people say and messages conveyed through papers and journals. [17,16] Our study results regarding the physical activity component were similar to many studies. [14,6,11] Similar facilitating factors for physical activity were perceived by the participants in another study. [16] Fear of diabetes and its comorbidities, lack of time, obligations to others, inability to link exercise with blood sugar control, lack of perception of obesity as a health issue, inadequate emphasis by physicians, social/cultural issues, lack of infrastructure, and physical restriction were the hindering factors for physical activity. [16,18,19] Our study results concerning foot care were in concordance with some studies. [20,21,22] However, a higher score for the footcare component was noticed by Karthik RC et al, Dasappa et al and George et al

where 82.4%, 48.46%, and 71.7% examined their foot <5 days a week. [9,8,23] The barriers identified in foot care practice were lack of awareness and low cultural acceptability. [24,15]

CONCLUSION AND RECOMMENDATIONS

Our study results revealed that the majority have good medication adherence, self-blood glucose monitoring, and dietary adherence. The factors facilitating them were increased awareness of the

progression of the disease and fear of complications. The barriers identified can be overcome by educating the people on lifestyle modifications. Apart from blood glucose monitoring, health workers need to be trained in assessing and educating the community regarding self-care practices. The doctors at the primary health care level should reinforce the self-management of diabetes to the patients at every visit.

REFERENCES

- 1)Kaveeshwar SA, Cornwall J. The current state of Diabetes mellitus in India. The Australasian medical journal. 2014;7(1):45.
- 2) Whiting DR, Guariguata L, Weil C, Shaw J. IDF diabetes atlas: global estimates of the prevalence of Diabetes for 2011 and 2030. Diabetes Res Clin Pract 2011; 94:311–321.
- 3)Yesudian CA, Grepstad M, Visintin E, Ferrario A. The economic burden of diabetes in India: a review of the literature. Globalization and health. 2014 Dec;10(1):1-8.
- 4)Nirmala PV, Gudivada M, Lashmi C. Comparative Study of the Prevalence of Type-2 Diabetes Mellitus in Various Demographic Regions of Andhra Pradesh, India: a Population based Study. Int J MCH AIDS. 2016;5(2):103-111. doi: 10.21106/ijma.91. PMID: 28058197; PMCID: PMC5187642.
- 5) Selvaraj K, Ramaswamy G, Radhakrishnan S, Thekkur P, Chinnakali P, Roy G. Self-care practices among diabetes patients registered in a chronic disease clinic in Puducherry, South India.

- Journal of Social health and Diabetes. 2016 Jun;4(01):025-9.
- 6) Raithatha SJ, Shankar SU, Dinesh K. Self-care practices among diabetic patients in Anand district of Gujarat. *International Scholarly Research Notices*. 2014;2014.
- 7) Vanstone M, Giacomini M, Smith A, Brundisini F, DeJean D, Winsor S. How diet modification challenges are magnified in vulnerable or marginalized people with diabetes and heart disease: a systematic review and qualitative meta-synthesis. *Ontario health technology assessment series*. 2013;13(14):1-35
- 8) Dasappa H, Prasad S, Sirisha M, Prasanna SR, Naik S. Prevalence of self-care practices and assessment of their sociodemographic risk factors among diabetes in the urban slums of Bengaluru. *Journal of Family Medicine and Primary Care*. 2017 Apr;6(2):218.
- 9) Karthik RC, Radhakrishnan A, Vikram A, Arumugam B, Jagadeesh S. Self-care practices among type II diabetics in rural area of Kancheepuram district, Tamil Nadu. *Journal of Family Medicine and Primary Care*. 2020 Jun;9(6):2912.
- 10) Gopichandran V, Lyndon S, Angel MK, Manayalil BP, Blessy KR, Alex RG, Kumaran V, Balraj V. Diabetes self-care activities: a community-based survey in urban southern India. *National Medical Journal of India*. 2012 Jan 1;25(1):14.
- 11) Dinesh PV, Kulkarni AG, Gangadhar NK. Knowledge and self-care practices regarding diabetes among patients with Type 2 diabetes in Rural Sullia, Karnataka: A community-based, cross-sectional study. *Journal of family medicine and primary care*. 2016 Oct;5(4):847.
- 12) Krishnamoorthy Y, Giriappa DK, Eliyas SK, Priyan S, Saya GK, Lakshminarayanan S. Patient and Provider's experience and perspective in addressing barriers to medication adherence among noncommunicable disease patients in rural Puducherry, South India—a qualitative study. *Journal of Patient Experience*. 2019 Sep;6(3):216-23.
- 13) Chittem M, Sridharan SG, Pongener M, Maya S, Epton T. Experiences of barriers to self-monitoring and medication-management among Indian patients with type 2 diabetes, their primary family-members and physicians. *Chronic illness*. 2022 Sep;18(3):677-90.
- 14) Rajasekharan D, Kulkarni V, Unnikrishnan B, Kumar N, Holla R, Thapar R. Self-care activities among patients with diabetes attending a tertiary care hospital in Mangalore Karnataka, India. *Annals of medical and health sciences research*. 2015 Feb 4;5(1):59-64.
- 15) Anitha Rani M, Shriram V. Are patients with type 2 diabetes not aware or are they unable to practice self-care? A qualitative study in rural South India. *Journal of primary care & community health*. 2019 Aug; 10:2150132719865820.
- 16) Ranasinghe P, Pigera AS, Ishara MH, Jayasekara LM, Jayawardena R, Katulanda P. Knowledge and perceptions about diet and physical activity among Sri Lankan adults with diabetes mellitus: a qualitative study. *BMC public health*. 2015 Dec; 15:1-0.37
- 17) Gehlawat M, Naik BN, Lakshminarayanan S, Kar SS. Dietary practices and barriers to dietary modification among diabetics and hypertensives in a rural health service area of Puducherry: A qualitative study. *Int. J. Health Allied Sci*. 2018 Jul 1; 7:139.
- 18) Advika TS, Idiculla J, Kumari SJ. Exercise in patients with Type 2 diabetes: Facilitators and barriers-A qualitative study. *Journal of family medicine and primary care*. 2017 Apr;6(2):288.
- 19) Chandra A, Nongkynrih B. Facilitators and barriers of physical activity in prevention and control of ncd a qualitative study in North India. *J Trop Med Health*. 2019; 3:144.
- 20) Lakshmi N, Patel N, Parmar P, Garasiya K, Chaudhary M. Study the foot care practice among diabetic patients in Ahmedabad city, Gujarat. *International Journal of Medical Science and Public Health*. 2018 May 1;7(5):333-8.
- 21) Taksande BA, Thote M, Jajoo UN. Knowledge, attitude, and practice of foot care in patients with diabetes at central rural India. *Journal of family medicine and primary care*. 2017 Apr;6(2):284.
- 22) Pitchai P, Joshi J. Knowledge and practice of foot care amongst diabetics in India: comparison between urban and rural setting-a reality check. *Int J Health Sci Res*. 2015;5(4):181-9.
- 23) George H, Rakesh PS, Krishna M, Alex R, Abraham VJ, George K, Prasad JH. Foot care knowledge and practices and the prevalence of peripheral neuropathy among people with diabetes attending a secondary care rural hospital in southern India. *Journal of family medicine and primary care*. 2013 Jan;2(1):27
- 24) Mallick N, Maharana SP, Garg S, Sembiah S, Banerjee R. Self-care practices among diabetes patients attending a health center in a slum of Kolkata: a qualitative study. *Medical Journal of Dr. DY Patil University*. 2018 Nov 1;11(6):506-11.