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Understanding Health-Seeking Behavior of People with Diabetes during COVID-19 Pandemic: A Facility Based Cross-Sectional Study Conducted in Ahmedabad, India

ABSTRACT

Objective: The study was conducted to understand health-seeking behavior (HSB) of people with diabetes during the coronavirus disease 2019 (COVID-19) pandemic.

Materials and methods: A hospital-based cross-sectional study was conducted at All India Institute of Diabetes and Research (AIIDR), Swasthya Diabetes Care in Ahmedabad, India. Data were collected with the help of a structured questionnaire. Response rate was 97%. One hundred thirty-eight participants who visited the hospital during the month of May 2022 were included and interviewed after obtaining informed consent.

Results: Of the study participants (n = 138), 43.5% were female, while 56.5% were male. The mean age of study participants was 51.22. Out of 138 participants, 18.1% (n = 25) had type 1 diabetes mellitus (T1D) and 81.9% (n = 113) had type 2 diabetes mellitus (T2D). It was found that 55.7% faced delay in regular check-ups, 39.8% used telemedicine to avoid travelling to hospital in fear of getting COVID infection, 7.8% faced delay in consuming medicines due to unavailability of medicines. Regular intake of medicines/insulin altered for 40.5% of study participants. 54.3% of our study participants felt fear while visiting the laboratory to measure their blood glucose level.

Conclusions: Uncertainties created by COVID-19 pandemic have affected HSB of people with diabetes in terms of access to healthcare facilities, medicine adherence, laboratory testing, self-management habits. Knowledge shared here can help program planners to identify influencing factors and implement appropriate interventions. This understanding also helps in setting the stage for the formulation of effective diabetes-related educational programs which might help for future pandemic.

Keywords: health-seeking behavior, COVID-19 pandemic, diabetes, people with diabetes, self-management in diabetes, diabetes care

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Introduction

India is home to 77 million people with diabetes, second highest in the world [1]. The International Diabetes Federation (IDF) estimates that in 2017, approximately 425 million adults (aged 20–79 years) were living with diabetes, and by 2045, this will rise to 629 million worldwide [2]. There is a worldwide epidemic of diabetes. Diabetes is life-threatening and requires

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a high degree of self-management [3]. The concept of studying health-seeking behaviors has evolved with time. Today, it has become a tool for understanding how people engage with the health care systems in their respective socio-cultural, economic, and demographic circumstances [4]. COVID-19 was classified as a pandemic in a short period of time. One of the most vulnerable people to this virus are those with chronic diseases such as diabetes mellitus [5]. During disease outbreaks and pandemics, HSB might change; due to the uncertainties that come with it [6]. The requirement of self-management in this disease can be burdensome, frustrating, and overwhelming to achieve the overall goal of preventing acute and chronic complications of diabetes [7]. The global coronavirus pandemic has impacted the health-seeking behaviors of different cohorts in the population, and there are reports of low uptake of healthcare services [6]. Diabetes increases the mortality of patients with COVID-19 [8]. Positive HSB should improve control of diabetes and thereby reduce the incidence of complications associated with this devastating disease [9]. HSB is influenced by matters like availability of services, transportation, and wealth of the patient. Poor availability of transport, physical distance to the health facility and the time taken to reach such facilities have been found to influence HSB and health service utilization [7]. Optimal glycemic control is important to reduce and prevent diabetic complications and people with diabetes need special care. However, the management of people with diabetes has been changed due to the lockdown imposed to prevent the spread of the pandemic. Governments from different countries have adopted various infection control measures to slow the spread of COVID-19. Social distancing and quarantine ensure that clinic visits are reduced for fear of infection. Furthermore, the infection control measures might affect physical activity and diet, and there are effects on health care and access to diabetes medication. Due to the contact restrictions and restrictions in the health care area, digital approaches to ensure optimal management of people with diabetes come into focus. Diabetes technology, for example telemedicine, overcomes physical limits and can improve health care access [5]. Knowledge about health and HSB can help program planners to identify obstacles to early diagnosis and effective treatment, and implement appropriate interventions. An understanding of what people do when they have diabetes can assist program planners by directing health education initiatives, approaching alternative health providers with a view of involving them in the program, and by removing or reducing barriers to presentation to health clinics. Identification of determinants of HSB can likewise set the stage for the formulation of effective diabetes-related educational programs [9]. But COVID-19 pandemic was associated with compulsory quarantines, national cessation of movements, compulsory lockdowns, etc. This can be attributed to decreased accessibility to doctors' consultation, including follow-up visits, and inappropriate drugs therapy, apart from lack of adequate counselling services, decreased medication adherence, changes in dietary patterns, reduction in physical activity levels, and decreased social interaction leading to mental health problems [10]. This introduction has summarized possible available published knowledge on HSB of people with diabetes during COVID pandemic. However, there are very few studies available on HSB of people with diabetes during COVID pandemic, which shows that there is a clear need for more studies for the long-term changes in HSB of people with diabetes during pandemic.

Materials and methods

Study setting

A hospital-based cross-sectional study design was used to conduct this study to understand HSB of people with diabetes during pandemic. The study was conducted at AIIDR, Swasthya Diabetes care in district Ahmedabad in the state of Gujarat, from the western part of India. It is operated by diabetologists. This private hospital offers diabetes care, retina care, lab tests and diagnostics, nutrition care, obesity care, foot care, nephrology care, physiotherapy, type 1 diabetes care, diabetes education, pharmacy, advance monitoring, and devices.

Participant criteria

One hundred thirty-eight participants who visited AIIDR were included and interviewed. Inclusion criteria were those people with diabetes who visited AIIDR during the month of May 2022 and people with diabetes who had been diagnosed with diabetes mellitus at least before 2019. People with diabetes who had been diagnosed with diabetes mellitus after 2019 were excluded from the study.

Data collection tool

Data were collected with the help of a structured open- and closed-ended questionnaire by the principal investigator of the study through personal interviews from 138 study participants after obtaining informed consent. Due to lack of time, this tool could not be validated. Data were collected in premise of AIIDR, Swasthya Hospital, Ahmedabad-Gujarat-India. The tool mainly consisted of five parts: Basic information about participant including measuring blood glucose level

without the time of pandemic, Information regarding access to healthcare facilities during pandemic, Information regarding medicine and fear of approaching laboratory during pandemic, Information regarding Diabetes Self-Management Habits during pandemic, Information regarding COVID infection.

Data analysis

Collected closed-ended data were cleaned in MS Excel. Collected open-ended data having similar kind of answers were categorized for easing of data analysis. All categorial data were analyzed with Chi-square test in SPSS.

Ethical approval

Ethical approval was obtained from Institutional Ethics Committee, Indian Institute of Public Health, Gandhinagar (IIPHG) and All India Institute of Diabetes and Research (AIIDR) before conducting this study.

Results

For the current study, 142 people with diabetes were approached. One hundred thirty-eight out of 142 gave consent for being a study participant. So, response rate was 97%. Descriptive statistics were employed to summarize and describe a variable or variables for the study participants while the chi-square test was used to examine categorial variables to see the association between two variables. A p-value less than or equal to 0.05 (two-tailed) was used to establish statistical significance.

Basic information about study participants before the pandemic

Table 1 shows that out of 138 study participants (n = 138), 43.5% were female, while 56.5% were male. The mean age of study participants was 51.22 years. Out of 138 study participants; 95.7% were educated (45.7% have done schooling, 33.3% were graduates, 16.7% have done higher study program) while only 4.3% were total illiterate.

Out of 138 participants, 18.1% (n = 25) had T1D and 81.9% (n = 113) had T2D. The mean age at the time of diagnosis was 39.58 years; 12.3% were below 20 years, 34.8% were between 21–40 years, 47.1% were between 41–60 years, while 5.8% were above 60 years.

Patients who measured their blood glucose level daily or once in a month or once in three months or at the time of regular check-ups were put in the category of measuring regularly as they have measured blood glucose in regular manner. Majority (48.6%) of total study participants (n = 138) were measuring their blood glucose level regularly before the time of pandemic, 15.9% were not measuring regularly while 35.5% were measuring sometimes. Out of 67 study participants who measured blood glucose regularly, 85.07% (n = 57) measured it at home while in 14.92% (n = 10) blood glucose was measured in laboratory. Out of all participants (n = 67) who measured regularly their blood glucose level, 73.5 (n = 50) measured once in a month, while 8.8% (n = 6) measured daily, 13.2% (n = 9) measured once in three months and 2.9% (n = 2) measured at the time of regular checkups. Out of 138 study participants, the majority (72.5%) were visiting doctor on regular basis without the time of pandemic, while 27.5% were visited health care facility whenever any complain happened.

Table 1. Basic Characteristics of Study Participants Related to Diabetes Before the Pandemic

Variables	N (%)
Type of diabetes	
Type 1	25 (18.1)
Type 2	113 (81.9)
Age at diagnosis of diabetes	
Less than 20	17 (12.3)
Between 21–40	48 (34.8)
Between 41–60	65 (47.1)
Above 60	8 (5.8)
Measuring regularly	
Yes	67 (48.6)
No	22 (15.9)
Sometimes	49 (35.5)
If measuring regularly, where?	
Home	57 (41.3)
Laboratory	10 (7.2)
NA	71 (51.4)
If measuring regularly, at what intervals?	
Daily	6 (4.3)
Once in a month	50 (36.2)
Once in three months	9 (6.5)
At the time of regular checkup	2 (1.4)
NA	71 (51.4)
About visiting doctor	
On regular basis	100 (72.5)
When any complains happen	38 (27.5)

NA — not applicable

Access to healthcare facilities during pandemic

Table 2 shows that 55.8% of study participants faced delays in regular check-ups due to pandemic and 39.9% study participants used telemedicine to avoid travelling to hospital in fear of getting COVID infection. Most of (87.7%) the study participants did not face

Table 2. Descriptive Statistics of Variables

	N (%)
Access to healthcare facilities during pandemic	
Was there any delay in visiting the hospital for regular check-ups because of pandemic or lockdown?	
Yes	77 (55.8)
No	40 (29)
Not regular	21 (15.2)
Have you used telemedicine to avoid travelling to hospital in fear of getting COVID infection?	
Yes	55 (39.9)
No	67 (48.6)
Other	16 (11.6)
Medicine and fear of approaching laboratory during pandemic	
Has your regular intake of insulin/ medicines altered during lockdown period, what do you think?	
Increase	54 (39.1)
Decrease	2 (1.4)
Same	82 (59.5)
Do you feel any fear of approaching laboratory for testing your blood sugar level in fear of getting COVID-19?	
Yes	75 (54.3)
No/No need	22 (15.9)
Prefer to do when come for check-ups	41 (29.7)
Diabetes Self-management habits during pandemic	
Has COVID pandemic affected your diabetes self-management in terms of following a healthy diet?	
Improved	7 (5.1)
Worsened	46 (33.3)
No difference	85 (61.6)
Has COVID pandemic affected your diabetes self-management in terms of snacking in between meals (grazing)?	
Improved	1 (0.7)
Worsened	54 (39.1)
No difference	83 (60.1)
Has COVID pandemic affected your diabetes self-management in terms of physical activity?	
Improved	11 (8)
Worsened	62 (44.9)
No difference	65 (47.1)
Has COVID pandemic affected your diabetes self-management in terms of sleep habits?	
Improved	3 (2.2)
Worsened	27 (19.6)
No difference	108 (78.3)
Regarding COVID infection	
Did you have fear of getting COVID infection during pandemic?	
Yes	123 (89.1)
No	A. 15 (10.9)

diabetic complication at home during pandemic, while 8.7% needed hospitalization. Fifty percent (n = 12) of study participants who had used local transport in regular days (before the pandemic) agreed that they used private transport during the pandemic.

Table 3 shows some important association between variables. Delays (yes/not) in regular check-ups due to pandemic had strong association with visiting doctor before the pandemic, management of blood glucose level in absence of regular check-ups and fear of getting COVID infection during the pandemic.

Management of blood glucose level in absence of regular check-ups was associated with education and visiting doctor before the pandemic.

Table 3. Significant Association Between Variables

Variable 1	Variable 2	P-value
Access to healthcare facilities during pandemic		
Was there any delay in visiting the hospital for regular check-ups because of pandemic or lockdown?	About visiting doctor before the time of pandemic	< 0.001
	Did you have fear of getting COVID infection during pandemic?	< 0.001
Have you used telemedicine to avoid travelling to hospital in fear of getting COVID infection?	Type of diabetes	0.006
	Gender	0.047
	Age	0.049
	Age at diagnosis of diabetes	0.003
	About visiting doctor before the time of pandemic	< 0.001
	Was there any delay in visiting the hospital for regular check-ups because of pandemic or lockdown?	< 0.001
Medicine and fear of approaching laboratory during pandemic		
Has your regular intake of medicines/insulin altered during lockdown period?	Did any diabetic complication occur during lockdown time at home?	0.003
Do you feel any fear of approaching laboratory for testing your blood sugar level in fear of getting COVID-19?	Did you have fear of getting COVID infection during pandemic?	<0.001
Diabetes self-management habits during pandemic		
Has COVID pandemic affected your diabetes self-management in terms of following a healthy diet?	Has COVID infection occurred to any one of your family members?	0.007
	Has COVID pandemic affected your diabetes self-management in terms of grazing?	< 0.001
	Has COVID pandemic affected your diabetes self-management in terms of physical activity?	< 0.001
	Has COVID pandemic affected your diabetes self-management in terms of sleep habits?	< 0.001
Has COVID pandemic affected your diabetes self-management in terms of grazing?	Type of diabetes	0.018
	Gender	0.001
	Age	< 0.001
	Age at diagnosis	0.001
	Has COVID pandemic affected your diabetes self-management in terms of sleep habits?	< 0.001
Has COVID pandemic affected your diabetes self-management in terms of physical activity?	Is there any difference in your body weight?	0.003
	Age at diagnosis	0.009
Has COVID pandemic affected your diabetes self-management in terms of sleep habits?	When COVID infection occurred in any of your family members, how did you take care of yourself	0.012
Is there any difference in your body weight?	Has COVID pandemic affected your diabetes self-management in terms of grazing?	0.025
	Has COVID infection occurred in any one of your family members?	0.044
	Has COVID pandemic affected your diabetes self-management in terms of physical activity?	0.003
Regarding COVID infection		
Has COVID infection happened to you during COVID pandemic?	Has COVID infection occurred in any one of your family members?	< 0.001
Did you have fear of getting COVID infection during pandemic?	Gender	0.05
	Was there any delay in visiting the hospital for regular check-ups because of pandemic or lockdown?	< 0.001
	Do you feel any fear of approaching laboratory for testing your blood sugar level in fear of getting COVID-19?	< 0.001

Chi-square test was applied; p-value ≤ 0.05 is significant

Telemedicine shows association with many variables such as type of diabetes, age, gender, age at diagnosis of diabetes, visiting doctor before the pandemic, delays in regular check-ups because of the pandemic, delays in consuming medicine/insulin due to unavailability in the medical stores during the pan-

demic, management of blood glucose level in absence of medicine/insulin.

Transport preferred to travel to hospital in regular days (before the pandemic) was associated with using sanitizer-mask-keeping social distancing (SMS) during the pandemic, time required to reach the Swasthaya Hospital, and diabetes self-management in terms of physical activity. Occurrence of diabetic complications during lockdown time at home was associated with type of diabetes and age of participants.

Medicine and fear of approaching laboratory during pandemic

Most of study participants had advance stock of medicines/insulin so they did not face delays in consuming medicines during the pandemic. Only 8% faced delays in consuming medicines due to unavailability at medical stores and 3.6% faced delays in consuming medicines because of financial crisis due to pandemic.

Regarding medication adherence, 18.1% study participants were on insulin while 81.9% study participants were either on medicines or on combination of medicines and insulin. Regular intake of insulin/ /medicines altered during lockdown period for 40.5% of the study participants; out of them, intake of medicines increased for 96.5% of the study participants; while for 59.5% of the study participants, intake of medicines was same. In addition, 54.3% felt fear of approaching laboratory for testing blood sugar level in fear of getting COVID infection.

Delay in consuming medicine/insulin due to unavailability — was associated with self-management in terms of following a healthy diet, snacking in between meals (grazing) and physical activity.

Altered regular intake of medicines/insulin during lockdown period – was associated with diabetic complication (occurred/not) during lockdown time at home.

Fear of approaching laboratory for testing blood sugar level in fear of getting COVID-19 was associated with visiting doctor without the time of pandemic, measuring (regularly/not) blood glucose level, COVID infection (happened/not) and fear of getting COVID infection during pandemic.

Diabetes self-management habits during pandemic

The study participants showed good SMS habits; 71.7% followed SMS always while 23.9% followed often. Table 2 shows that COVID-19 has worsened self-management in terms of following healthy diet in 33.3 study participants, snacking in-between meals in 39.1% study participants, physical activity in 44.9 study participants, and sleep habits in 19.6 study participants. Among all, physical activity was found to be most affected. Almost 50% of the study participants noticed changes in their weight; 24.6% reported an increase in weight, while 20.3% reported a decrease in weight.

Table 3 shows that following SMS was associated with education, visiting doctor before the time of pandemic, transport preferred to travel to hospital in regular days (before the pandemic).

Self-management in terms of following a healthy diet was associated with delays (happened or not) in regular check-ups because of pandemic, diabetic complication (occurred or not) during lockdown time at home, delays in consuming medicine/insulin due to unavailability, physical activity, sleep habits, snacking in between meals (grazing), COVID infection (occurred/ not) in family members.

Self-management in terms of grazing – was associated with type of diabetes, age, gender, age at diagnosis of diabetes, delays in taking medicine/insulin due to unavailability, physical activity, sleep habits, weight, delays in buying medicine/insulin because of financial crisis due to pandemic.

Self-management in terms of physical activity — was associated with difference in body weight, age at diagnosis, following a healthy diet, and grazing.

Self-management in terms of sleep habits — was associated with self-management when COVID infection occurred in family members, grazing, physical activity and COVID infection occurred in any one of the participant's family members.

Regarding COVID infection

Out of 138 participants, 48 study participants (34.8%) was diagnosed with COVID infection before 31st May 2022, and 89.1% (n = 123) felt fear of getting COVID infection during the pandemic. Table 3 shows that the occurrence of COVID infection in study participants was strongly associated with COVID infection in any of their family members. It was also associated with diabetic complication (occurred/not) during lockdown time at home.

Fear of getting COVID infection during pandemic — was strongly associated with delays in regular check-ups because of pandemic or lockdown and fear of approaching laboratory for testing blood sugar level in fear of getting COVID-19.

Discussion

The present study explores the health-seeking behavior of people with diabetes during the time of COVID-19 pandemic. HSB is a combined outcome of many independent factors operating at individual, family, and community levels [9]. Here, we have covered individual factor mostly.

In the current study, 138 participants from AIIDR of Ahmedabad-India were included and interviewed, out of them 81.9% were of T2D and 18.1% were of T1D. Almost half (48.6%) of total study participants were measuring their blood glucose level regularly. Out of total study participants, 72.5% were visiting doctor on regular basis before the time of pandemic which shows positive HSB. Positive HSB should improve control diabetes control and thereby reduce the incidence of complications associated with this devastating disease [9].

Data collection tool had mainly 5 parts to understand the health-seeking behavior of people with diabetes during the time of COVID-19 pandemic: Basic Information about Participant including measuring blood glucose level before the time of pandemic, Access to healthcare facilities during pandemic, Intake of medicine and laboratory testing during pandemic, Diabetes Self-Management Habits during pandemic and about COVID infection.

Temporary disruptions in routine and nonemergency medical care access and delivery have been observed during periods of considerable community transmission of severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2) [11]. There was a great fear of contracting the virus on the way to the health facility which may delay the regular follow-ups [6]. Our study shows that 55.7% faced delay in regular check-ups, and delays in regular check-ups were strongly associated with fear of getting COVID infection. Participants manage blood glucose level at home in case of delay in regular check-ups – is found to be associated with education.

The number of telemedicine visits rose rapidly [12]. Our study found that 39.8% participants used telemedicine to avoid travelling to hospital in fear of getting COVID infection. Telemedicine shows association with many variables such as type of diabetes, age, gender, age at diagnosis of diabetes, visiting doctor before the time of pandemic, delay (happen/not) in visiting the hospital for regular check-ups because of pandemic or lockdown, if delay happen in taking medicine/insulin during pandemic then how participant manage blood glucose level.

Poor availability of transport, physical distance to the health facility and the time taken to reach such facilities have been found to influence HSB and health service utilization [7]. Most of the study participants (71.7%) used private transport to reach to hospital. Preferred transport used to travel to hospital during pandemic was found to be associated with SMS. Occurrence of diabetic complication during lockdown time at home was found to be associated with type of diabetes and age.

Early in the COVID-19 pandemic, countries across the world went into lockdown, shutting down or reducing transport within and between them. This affected the manufacturing, supply and distribution of medicines, leading to constraints in the global medicines supply chain [13]. In our study, 7.8% faced this delay in consuming medicines due to unavailability of medicines which was found to be associated with diabetes self-management in terms of following a healthy diet, grazing and physical activity. Regular intake of medicines/insulin altered for 40.5% of our study participants during COVID pandemic which was found to be associated with diabetic complication (occur/not) at home.

Laboratory personnel are among the high-risk workers that have probable exposure to the sample or specimen taken from COVID-19 patients [14]. The COVID-19 pandemic has led to a rise in fear, anxiety, stress, and depression among the population [7]. 54.3% of our study participants also felt this fear while visiting the laboratory to measure their blood glucose level, which was found to be strongly associated with fear of getting COVID infection during pandemic, COVID infection (happened/not) in study participants, measuring (regularly/not) their blood glucose level and visiting the doctor (regularly/not) before the pandemic.

Self-management and self-care are the cornerstone of diabetes care and an essential part of successfully preventing or delaying diabetes complications [15]. Diabetes can be well managed with healthy eating, combined with regular physical activity and weight management [8]. But our study shows that COVID-19 has worsened self-management in terms of following healthy diet in 33.3 study participants, snacking in-between meals in 39.1% study participants, physical activity in 44.9 study participants, and sleep habits in 19.6 study participants. While asking about self-management in terms of following a healthy diet, association was found with grazing, physical activity, sleep habits, regular check-ups, diabetic complication during pandemic, delays in consuming medicines and COVID infection in family members. Self-management in terms of grazing was found to be associated with physical activity, sleep habits, changes in weight, type of diabetes, age, gender, and delays in consuming medicines due to unavailability at medical stores and financial crisis. Physical activity was found to be associated with changes in weight, age at diagnosis of diabetes and delays in consuming medicines. Changes in weight was found to be associated with diabetic complication during pandemic and COVID infection in family members.

One of the most vulnerable people to this virus are those with chronic diseases such as diabetes mel-

litus [5]. Diabetes increases the mortality of patients with COVID-19 [7]. Our study shows that 34.7% of the study participants were diagnosed with COVID infection during the pandemic.

Psychological stressors, like panic, fear, phobia, etc., are being substantially reported during the COVID-19 outbreak [16]. Our study shows that 89.1% of the study participants expressed their fear of getting COVID infection. This fear of getting COVID infection was found to be strongly associated with delays in regular check-ups and fear of approaching laboratory to measure blood glucose level.

In our study, airborne infection, digital technology, awareness and education about diabetes, travelling time to reach the health facility, etc. were found as influencing factors to HSB in people with diabetes during the pandemic. There is evidence available that more than 95% of diabetes management is self-care [15]. It is known that between diabetes and COVID-19 there is a mutual influence: patients with diabetes have more aggressive forms of COVID-19, and the evolution of diabetes is more severe in the context of SARS-CoV-2 infection [17]. Poor availability of transport, physical distance to the health facility and the time taken to reach such facilities have been found to influence health-seeking behavior and health service utilization [7]. The number of telemedicine visits rose rapidly [12].

Strength of the study

As there are very few studies available on HSB of people with diabetes during COVID pandemic, the knowledge shared here can help program planners to identify influencing factors and implement appropriate interventions. This understanding also helps in setting the stage for the formulation of effective diabetes-related educational programs which might help for future pandemic.

Limitation of the study

It is important to mention about limitations of the study. 1) The study was conducted at a single center in India, which limits the generalizability of the findings to other settings and populations. 2) The study used a cross-sectional design, which does not allow for causal inferences and cannot capture changes in health-seeking behavior over time. 3) The study relied on self-reported data, which may be subject to recall bias. 4) The study did not examine the impact of the COVID-19 pandemic on diabetes-related outcomes, such as glycemic control or complications, which limits the clinical relevance of the findings. 5) The study did not collect data on the socioeconomic status of the participants, which may be an important determinant of health-seeking behavior.

Conclusions

COVID-19 pandemic has been associated with many uncertainties. All these have affected HSB of people with diabetes in terms of access to healthcare facilities, medicine adherence, laboratory testing, self-management habits (physical activity, healthy diet, grazing, sleep habits). There are very few studies available on HSB of people with diabetes during COVID pandemic which shows clear need for more information for long-term changes in HSB of people with diabetes. Knowledge shared here on health-seeking behavior of people with diabetes during pandemic can help program planners to identify influencing factors and implement appropriate interventions. This understanding also helps in setting the stage for the formulation of effective diabetes-related educational programs which might help for future pandemic.

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Conflict of interests

None declared.

REFERENCES

1. Onchonga D, Omwoyo J, Nyamamba D. Assessing the prevalence of self-medication among healthcare workers before and during the 2019 SARS-CoV-2 (COVID-19) pandemic in Kenya. Saudi Pharm J. 2020; 28(10): 1149–1154, doi: 10.1016/j.jsps.2020.08.003, indexed in Pubmed: 32837218.
2. Allweiss P. Diabetes and Disasters: Recent Studies and Resources for Preparedness. Curr Diab Rep. 2019; 19(11): 131, doi: 10.1007/s11892-019-1258-7, indexed in Pubmed: 31748930.
3. National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). (2010). Diabetes Control and Complications Trial (DCCT) (Clinical Trial Registration No. NCT00360815). https://clinicaltrials.gov/ct2/show/NCT00360815 (12.02.2023).
4. Mudford, A. (2022, June 6). Nossal Institute for Global Health. Melbourne School of Population and Global Health. https://mspgh.unimelb.edu.au/centres-institutes/nossal-institute-for-global-health (12.02.2023).
5. Eberle C, Stichling S. Impact of COVID-19 lockdown on glycemic control in patients with type 1 and type 2 diabetes mellitus: a systematic review. Diabetol Metab Syndr. 2021; 13(1): 95, doi: 10.1186/s13098-021-00705-9, indexed in Pubmed: 34493317.

6. Wändell PE. Quality of life of patients with diabetes mellitus. An overview of research in primary health care in the Nordic countries. Scand J Prim Health Care. 2005; 23(2): 68–74, doi: 10.1080/02813430510015296, indexed in Pubmed: 16036544.
7. Wu ZH, Tang Y, Cheng Q. Diabetes increases the mortality of patients with COVID-19: a meta-analysis. Acta Diabetol. 2021; 58(2): 139–144, doi: 10.1007/s00592-020-01546-0, indexed in Pubmed: 32583078.
8. Vaishnavi. (n.d.). Health-seeking behavior of patients with diabetes mellitus: A community-based cross-sectional study in an urban area of Pondicherry. https://www.jcrsmed.org/article.asp?issn=2455-3069;year=2021;volume=7;issue=1;spage=33;epage=38;aulast=Vaishnavi (18.06.2022).
9. Kannan, R. (2019, November 14). India is home to 77 million diabetics, second highest in the world. The Hindu. https://www.thehindu.com/sci-tech/health/india-has-second-largest-number-of-people-with-diabetes/article29975027.ece (12.02.2023).
10. Verma M, Sharma P, Chaudhari A, et al. Effect of Lockdown on Diabetes Care During the COVID-19 Pandemic: Result of a Telephone-Based Survey Among Patients Attending a Diabetic Clinic in Northern India. Cureus. 2021; 13(10): e18489, doi: 10.7759/cureus.18489, indexed in Pubmed: 34754650.
11. Czeisler MÉ, Marynak K, Clarke KEN, et al. Delay or Avoidance of Medical Care Because of COVID-19-Related Concerns — United States, June 2020. MMWR Morb Mortal Wkly Rep. 2020; 69(36): 1250–1257, doi: 10.15585/mmwr.mm6936a4, indexed in Pubmed: 32915166.
12. The Impact of the COVID-19 Pandemic on Outpatient Visits: A Rebound Emerges. https://www.commonwealthfund.org/publications/2020/apr/impact-covid-19-outpatient-visits (12.02.2023).
13. Zhu X, Lee M, Chew EAl, et al. "When nothing happens, nobody is afraid!" beliefs and perceptions around self-care and health-seeking behaviours: Voices of patients living with diabetic lower extremity amputation in primary care. Int Wound J. 2021; 18(6): 850–861, doi: 10.1111/iwj.13587, indexed in Pubmed: 33955156.
14. Vlad A, Serban V, Timar R, et al. Increased Incidence of Type 1 Diabetes during the COVID-19 Pandemic in Romanian Children. Medicina (Kaunas). 2021; 57(9), doi: 10.3390/medicina57090973, indexed in Pubmed: 34577896.
15. Rodríguez-Hidalgo AJ, Pantaleón Y, Dios I, et al. Fear of COVID-19, Stress, and Anxiety in University Undergraduate Students: A Predictive Model for Depression. Front Psychol. 2020; 11: 591797, doi: 10.3389/fpsyg.2020.591797, indexed in Pubmed: 33224080.
16. EMA. (2020, April 11). Availability of medicines during COVID-19 pandemic [Text]. European Medicines Agency. https://www.ema.europa.eu/en/human-regulatory/overview/public-health-threats/coronavirus-disease-COVID-19/availability-medicines-during-COVID-19-pandemic (12.02.2023).
17. Amri MF, Azizan N, Hussain FA, et al. The challenges and risk of laboratory handling on a histology specimen during COVID-19 pandemic. Ann Med Surg (Lond). 2021; 64: 102242, doi: 10.1016/j.amsu.2021.102242, indexed in Pubmed: 33815787.