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ORIGINAL RESEARCH

Information-Seeking Behavior and Its Associated Factors Among Patients with Diabetes in a Resource-Limited Country: A Cross-Sectional Study

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Background: Diabetes mellitus is one of the most common chronic diseases in the world. The burden of diabetes mellitus is increasing rapidly in developing countries, including Ethiopia. Diabetes information seeking is essential for patients with diabetes to better manage and control their diabetes. However, information seeking about disease prevention and treatment is low in developing countries.

Objective: This study aims to assess the diabetes information-seeking behavior and its associated factors among patients with diabetes in Debre Markos Referral Hospital, Amhara Region, Northwest Ethiopia.

Methods: An institution-based cross-sectional quantitative study supplemented with a qualitative study was conducted among 423 subjects from March to April 2019. A structured questionnaire and in-depth interview were used to collect the required data from the study subjects. The data were entered using Epi Info version 7.2.2. Data processing and analysis were conducted using SPSS version 23. Descriptive statistics and a binary logistic regression model were used for the quantitative study, and thematic content analysis was used for the qualitative study. The significance test cut-off value for bivariate analysis was $P<0.2$ and the cut-off value for multivariate analysis was $P<0.05$. Adjusted odds ratios with 95% confidence intervals were used to interpret the results.

Results: Out of 423 study participants, only 41.6% of patients with diabetes were diabetes information seekers. After adjusting all other factors in the final model, educational status, place of residence, comorbidity and health literacy were significantly associated with diabetes information seeking.

Conclusion: This study result indicates that the overall prevalence of information seeking among patients with diabetes toward diabetes was low. Having higher educational status, urban place of residence, the presence of comorbidity and adequate health literacy level increased the likelihood of diabetes information-seeking behavior among patients with diabetes.

Keywords: diabetes mellitus, information, information seeking, information-seeking behavior, Ethiopia

Background

Health information-seeking behavior is defined by the ways in which people obtain information about health, disease, health risk and health promotion.[1,2] It is characterized by the source of health information, the type of health information that

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people sought and the frequency of health information that they sought.[2] Health information-seeking behavior refers to the ability of individuals and communities to understand and act on health information to improve health outcome at an individual and a community level.[3,4] It is also used as a basis to develop effective health-promoting actions, health communication initiatives, disease prevention and disease management mechanisms.[2]

Diabetes mellitus is a chronic disease characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both.[6] Individuals with diabetes need to practice self-care to promote health, prevent disease, and improve their day-to-day functioning and well-being.

According to the 2018 WHO report, the global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014, which means that the diabetes prevalence has increased from 108 million to 422 million adults.[7] Similarly, the prevalence of diabetes has been rising rapidly in middle- and low-income countries. Ethiopia had 2.56 million cases of diabetes in 2014.[8]

In developing countries, including Ethiopia, health information seeking and the culture of using information for improving the health of individuals and the public are limited.[9] Similarly, a study conducted in Bahir Dar shows that health professionals in the health sector have limited or no access to major health information sources, especially formal information resources such as the internet, journals, library services and in-service training.[11] In general, in Ethiopia, the level of health information-seeking behavior is low and the culture of using information in the health system to attain better health is not practiced well at the individual and community levels. This is due to cultural, organizational, personal, economic, educational status and technical factors.[10]

Diabetes mellitus is a serious chronic metabolic disease which is difficult to cure. It also needs routine medical care and patient self-management to avoid acute complications and to decrease chronic complications.[11] Similarly, diabetes mellitus is a major risk factor for cardiovascular disease.[12] So, high-quality information on diabetes is required to make evidence-based decision related to diabetes mellitus and other comorbidities in order to improve outcomes among patients with diabetes.[13] Diabetes information seeking is highly related to disease incidence, prevalence and complications, and plays a great role in reducing the occurrence of disease, disability and death through improving knowledge on diabetes therapy and complications. It also helps in planning diabetes care and management upon diagnosis, so that complications can be minimized and quality of life can be improved.[5,11]

To the authors' knowledge, no studies have been conducted on diabetes information seeking behavior among patients with diabetes. For this reason, we are unaware of diabetes information seeking behavior and it is essential to assess diabetes information seeking behavior among patients with diabetes. Thus, the results of this research study could provide preliminary information on diabetes information seeking behavior among patients with diabetes. Furthermore, policy makers and researchers could use this study as a baseline for making interventions on diabetes information seeking behavior and retrieval.

Literature ReviewAn

Over the course of a lifetime, people will need different skills, knowledge and attitude to enable them to control their condition to improve their health status . The success of diabetes care depends on patients' daily self management activities and providers continuous support . Diabetes self-management education (DSME) and ongoing support significantly contributes to metabolic and psychological outcomes of the disease. A study conducted in AMERICA among chronic patients shows that more patients are passive information seekers rather than active information seekers .[17] This means that most diabetic patients seek diabetes information unintentionally. This study also indicates that the information sources most used by diabetic patients are physicians (3.12%), television (2.43%) and family members (2.32%).

Social media and health literacy is increasingly being used by young people for health-related issues, including communicable diseases to improve health status of the people.[18,19] An other study conducted on Ethiopia stated that Internet access has a significant impact on a country's economic development and enhance health status by reducing the prevalence of the communicable diseases including diabetes.[22] Increasingly sedentary lifestyles, the obesity pandemic and increasing life expectancy have led to a dramatic increase in type 2 diabetes mellitus in many countries of the Region.[11]

The general relationships between the dependent and independent variables are shown in Figure 1.

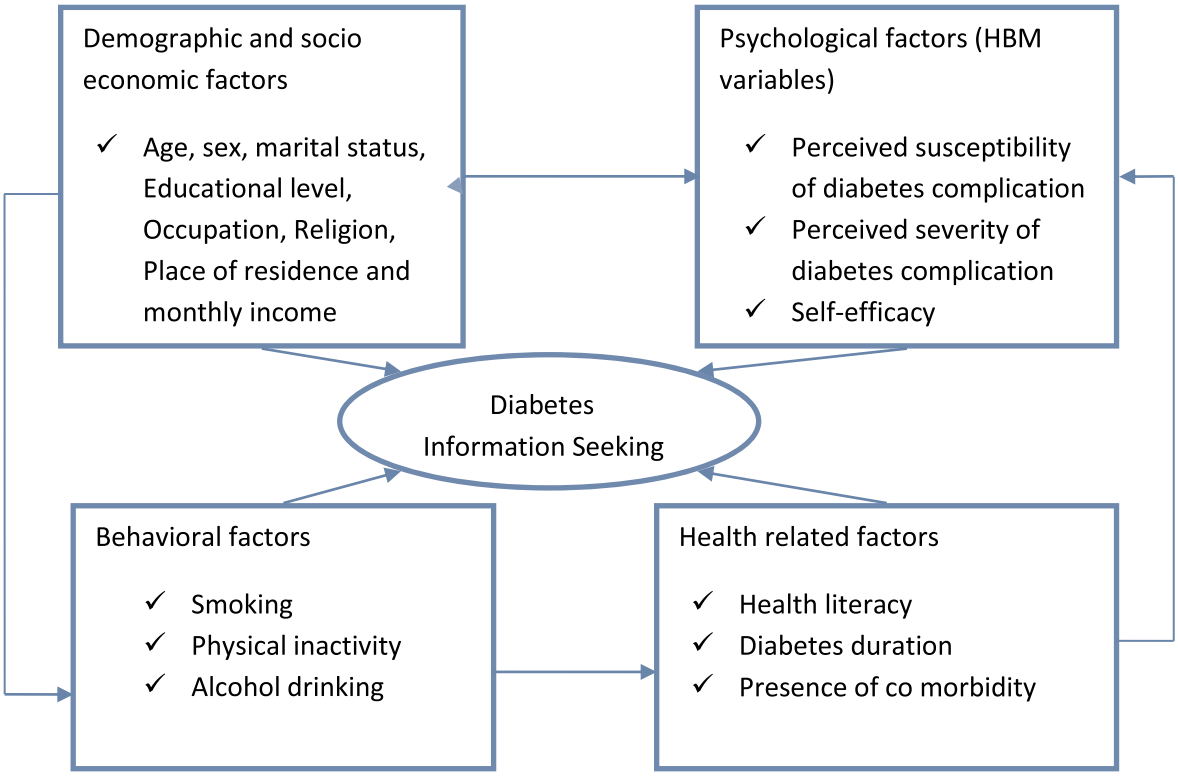

Figure 1 Conceptual framework of the study (adapted from different studies in the literature).

Methods

Study Design and Setting

An institution-based cross-sectional quantitative study supplemented with a qualitative method was conducted from March to April 2019 among patients with diabetes at Debre Markos Referral Hospital, which is located in Debre Markos town, the capital city of East Gojjam Zone. Debre Markos town is located in Amhara Region, Northwest Ethiopia, about 305 km from Addis Ababa. The town has one public referral hospital, which serves a population of up to 3.5 million in its catchment area by providing both inpatient and outpatient services. Currently, there are 847 patients with diabetes in the hospital chronic outpatients department receiving treatment, medication and advice on the disease.

Study Participants

The study participants were all patients with diabetes who attend for health care at Debre Markos Referral Hospital. All diabetic patients in Debre Markos Referral Hospital during the data collection period were included in the study. Diabetic patients who could not give responses owing to serious illness at the time of data collection were excluded from the study.

Sample Size Determination and Sampling Procedure

The sample size for the quantitative method was determined using a single-population proportion formula:

$$n = (Z\alpha/2)^2\, p(1-p)/d^2$$

where Z=standard normal deviation (1.96 for a 95% confidence level), n=sample size, p=proportion of the population (taking a single-population proportion, p=50%), *and* d=margin of error (d=0.05). Thus, n=384 + non-response rate (10% of 384) =423 respondents.

For the qualitative method, the sample size was the number of participants until saturation was reached.

For the quantitative study, a systematic random sampling technique was used to select study participants from the total population of patients with diabetes. There were a total of 847 patients with diabetes in the hospital, of whom 423 were selected through a systematic random sampling technique. The selected patients with diabetes were interviewed using a structured Amharic language-version questionnaire. During the data collection period, the interval size (K) was calculated first by the following formula:

$$K=N/n$$

where K=interval size, N=total number of patients with diabetes in Debre Markos Referral Hospital (847), and

n=number of sampled patients with diabetes (423). Thus, *K*=847/423=2 (select the second unit).

Then, an integer (2) was randomly selected through the lottery method between 1 and *k* (2), and every *k*th (2) unit was taken. Finally, 423 patients with diabetes were selected and interviewed.

For the qualitative study, a purposive sampling technique (criterion sampling) was used to select study participants purposely from a diverse range of age, educational status, occupation, income level, place of residence (urban, rural) and disease duration (long, short) until saturation was reached. Finally, 14 patients participated in the qualitative study.

Study Variables

According to our research objectives, the primary outcome measure is diabetes information seeking. By reviewing the existing literature on diabetes information seeking,[14–16] the following independent variables were used to develop the conceptual framework for the questionnaire, which is also presented in Figure 1.

- Socio-demographic factors: Age, gender, marital status, religion, educational status, occupation, place of residence and monthly income.
- Psychological factors: Perceived susceptibility to disease complication, perceived severity of disease and self-efficacy.
- Behavioral factors: Smoking, alcohol drinking and physical activity.
- Health-related factors: Health literacy, diabetes duration and presence of comorbidity.

Data Collection and Analysis

A structured, translated, interviewer-administered Amharic-version questionnaire was used to collect quantitative data on socio-demographic, behavioral, psychological and health-related factors, and to identify the source, type and frequency of diabetes information that they sought. The questionnaire on socio-demographic, behavioral and psychological factors was adapted from US Health Information National Trends Survey (National Cancer Institute 2014)[17] and the questionnaire on health literacy was adapted from The Newest Vital Sign.[18]

The study was reviewed and approved by the Institute of Public Health Review Board (IRB) of the University of Gondar. Before the start of data collection, a supportive letter was written to Debre Markos Referral Hospital and an acceptance letter was also obtained from Debre Markos Referral Hospital. All respondents participated in this study on a voluntary basis. Care was taken to ensure the respect, dignity and freedom of all patients with diabetes participating in the study. Informed consent was obtained before administering the questionnaire and participants were assured of confidentiality of information. A pretest was conducted on 5% of the sample at University of Gondar Referral Hospital. The completeness and consistency of the data were checked before data collection. A training plan was prepared by the researchers. Then, the data collectors and supervisor were trained for one day before data collection, and frequent and timely supervision of data collectors was undertaken to ensure the quality of data.

Data collection was carried out by three BSc health informatics professionals and one supervisor. A structured interviewer-administered Amharic-version questionnaire was used for collecting quantitative data. A qualitative study was conducted by the investigator using open-ended questions for the purpose of identifying barriers that could not be answered using the quantitative method. An in-depth interview guide with a tape recorder was used for gathering qualitative data. For the qualitative study, participants were selected purposely from those who were willing to participate in an in-depth interview. Finally, in-depth interviews among 14 participants were conducted by the principal investigator, using the Amharic language as the medium for discussion.

After collection, the quantitative data were coded and cleaned up manually before entered into software. Then, the completed questionnaire was entered into Epi Info version 7.2.2 and, finally, SPSS version 23 was used for data analysis. Descriptive statistics and binary logistic regression analysis were used to describe the socio-demographic characteristics of patients with diabetes and to identify factors associated with diabetes information-seeking behavior, respectively. Similarly, bivariable and multivariable analyses were conducted to describe associations between each independent variable and the dependent variables. *P* values <0.2 and <0.05 were taken as cut-off values in significance tests for the bivariable and multivariable analyses, respectively. Qualitative data were collected using a tape recorder and the recorded data were transcribed in the English language. The transcribed data were coded and categorized into themes. Finally, thematic content analysis was conducted to identify emerging themes and support the quantitative findings.

Results

A total of 423 patients with diabetes participated in this study. Of these, 57.7% of patients were in the age group 18–40 years and more than half (51.8%) were male. The majority (57.9%) of the patients with diabetes were married, and 62.6% followed the Orthodox religion, followed by Muslims (27.9%). In terms of occupation, 23.4% of patients with diabetes were housewives, followed by government employees (21.5%) and merchants (15.4%). Of the total, 33.8% had higher education and 13.2% were unable to read and write. Regarding place of residence and monthly income, the majority of patients with diabetes (68.8%) were urban residents, and 71.2% of patients with diabetes had a monthly income <5000 ETB and 19.9% had an income in the range of 5000–10,000 ETB. The socio-demographic information of the respondents is presented in Table 1.

Table 1 Socio-Demographic Characteristics of Patients with Diabetes

Variable	Category	Frequency (n)	Percent (%)
Age (years)	18–40	244	57.7%
	41–50	124	29.3%
	51–60	38	9.0%
	>60	17	4.0%
Gender	Female	204	48.2%
	Male	219	51.8%
Marital status	Single	108	25.5%
	Married	245	57.9%
	Divorced	20	4.7%
	Separated	16	3.8%
	Widowed	34	8.1%
Religion	Orthodox	265	62.6%
	Muslim	118	27.9%
	Protestant	35	8.3%
	Catholic	5	1.2%
Occupation	Government employee	91	21.5%
	Housewife	99	23.4%
	Non-government employee	29	6.9%
	Farmer	53	12.5%
	Merchant	65	15.4%
	Daily laborer	23	5.4%
	Student	51	12.1%
	Unemployed	12	2.8%
Educational status	Unable to read and write	56	13.2%
	Able to read and write	72	17%
	Primary education	79	18.7%
	Secondary education	73	17.3%
	Higher education	143	33.8%
Place of residence	Rural	132	31.2%
	Urban	291	68.8%
Monthly income (ETB)	<5000	301	71.2%
	5000–10,000	84	19.9%
	10,001–15,000	26	6.1%
	>15,000	12	2.8%

Diabetes Information Seeking

From the total study population, 41.6% of patients were diabetes information seekers. The results of the qualitative study indicated that the perception of already having enough information about diabetes, lack of awareness on information use, having lower educational level, far distance from health institutions and difficulty in accessing information sources were the major barriers to diabetes information seeking.

A female diabetic patient said:

> During the past 1 month I have not sought information related to diabetes purposely from any source of information. This is because of the perception of having good enough information about diabetes. (Respondent 7)

A diabetic patient residing in a rural area said:

> I have not sought information related to diabetes intentionally from any different source of diabetes information. Lack of awareness on information use is the barrier for diabetes-related information seeking. Due to the above reason I have not sought diabetes information purposely from any source of diabetes information. (Respondent 9)

A 62-year-old diabetic patient with comorbidity said:

> I have not sought diabetes information purposely from any source of diabetes information. This is because of a lack of awareness on information use. (Respondent 13)

A diabetic patient with lower educational status said:

> I have not sought diabetes-related information purposely from different sources of information. This is due to the presence of lack of awareness on information use and having lower educational level. (Respondent 2)

A patient residing in a rural area with 1 year disease duration said:

> I have not sought diabetes information purposely from any source of information. This is due to far distance from health institutions and inaccessibility of diabetes

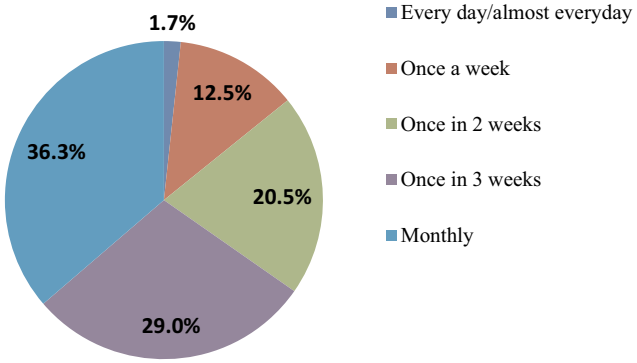

Figure 2 Frequency of seeking diabetes-related information among diabetic patients in Debre Markos Referral Hospital, Northwest Ethiopia, 2019.

information sources such as books, magazines, the internet and mass media. (Respondent 6)

Frequency of Seeking Diabetes Information

About 36.3% of the patients with diabetes sought diabetes-related information monthly. However, only 1.7% of them, especially males and highly educated patients with diabetes, sought diabetes-related information every day.

From the total group of respondents, three-quarters (75.6%) had sought diabetes information for "themselves" and 23.8% respondents for "both themselves and someone else" (Figure 2).

Sources of Diabetes Information

When participants were asked about their primary sources, 156 (88.6%) of them used health professionals as the primary source to obtain diabetes-related information. Other sources of information included books, the internet, brochures, mass media, family, friends, and magazines or newspapers. The results of the qualitative study showed that health professionals were the primary source of diabetes information among patients with diabetes (Figure 3).

A diabetic patient with higher educational status said:

I have sought diabetes information purposely from health professionals during the past 1 month. Because, as compared to other sources of diabetes information, health professionals provide easily understandable and clear information about diabetes and also health professionals are easily accessible in our village. (Respondent 14)

This study indicates that out of the total participants, the majority, 417 (98.6%), of patients with diabetes have a high level of trust in health professionals, followed by books, 376 (88.9%), and mass media, 312 (73.7%), (Figure 4). The results of the qualitative study show that the majority of patients with diabetes have greater trust in health professionals than in other sources of diabetes information.

A government-employed diabetic patient said:

I have sought information about diabetes purposely from health professionals during the past 1 month. Because, as compared to other sources of information, health professionals are highly educated and trained and also I have a good trust in health professionals. (Respondent 8)

Types of Diabetes Information

The respondents sought both prevention- and treatment-related types of diabetes information. Other type of prevention- and treatment-related diabetes information looked for by patients with diabetes were alcohol risk, smoking

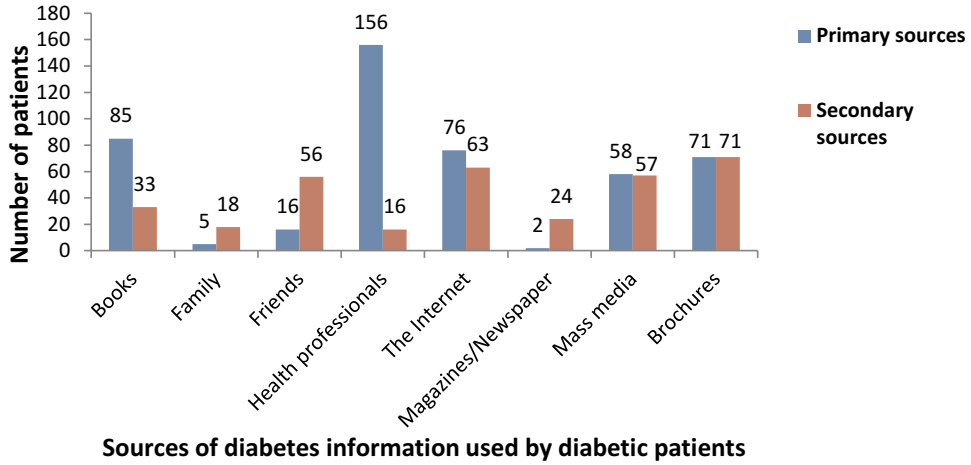

Figure 3 Sources of diabetes information among diabetic patients in Debre Markos Referral Hospital, Northwest Ethiopia, 2019.

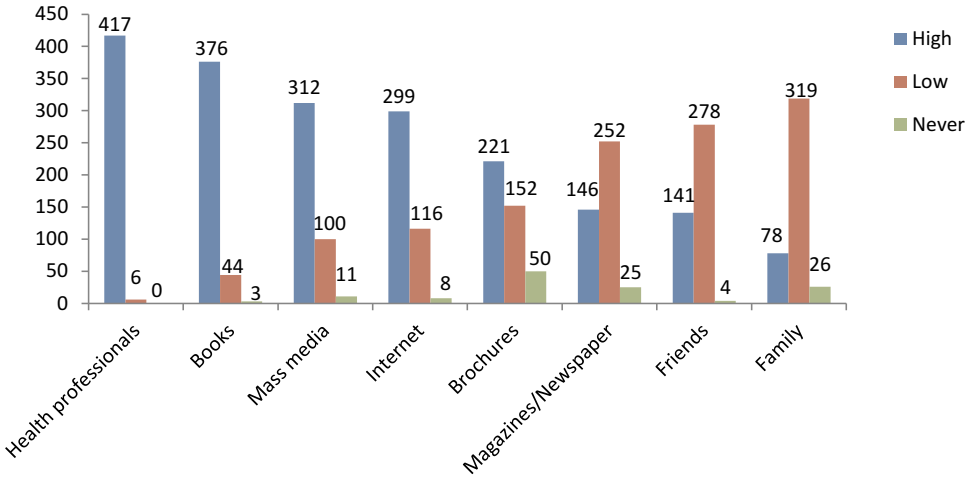

Figure 4 Level of trust of diabetic patients regarding sources of diabetes information in Debre Markos Referral Hospital, Northwest Ethiopia, 2019.

risk, medication and physical exercise (Figure 5). The results of the supportive qualitative study revealed that most patients with diabetes sought diabetes information for the purpose of self-care management and to obtain information about diet related to the disease.

A diabetic patient with higher education said:

> I have sought diabetes information for the purpose of saving life through self-management and to get information about diet related to diabetes. (Respondent 8)

Factors Associated with Diabetes Information Seeking

A total of 17 variables were entered into the logistic regression model. Of these, gender, occupation, educational status, monthly income, place of residence, self-efficacy, perceived susceptibility, perceived severity, physical activity, comorbidity and health literacy turned out to be significant factors associated with diabetes information seeking from the bivariable analysis. Educational status, place of residence, comorbidity and health literacy were found to be significant factors from the multivariate logistic regression analysis.

With respect to educational status, patients who were unable to read and write were 98% [AOR=0.02, 95% CI (0.01, 0.46)] less likely to seek diabetes information compared to patients with higher education. Regarding health literacy, the odds of diabetes information seeking were seven [AOR=6.87, 95% CI (3.75, 12.58)] times higher among patients with diabetes with an adequate health literacy level compared to patients with diabetes with a limited literacy level.

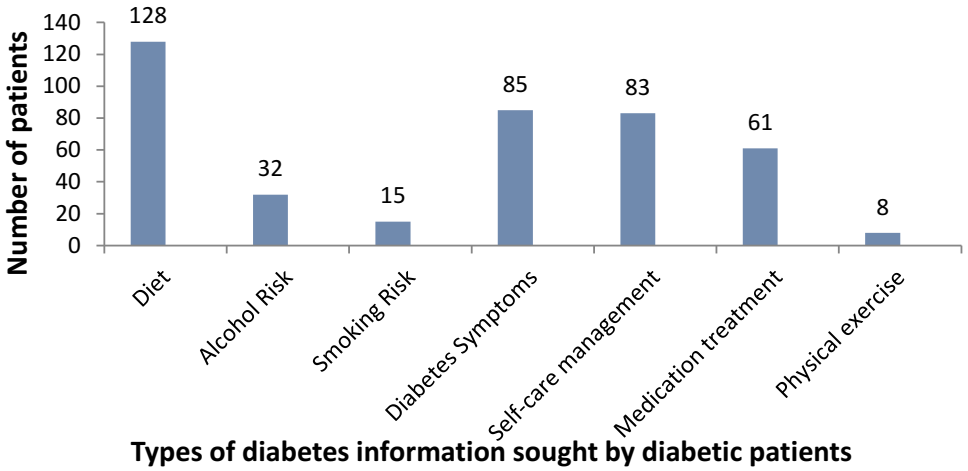

Figure 5 Types of diabetes information sought by diabetic patients in Debre Markos Referral Hospital, Northwest Ethiopia, 2019.

This study found that the odds of diabetes information seeking were four [AOR=3.97, 95% CI (1.56, 10.01)] times higher among urban residents with diabetes compared to rural residents. With regard to comorbidity, the odds of diabetes information seeking were two [AOR= 2.01, 95% CI (1.95, 8.26)] times higher among patients with diabetes with comorbidity compared to patients with diabetes without comorbidity. The output of the logistic regression analysis is presented in Table 2.

Discussion

The purpose of this study was to assess diabetes information-seeking behavior and its associated factors among patients with diabetes. Diabetes information-seeking behavior is characterized by the source of diabetes information, frequency of diabetes information and types of diabetes information. Hence, in this section, a discussion of the key findings about diabetes information seeking, the source of diabetes information, the frequency of diabetes information and types of diabetes information is provided. Furthermore, findings about the factors associated with diabetes information seeking are discussed.

This study found that the overall prevalence of diabetes information seeking among patients with diabetes was only 41.6% (95% CI: 36.9, 46.3). This finding is low compared to the results of studies conducted in Nepal[19] (84.3%), in 2015,[20] Greece, and Hong Kong, China (85.1%), in 2013.[18] This could be due to the low internet penetration rate in Ethiopia.[22] According to the 2019 World Internet Statistics report, the internet penetration rate in Ethiopia is 14.9%, whereas the internet penetration rates in India and China are 40.9% and 58.4%, respectively.[22]

The results of the qualitative study supported that the low prevalence of diabetes information seeking was mainly due to the perception of already having good enough information about diabetes, lack of awareness on information use, having lower educational status, far distance from health institutions and the difficulties in accessing information sources.

According to the results of this study, most (88.6%) patients with diabetes used health professionals as their primary source of diabetes information. This finding is supported by a previous research study from Athens, Greece, which indicates that 94.6% of patients with diabetes use physicians as the primary source of diabetes information.[23] Similarly, a study conducted in Iran in 2015 also indicates that patients with diabetes use physicians as the primary source of diabetes information.[24] This is because almost all of the patients with diabetes (98.6%) have a high level of trust in health professionals compared to other sources of diabetes information, as identified in this study. Similarly, the results of the qualitative study indicate that most patients with diabetes use health professionals as the primary source of diabetes information. This is because health professionals are easily accessible by patients with diabetes compared to other sources of diabetes information, and the patients have a high level of trust in health professionals. Furthermore, in this research study, the internet (43.2%) was the third major source of diabetes information. However, some studies have shown that the internet is the major source of health information in developing countries.[25–27]

This study found that only 1.7% of patients with diabetes, especially those with a higher level of education, sought diabetes information every day. This finding is similar to a study conducted in Athens, Greece, in 2015, in which only 3% of patients with diabetes sought health information every day.[23] Similarly, a study conducted in Saudi Arabia in 2017 found that only 4.1% of patients with diabetes sought health information every day for the management of their diabetes.[27]

Diabetes information was sought monthly by 36.3% of patients with diabetes in this study. This finding is similar to a study conducted in Saudi Arabia in 2017, which found that 40.8% of patients with diabetes sought diabetes information monthly.[28]

The results of this study indicate that diet (72.7%), diabetes symptoms (48.3%) and self-care management (47.2%) were the main types of diabetes information looked for by patients with diabetes. Likewise, a study conducted in Saudi Arabia in 2015 showed that diet and diabetes symptoms were the primary type of diabetes information looked for by the majority of patients with diabetes.[5] This may be due to diabetes needing self-management and being directly related to diet.[12] The supporting qualitative study revealed that most patients with diabetes have sought diabetes information for the purpose of self-care management and to obtain information about diet related to the disease.

Educational status, health literacy, place of residence and comorbidity were found to be significant factors for diabetes information seeking in the final multivariate logistic regression analysis.

Table 2 Bivariable and Multivariable Analysis of Factors Associated with Diabetes Information Seeking Among Patients with Diabetes

Variables	Diabetes Information Seeking		Crude Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
	Yes	No		
Gender				
Male	110 (50.2%)	109 (49.8%)	2.1 (1.42,3.13)	1.47 (0.73,2.95)
Female	66 (32.4%)	138 (67.6%)	1	1
Occupation				
Unemployed	4 (33.3%)	8 (66.7%)	0.12 (0.03,0.45)	0.11 (0.13,4.82)
Student	17 (33.3%)	34 (66.7%)	0.12 (0.06,0.27)	0.01 (0.09,0.99)
Daily Laborer	3 (13%)	20 (87%)	0.04 (0.01,0.14)	0.09 (0.11,4.55)
Merchant	32 (49.2%)	33 (50.8%)	0.24 (0.12,0.49)	0.02 (0.26,4.03)
Farmer	9 (17%)	44 (83%)	0.05 (0.02,0.12)	0.08 (0.34,12.68)
Non-gov't employee	20 (69%)	9 (31%)	0.55 (0.21,1.40)	0.25 (0.19,2.15)
Housewife	18 (18.2%)	81 (81.8%)	0.55 (0.03,0.11)	1.33 (0.23,5.62)
Gov't employee	73 (80.2%)	18 (19.8%)	1	1
Educational status				
Unable to read and write	5 (8.9%)	51 (91.1%)	0.03 (0.01,0.09)	0.02 (0.01,0.46)**
Able to read and write	22 (27.8%)	62 (86.1%)	0.05 (0.02,0.12)	0.01 (0.03,0.58)**
Primary	32 (43.8%)	57 (72.2%)	0.13 (0.07,0.24)	0.11 (0.05,0.75)*
Secondary	107 (74.8%)	41 (56.2%)	0.26 (0.14,0.48)	0.47 (0.16,1.39)
Higher	36 (25.2%)	1	1	
Place of residence				
Urban	160 (55%)	131 (45%)	8.85 (5.0,15.68)	3.97 (1.56,10.1)**
Rural	16 (12.1%)	116 (87.9%)	1	1
Monthly income (ETB)				
>15,000	7 (58.3%)	5 (41.7%)	3.08 (0.95,9.96)	1.51 (0.2,11.32)
5–10000	16 (61.5%)	10 (38.5%)	3.52 (1.54,8.05)	1.01 (0.29,3.45)
10001–15000	59 (70.2%)	25 (29.8%)	5.20 (3.07,8.81)	1.39 (0.61,3.19)
<5000	94 (31.2%)	207 (68.8%)	1	1
Self-efficacy				
Confident	44 (31.9%)	94 (68.1%)	0.54 (0.35,0.83)	0.43 (0.41,1.69)
Not confident	132 (46.3%)	153 (53.7%)	1	1
Perceived susceptibility				
Susceptible	107 (53.2%)	94 (46.8%)	2.52 (1.69,3.75)	1.25 (0.26,6.05)
Not susceptible	69 (31.1%)	153 (68.9%)	1	1
Perceived severity				
Severe	108 (52.9%)	96 (47.1%)	2.49 (1.68,3.7)	2.07 (0.42,10.14)
Not severe	68 (31.1%)	151 (68.9%)	1	1
Physical activity				
Physically active	37 (78.7%)	10 (21.3%)	6.3 (3.04,13.08)	1.31 (0.46,3.82)
Physically inactive	139 (37%)	237 (63%)	1	1
Comorbidity				
Yes	56 (57.1%)	42 (42.9%)	2.28 (1.44,3.61)	2.01 (1.95,8.26)***
No	120 (36.9%)	205 (63.1%)	1	1
Health literacy				
Adequate	139 (69.8%)	60 (30.2%)	11.7 (7.36,18.64)	6.87 (3.75,12.58)***
Limited	37 (16.5%)	187 (83.5%)	1	1

Notes: *Significant at $P<0.05$. **Significant at $P<0.01$. ***Significant at $P<0.001$. 1: Reference category.

In this study, patients with diabetes who were unable to read and write were 98% less likely to seek diabetes-related information than patients with higher educational status. This could be due to their limited literacy level (in 91.1%), which was identified in this study. In other words, highly educated patients with diabetes were more likely to seek diabetes-related information compared to patients who are unable to read and write. This result is supported by a study conducted in Kuwait in 2018, which indicates that more patients with higher educational status (48.8%) were health information seekers than patients with lower educational status (10.1%).[29] Furthermore, a qualitative study conducted in Iran in 2014 indicates that highly educated patients with diabetes sought diabetes-related information more than patients with diabetes with lower educational status.[30] Another research study, in Egypt, also found that adults with higher educational status have better online health information-seeking behavior than adults with lower educational status.[15] This could be due to patients with diabetes with a higher level of education have greater interest in information about complications, hypoglycemia and exercise.[23]

According to the results of this study, the odds of diabetes information seeking among patients with diabetes with an adequate health literacy level were seven times higher than for patients with diabetes with limited health literacy levels. This could be due to their higher educational status (55.3%) and urban place of residence (84.4%), which were identified in this study. Furthermore, studies conducted in China, Italy and Finland indicate that this could be due to people with adequate health literacy levels having more engagement in health information seeking than people with limited health literacy levels.[25,30,32]

According to the results of this study, the odds of diabetes information seeking among urban patients with diabetes were four times higher than for patients residing in rural areas. This could be due to their higher educational status (46.6%) and adequate level of health literacy (57.7%), compared to the lack of adequate infrastructure (78.4%) and shortage of healthcare providers (81.1%) in rural areas of the country.[33,22] Similarly, the qualitative study shows that this is due to the far distance from health institutions and low accessibility of diabetes information sources, such as books, magazines, the internet and mass media, in the rural areas of the country.

Based on the results of this study, the odds of diabetes information seeking among patients with diabetes with comorbidity were two times higher than for patients with diabetes without comorbidity. This could be due to their higher severity of disease (52%) and susceptibility to other complications (51%), which were identified in this study. It may also be due to patients with comorbidity having more engagement with disease information than patients without comorbidity.[34] Conversely, a study conducted in Malaysia in 2014 found that patients with diabetes without comorbidity were three times more likely to seek health information than patients with cmorbidity.[35]

Strengths of the Study

This study was conducted using quantitative research supported by qualitative research. The study was conducted in a resource-limited setting, whereas most of the previous studies were conducted in developed countries.

Limitations of the Study

The study was conducted among patients with diabetes in Debre Markos Referral Hospital. Patients with diabetes from other referral hospitals were not included in this research study, which may affect its generalizability owing to infrastructure and technological variations in different health facilities and cultural differences among patients with diabetes in treating and managing diabetes. Hence, future research studies could include patients with diabetes from more referral hospitals in order to increase their generalizability. The cross-sectional nature of the study limits the ability to draw conclusions on causation. The sampling method and the low educational status of the participants may affect generalizability to other countries. Finally, the lack of any interventions to affect future practice is another limitation of the study.

Conclusion

The overall prevalence of diabetes information seeking among patients with diabetes in Debre Markos Referral Hospital was low. The perception of already having enough information about diabetes, lack of awareness, having lower educational status, far distance from health institutions and difficulty in accessing information sources were the major barriers to diabetes information seeking among patients with diabetes.

The majority of patients with diabetes used health professionals as the primary source of diabetes information, because health professionals were easily accessible by patients with diabetes compared to other sources and the patients had

a good level of trust in health professionals. Diet, diabetes symptoms and self-care management were the major types of diabetes information looked for by patients with diabetes.

Having higher educational status, urban place of residence, the presence of comorbidity and adequate health literacy levels increased the likelihood of diabetes information seeking among patients with diabetes.

Abbreviations

AOR, adjusted odds ratio; CI, confidence interval; ETB, Ethiopian Birr; WHO, World Health Organization.

Data Sharing Statement

The datasets generated and/or analyzed during the current study will be available upon request from the corresponding author.

Ethics Approval and Consent to Participate

The study protocol was reviewed and approved by the ethical review board of the University of Gondar, and informed consent was obtained from each study participant. A letter of permission was also obtained from each hospital. Names of participants and other personal identifiers were not included in the data collection tool. The participants' consent included the publication of anonymous responses. This study was conducted in accordance with the Declaration of Helsinki.

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Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests.

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