

A qualitative study on factors affecting adherence to antidiabetic medication in patients approaching a health center in an urban area

Paawanjot Kaur¹, Rozy Gomra², Sangeeta Girdhar³, Sarit Sharma³,
Anurag Chaudhary³

¹Intern, Dayanand Medical College and Hospital, Ludhiana, Punjab, India, ²Extern, Dayanand Medical College and Hospital, Ludhiana, Punjab, India, ³Department of Community Medicine, Dayanand Medical College and Hospital, Ludhiana, Punjab, India

Paawanjot Kaur and Rozy Gomra contributed equally to this work.

ABSTRACT

Aim: The aim of this study was to evaluate the factors affecting adherence to antidiabetic medication among diabetic patients in India. **Setting and Design:** A qualitative study was conducted among 40 diabetic patients aged >30 years, on treatment for more than a year without any complications in the Urban Health Centre of Dayanand Medical College and Hospital, Ludhiana, Punjab, India. **Materials and Methods:** A semistructured questionnaire was harnessed to congregate data by interviewing the patients for 30–40 min in person. The interviews were recorded in the form of audios by acquiring informed consent and transcribed verbatim. The factors were then divided into barriers and enablers which were further subdivided into themes and subthemes as a result of which four major themes were built including individual, social, organizational, and community levels. These major themes were further categorized into several subthemes to assess the nonadherence to antidiabetic medications. **Results:** The results of the interviews depicted that the lack of knowledge, financial problems, familial issues, misconceptions regarding the disease, and side effects of taking medications daily were the major altruist for nonadherence, whereas on the other hand, positive perception about the disease, family support, and getting medications on affordable prices by some health-care institutes played an important role in enabling medication adherence as about 50% patients were adherent to the medications. Moreover, various interventions were used to escort the patients regarding medication compliance and blood glucose level monitoring such as lifestyle modifications (diet and exercise), use of reminders for medication intake on time, encouraging them to visit health-care centers, or hospitals on time for regular check-ups and by educating them regarding the long-term effects of diabetes and its prevention.

Keywords: Adherence, antidiabetic medications, barriers, enablers

Introduction

Diabetes mellitus is one of the most prevalent diseases currently which has affected a large number of populations all over the

Address for correspondence: Dr. Paawanjot Kaur,
House No. Z-2-10915, Street No. 20, Guru Teg Bahadur Nagar,
Bathinda, Punjab, India.

E-mail: dr.paawanjotkaur@gmail.com

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globe. According to IDF Atlas 10th edition (2021), around 537 million adults (20–79 years) have diabetes, that is, 1 in 10 adults and around 90% of these patients account for type 2 diabetes.^[1] The number of people living with diabetes is predicted to increase by 69% by 2045.^[2] Of all the adult diabetic patients, one in seven resides in India, hence making it a major health concern resulting in an increase in morbidity and mortality as well as declining the quality of life. The most probable

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complications include cardiovascular diseases, stroke, peripheral vascular diseases, retinopathy, nephropathy, neuropathy, and hypoglycemia. Interventions to control blood glucose levels among diabetic patients should focus on their lifestyle (patient's diet, weight, alcohol, and smoking), monitoring blood glucose levels regularly, and medication compliance. To prevent or delay the complications, patients should be adherent to antidiabetic medications, failure of which can lead to progression of the disease. WHO defines adherence as the extent to which person's behavior, taking medications, following a diet, and/or executing lifestyle changes corresponds with agreed recommendations from a health-care provider.^[3] Adherence in diabetic patients taking oral hypoglycemic agents and insulin ranges between 65–85% and 60–80%, respectively.^[4] A cross-sectional study in India demonstrated that nonadherence was seen in 55.14% of the participants and the leading factors were lack of lifestyle modification in 83.78% of patients.^[5]

There are numerous factors which contribute to nonadherence, for instance, failure to take medications which includes ignorance, workload, lack of knowledge, financial issues, failure to follow up, and difficulty in traveling to hospital. Further, there was a study carried out in Nigeria wherein socio-ecological model was used as a tool for assessing the adherence among diabetic patients including personal, interpersonal, organizational, and community-level barriers.^[6] In-depth qualitative studies provide freedom to the patients to express themselves and give precise details. In comparison to quantitative studies conducted all over the world, the number of qualitative studies is far less, as for exploring the factors affecting adherence to antidiabetic medications in patients with diabetes mellitus. Therefore, it is a demand of the time to conduct more qualitative studies on this subject to gain an insight into patient's perspective in India.

Primary health-care providers are the first point of contact for diabetic patients, and they have the opportunity to educate patients about the importance of taking medicine. A qualitative study was planned using in-depth interviews to determine the factors responsible for nonadherence to antidiabetic medications. The factors were further divided into barriers and enablers. This information can be used by primary health-care providers for providing better care and improving health-care outcomes in diabetic patients.

Materials and Methods

Study design

It is a qualitative study assessing the enablers and barriers for adherence to antidiabetic medications.

Study area

In this study, sample of participants was obtained from patients visiting the Urban Health Centre of Dayanand Medical College and Hospital, Ludhiana, Punjab, India. It was a purposive sampling with inclusion and exclusion criteria set before the beginning of

study. Patients diagnosed with type 2 diabetes mellitus hinging on medication for more than 1 year with age 30 years or more and without any diabetes-related complications were recruited, excluding pregnant and lactating women. The people who did not give their consent were also eliminated from this study.

Sampling methodology

Face-to-face in-depth interview was done with each participant by a trained investigator who asked semistructured questionnaire which included demographic profile, such as age, gender, education, occupation, and marital status; age at diagnosis; and duration of diabetes. The participant's recent RBS levels were also used to guide the interview which lasted for 30–40 min. Adherence was checked using WHO criteria. An interview guide was further developed which included open-ended questions on barriers of adherence and it was finally validated by two reviewers. The interview began by questioning the time span during which the participant was diagnosed with type 2 diabetic mellitus. Each interview was recorded in audio form after obtaining informed consent and transcribed verbatim and finally data saturation was achieved after interviewing 40 patients in 1-month period.

Interview guide

P _____	Age _____	Gender _____	Marital Status _____
Education _____	Occupation _____	RBS level _____	
Duration of Diabetes _____			

How and when was your Type2 DM diagnosed?
 What is the number and frequency of ADM that you have been prescribed?
 Are you adherent to the medication?
 Yes /No, specify reasons:
 How are your diabetes medications affecting you/your family?
 What are the things you do not like about your ADMs?
 How often do you get your blood glucose levels checked?
 What are the dietary/lifestyle modifications that you have incorporated in your daily routine?
 How do you decide whether or not to take your medications?
 Have you ever used alternative form of medicine? if yes, specify _____
 What are the factors regarding health care system that affects purchase and use of ADMs?
 What is your current knowledge regarding diabetes?

Data analysis

The audiorecorded interviews were transcribed verbatim. So the investigators, first, went through each interview three times to comprehend and interpret each factor; then the verbatim were further translated from vernacular to the Standard English language using Google Translate. After that, the codes produced were devised thorough content analysis by two investigators and cross-checked. Codes were then consolidated into subthemes and their description was added and finally the appropriate result was generated thoroughly analyzing the content [Table 1].

Results

Barriers

Individual: The principal factor which was responsible for nonadherence to antidiabetic medication was an individual's own perspective of the disease. Most of the patients were diagnosed incidentally. The diagnosis of diabetes came as a surprise to patients who sought health care for other complaints such as

Table 1: Characteristics of study participants

Study patients	Age (years)	Gender	Age at diagnosis of DM (years)	Duration of diabetes (years)	No. of ADMs	Employment	Education	Marital status	RBS levels (mg/dl)
P1	68	Male	67	1	1	Laborer	Illiterate	Widower	210
P2	62	Female	50	12	1	Housewife	Illiterate	Widow	144
P3	44	Female	37	7	1	Housewife	Primary	Married	130
P4	59	Female	49	10	2	Housewife	Illiterate	Married	160
P5	60	Female	58	2	1	Factory worker	Illiterate	Widow	250
P6	61	Male	61	1	1	Retired	Primary	Married	234
P7	67	Male	61	6	1	Retired/Pension	Metric	Married	127
P8	62	Female	52	10	1	Housewife	Secondary	Married	150
P9	60	Female	56	4	1	Housewife	Illiterate	Widow	185
P10	42	Female	40	2	1	Housewife	Secondary	Married	210
P11	45	Female	42	3	1	Housewife	Secondary	Widow	160
P12	66	Male	65	1	1	Tailor	Secondary	Married	213
P13	52	Female	48	4	1	Housewife	Metric	Married	237
P14	48	Female	46	2	1	Housewife	Secondary	Married	314
P15	46	Female	44	1	1	Housewife	Graduate	Widow	301
P16	40	Female	39	1	1	Housewife	Secondary	Married	500
P17	50	Female	41	9	1	Housewife	Metric	Married	150
P18	51	Male	45	6		Security	Secondary	Married	145
P19	49	Male	32	17	1	Tea Shop	Primary	Married	197
P20	47	Female	38	9	1	Housewife	Secondary	Married	320
P21	50	Female	47	3	1	Housewife	Secondary	Married	332
P22	65	Female	60	5	1	Housewife	Secondary	Widow	140
P23	61	Male	41	20	1	Farmer/Retired	Secondary	Widower	160
P24	61	Female	58	3		Housewife	Illiterate	Married	320
P25	58	Female	52	6	1	Retired	Primary	Married	89
P26	62	Male	53	9	1+ insulin inj.	Retired	Secondary	Married	160
P27	56	Male	51	5	Insulin inj.	Retired	Graduation	Married	293
P28	70	Male	60	10	1	Laborer	Primary	Married	150
P29	62	Female	48	14	1	Housewife	Metric	Widow	242
P30	62	Female	52	10	1	Tailor	Secondary	Married	150
P31	65	Male	64	1	1	Retired	Metric	Married	450
P32	75	Female	72	3	1	Housewife	Primary	Widow	280
P33	60	Female	56	4	1	Masseuse	Illiterate	Widow	150
P34	71	Male	63	8	1	Retired	Secondary	Married	262
P35	55	Male	45	10	1	Bakery owner	Secondary	Married	192
P36	52	Female	42	10	1	Housewife	Secondary	Widow	477
P37	53	Female	44	9	1	Housewife	Second grade	Widow	250
P38	58	Male	43	15	1	Blacksmith	Metric	Married	180
P39	72	Male	69	2.5	1	Retired	Diploma	Widower	428
P40	35	Female	34	1	1	Lock maker	Illiterate	Married	197

fever, body aches, or elective surgery but on testing, their blood glucose levels came out to be way above the normal range. Few patients, after getting a second opinion, accepted the fact that they had the disease, while some believed they would get better on their own or by following home remedies (either consuming karela juice or neem leaves) [Table 2].

“I was dizzy and my legs were burning, I thought I got fever and went to the doctor. Tests were done and my RBS came out to be 375 mg/dl, I was surprised to see how come I have diabetes as I am a rickshaw puller and manual laborer, then I came home and discussed it with my children. They said it might be possible. For second opinion I went to UHC, got tested again and I believed it.”

Therefore, they did not start taking ADMs initially. It was only when they noticed that their blood glucose levels were still higher than normal; besides following home remedies, they switched to ADMs.

Some of the patients were living with the misconception that use of alternate medication along with ADMs is going to be beneficial as Ayurveda or homeopathic medication as they don't have any side effects. As a result, they started taking Ayurveda or homeopathic treatment, especially during winters because of the myth that it creates heat in the body due to which they skipped their antidiabetic medications.

Table 2: Barriers responsible for non-adherence to antidiabetic medications

Themes	Subthemes	Description	Patient's quotes	
Individual	Poor knowledge regarding the disease	Patient's inadequate knowledge, attitude, and belief toward the disease and RBS levels	<p>"Initially I thought the disease would become normal on its own." P9</p> <p>"I stopped taking ADMs and started following home remedies which didn't work. Also, I was too lazy to come to the hospital. Now I'm experiencing numbness in my feet." P14</p> <p>"I omitted medicine because I wasn't aware that it is a chronic disease. When my family told me that I'm getting weak day by day, I got tested again and started my treatment." P20</p> <p>"My sister is also diabetic but she says I eat everything and then I inject insulin." P36</p> <p>"180–200 mg/dl RBS is normal that's why I skip medicine sometimes." P40</p> <p>"As compared to my wife's RBS (500–600 mg/dl), mine (150 mg/dl) is normal." P1</p>	
	Fearful regarding side effects of Medication	Patient's concern regarding the long-term side effects of the medications	<p>"Damage the kidneys." P9, 15, 25, 35, 40</p> <p>"I usually skip medications every 2–3 days due to fear of damage to kidneys." P9</p> <p>"Medication doesn't work, moreover it damages our liver and kidney." P15</p> <p>"ADMs made me dizzy, so I stopped after few days." P15</p> <p>"I skip medicine whenever I feel sick from my stomach. There is no use taking too much medicine. I feel these medicines are too strong because it causes allergy on my body." P20</p>	
	Misconceptions about intake of medication	Patients have mistaken belief about when to have or when not to have medication	<p>"Allergic reactions on body indicates increase in blood glucose levels." P30</p> <p>"Whenever I feel better, I skip my medicine." P3</p> <p>"Whenever I go out, I forget to take the medicine." P3</p> <p>"I took medicines for some time, then I did not feel like having it, so I stopped." P24</p> <p>"I often forget to take medications due to work load and I do not follow any diet but on the other hand, my mother in law follows it as she is also a diabetic for a long time and her blood glucose levels are under control." P16</p>	
	Fear of hypoglycemia	Patients are worried about blood glucose levels falling below normal because it is more life-threatening	<p>"Blood glucose levels decrease on regular intake of medicine, that's why I skip it occasionally." P25</p> <p>"My blood glucose levels started dropping frequently so I anticipated that after using insulin it would decline further more because it has happened 3–4 times previously." P27</p> <p>"It's a very bad disease; no one should have this because there is no cure for it. How much one can abstain, even if I control myself I end up eating one thing or the other. Sometimes when I abstain intensely and take regular medication, my blood sugar levels drop suddenly which is more life threatening." P14</p>	
	Cost implications	Unable to buy medications due to lack of money	<p>"If I do not earn, I will become a burden on the children in future." P19</p> <p>"I buy medicine whenever I have money otherwise I skip it." P33</p> <p>"I can't afford daily medications because of its cost." P14</p> <p>"I am afraid to ask for money from children repeatedly because of fear of being questioned." P1</p> <p>"I skip medication every 2–3 days so that it can last for long time." P1</p> <p>"I missed my last appointment because I didn't have any money"</p>	
	Work commitments	Patient's negligence because of work pressure	<p>"Didn't feel need because I was busy at work and that's why I never took it initially." P28</p> <p>"I forget to take medicine while doing housework." P16</p>	
	Dietary nonabstainers	Failure to change the daily personal habits	<p>"I face difficulty in abstaining." P9, 17, 35, 36, 40</p> <p>"My husband tried to stop me, but I couldn't do it." P40</p> <p>"Alcohol increases my blood glucose levels." P35</p>	
	Alternative medications Ayurveda/ Homeopathic	Use of another type/ mode of medication	<p>"I took desi medicine, so did not buy ADMs for few days, but blood glucose levels remain raised." P40</p> <p>"I follow Ayurveda treatment along with allopathic and obey the instructions of BAMS Doctor by following a vegan diet." P27</p> <p>"I took desi medications for 3–4 months. It produces heat in my body, so I consume it during winter. In summers, I prefer ADMs." P21</p>	
	Social	Familial issues/problems	Lack of support of family members	<p>"There is lot of stress in the family." P30</p> <p>"Children are busy on their own." P3</p> <p>"Only my husband takes care of me. Son and daughter in law are just pretentious. There is no special meal preparation for me. I am the one who prepares food for everyone in the family. Due to budget deficit, we can't even afford fruits." P24</p> <p>"I and my husband, live on rent separate from son and his wife because they sold our house. There is no monetary support from them. My husband must work. Recently, my daughter in law had surgery so they asked me to do all the household chores. It increases my stress levels." P21</p>
		Organizational Obstacles/ Challenges faced	Problems faced on visiting health center	<p>"It takes a lot of time." P4, 25</p> <p>"I have to come a long way"</p>

Contd...

Table 2: Contd...

Themes	Subthemes	Description	Patient's quotes
	(waiting time, traveling)		"The hospital is situated at a distance of 2 miles from my home. Either I take lift from strangers or I walk to the hospital." P2
	Follow-up	Reasons for missing appointments	"At times, gap for 1–2 days arises in follow-up because of my work"
	Self-medication (pharmacy)	Patient taking medications directly from drug store	"I used to get dizzy and anxious, went to medical store to get RBS checked, it was quite high, then I started taking medications from pharmacy on my own." P36
Community	Opinion of society/ Peer pressure	Misguided by family and friends about the disease	"My sister is also diabetic. She says everybody is going to die one day, you should eat everything, enjoy your life and die"

Some patients had mistrust regarding the efficacy of ADMs as their blood glucose levels were not controlled even after taking the medications regularly.

Most of the patients were further afraid to take medicine due to the prevalent notion in the general population that allopathic medication damages the kidneys due to which they started skipping their medications during their treatment. Few of them also assumed that their body would get adapted to the daily required dose of medication, as a result of tolerance; they would never be able to return to a lower dose, or it might result in hypoglycemia, which in itself is more life-threatening; hence, they decreased the dose of their medications accordingly.

Financial problems were basically the main challenge experienced by the patients which in turn lead to nonadherence as they were unable to buy their medications due to the cost. Poverty, high cost of medicine, and lack of insurance gave them no choice, but to skip medicine, every alternate day, so that the medicine stock can last longer, result of which they would be able to save money for the next appointment as well as keep their blood glucose levels in control.

Family: Family plays a vital role which helps one to deal with difficulties of life by supporting either financially or emotionally. So, the lack of this support leads to a stressful life and affects the patient in several ways. Most of the patients were facing the same difficulty with respect to their children. Also, they were afraid to ask their children and other family members for money to buy their medications. Few patients revealed that if they didn't earn money, they would become a burden on their children in the future. To avoid that, many of them were still working so as to be financially independent.

Organizational: Due to long waiting time and nonaccessibility, few patients did not seek health care from doctors as whenever they felt unwell, they directly went to the pharmacy and self-medicate. Due to an increase in prevalence of disease, numbers of patients have increased resulting in overcrowding of the health centers as well as the hospitals. It has further led to more time consumption. High cost of medications was another factor which had contributed in nonadherence to ADMs.

Community: Nonexpert advice and recommendation was another barrier to medication adherence. The negative recommendation

by society also played a role in nonadherence. Social pressure and stigma associated with diabetes was a major barrier.

Enablers

Individual level

Knowledge about disease and ADMs: The patients who were aware of the symptoms had knowledge about the course of disease and its complications were found to be more adherent to antidiabetic medications. Also, the patients who were familiar with the role of insulin and blood glucose levels monitored blood glucose levels on glucometer routinely. Moreover, few patients who had family history were familiar with consequences of the disease and were vigilant in following doctor's advice and dietary and lifestyle modifications played a positive role in taking medications. Medication intake with meals helped them remember taking medicine regularly on time and the patient's desire to live longer and lead a quality life gave a push for consuming medications. Also, some patients experienced fatigue without the medications, whereas some felt normal after taking them [Table 3].

Family support: Emotional, physical, and monetary support from family played a major role in enabling medication adherence. Some patients came to the hospital with family members. The spousal support further played a key role in managing the disease which included looking after diet, giving medications on time, checking blood glucose levels with glucometer, accompanying the patient to doctor's appointment, and financially also. This responsibility was taken up by children in widowed patients with no spousal support. In addition, few patients were sensitized by their children regarding the illness.

Organizational: Cost of ADMs was a major factor that affected adherence to ADMs in diabetic patients. Patients preferred health centers where it was available at an affordable price and the centers which were near to their house which resulted in less waiting period enabling regular follow-up appointments. Further, the faith in doctors and health-care workers enabled the patients to take medications and follow the instructions given by doctor on each and every visit.

Discussion

The objective of this study was to determine the barriers and enablers affecting adherence to antidiabetic medications. This

Table 3: Enablers responsible for adherence to antidiabetic medications

Themes	Subthemes	Description	Patient's quotes
Individual	Positive perception about the disease	Patient's positive attitude, belief regarding the disease	"I have to take medications for my body, otherwise I feel weak." P11 "Blood glucose is required for energy to do daily routine work but, sometimes it increases from its normal value. To maintain a normal level, one should diet, exercise and take regular medications." P7 (67 years old) "The ADMs are efficacious. They provide symptomatic relief" "If we do not take medicine, then we'll die soon. Our body would have to fight in the hospital. If we take medications regularly, we will live for longer." P29 "Can't live without medicine, I remember it more than money." P6 "My wife passed away 1 year ago due to complications of diabetes, she was on insulin injections. I wasn't aware of the complications earlier, but now I take my medications regularly." P23 "I can work actively after taking my medicines." P10 "I only have to take the tablets which are far better than injecting insulin." P13
	Reminder	Conditioning by doing two activities simultaneously	"I take it 15 min before my meal. It acts as a reminder"
	No side effects of ADMs	No negative effects encountered by patients	"I don't experience any side effect of ADMs." P3
Social	Familial support (emotional/monetary/physical)	Patient's description about the role of their family with respect to their disease	"Children stop me from eating sweets" "My husband used to take care of me all the time. He supervised my diet, gave me medications, and went to a doctor's appointment with me. Now, after his demise, this role has been taken by my son and daughter-in-law." P29 "Even if I forget to take medicines, my children remind me." P6
Organizational	Affordable medications	Patient is able to buy ADMs regularly if it is available at an economical price	"I get free medication here." P1, 4, 5, 9, 36 "The medicine available here is at affordable price which is convenient for the poor patients." P6
	Distance/Waiting time	Patients prefer hospital near to their house and with less waiting period	"The waiting period is less than the previous hospital"
	Regular follow-up (medications, regularly checked RBS levels)	Patients are vigilant of their disease and are watchful of their RBS levels	"I never miss an appointment even if I have to wait for my turn." P10
Community	Guidance by society	Positive attitude of society favors taking medications	"Earlier I took homeopathic medicine for one year, it was of no benefit. Then my relatives advised me to start allopathic treatment." P10

study was conducted among the patients, which explores the patient's perspective toward the disease and its treatment.

This study showed that individual-level barriers contribute the highest in nonadherence to antidiabetic medications. Poor knowledge regarding the disease, fear of side effects and hypoglycemia, misconceptions, ignorance toward medications, medication expenses, and workload were the predominant barriers.

This study also proposed that the family played a vital role in a patient's life for fighting against the disease. Apart from financial support, family members including spouse and children provided emotional support and a safe environment for the patient to discuss their fears and doubts regarding the disease. They also act as reminders for taking medications. A study in Qatar by Jaam Myriam *et al.*^[7] also focused on importance of family and need for family involvement in the management of diabetes.

Onwuchuluba EE *et al.*,^[6] a Nigerian study, demonstrated barriers and facilitators from socio-ecological perspective by showing that barriers go beyond personal factors and include family, community, and health-care providers. This study found that in

Nigeria, organizational-level barriers were often reported. Patients criticized the health center structure (overcrowding, long waiting hours, multiple prescribers), poor doctor-patient relationship, low accessibility, and high cost of medications, whereas in the current study, organizational level acted as a barrier as well as an enabler to the patients. High-cost medications and overcrowding at some hospitals, self-medication, and nonaccessibility were the barriers; however, patient's faith in doctors and health-care workers, getting medications at affordable prices, and less waiting time in health-care centers were the enablers seen in some patients.

In contrast to present study, Mehdi Rezaei *et al.*,^[8] an Iranian study, showed that lack of trust in health-care workers, opinions, and beliefs of others and their own experiences prevented adherence to medication. It was seen that the patients did not believe in doctor's advice and considered their recommendation to be mere words, accepting interpretations from people other than doctors.

Ahmad Akram *et al.*,^[9] a study conducted among Indian migrants in Australia, showed that fear of drug dependence and side effects were the barriers which led to delay in seeking the medications and resorting to Ayurvedic treatment. Patients weighed the

benefits against the concerns after initiating medication and overall well-being enabled them to take medication. Similar findings were observed in the current study.

Jafer Siraj *et al.*,^[10] a cross-sectional study, conducted at Mizan-Tepi University Teaching Hospital, Mizan-aman, Ethiopia, also reported the similar reasons for nonadherence to the present study such as financial problems, forgetfulness, and overlapping schedule of medication intake with working time and side effects of medications. The financial problem was the major contributor which led to nonadherence, which was faced especially by the elderly and widowed patients because of their inability to earn money. Also, lack of financial support from the family due to their poor relationship with their children as well as their fear to become a burden on their family was majorly reported in the present study.

Management of diabetes requires commitment on part of patient but concurrently the involvement of primary care physician is equally important. Primary care physicians can enhance adherence to treatment by educational messages integrated into their visits to health center. In this study, various factors regarding adherence to antidiabetic medications were explained but it still held some limitations as it was only based on the fact of patient's statements and their experience. The small sample size cannot be generalized to the larger population. To overcome these limitations, further investigations should be carried out in the future for better results.

Ethical statement

Written informed consent was obtained from the patients for their anonymized information to be published in this study. Ethical approval was obtained from Institutional Ethics Committee.

IEC approval

The study was approved by IEC Committee, DMC&H, Ludhiana, Ref no. 2022-770.

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Conflicts of interest

There are no conflicts of interest.

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