Awareness of Diabetic Patients About Their Illness and Its Complications Among Patients Who Have Follow-Up at Jush Diabetic Follow-Up Clinic, In Jimma Zone, South West Ethiopia, May 2021 Gc

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Abstract

Background: Diabetes mellitus is a chronic metabolic syndrome characterized by hyperglycemia as a cardinal biochemical feature. The major forms of Diabetes are type 1 and type 2. Morbidity and mortality stem from acute metabolic derangements and from long-term complications that affect small and large vessels. It is crucial to make patients aware of the disease and its complications and involve them in the management of their illness.

Objective: This study aims to evaluate the awareness of diabetic patients about their illness and its complications among patients who are being followed up at the JUSH diabetic clinic.

Methodology: A cross-sectional study was conducted with total of 384 participants at the JUSH diabetic follow-up clinic from May 1, 2021, to June 1, 2021. The data was collected using a structured questionnaire, then checked for completeness and analyzed using SPSS for version 24.

Result: Out of the 295 patients who came in during the study time, 290 diabetic patients volunteered to participate, and 5 patients declined to do so. 91.48% of respondents participated in this study. Of the total number, 132 (45.52%) were female and 128 (54.48%) were male. The age group of over 55 made up 98 (33.81%) of the total, followed by the 4655 age group (80; 27.58%). The majority of patients were Oromo by ethnicity (202; 69.66%) and Muslims by religion (180.77). According to Table 1, 68 (23.45%) were housewives, 88 (30.34%) were farmers, and 96 (33.10%) were illiterate. A family history of DM was present in 46 (15.86%) of the patients. In terms of diabetes awareness, 228 people (78.62%) are aware that the disease is inherited, and 244 people (84.14%) are aware that it cannot be cured.

Conclusion: The study found that diabetic patients had a strong understanding of follow-up at JUSH's diabetes clinic. The chronic problem was not well understood. The duration since diagnosis was found to be substantially linked with awareness.The study found that age, gender, type of diabetes mellitus, and length of diabetes were all substantially linked with the development of diabetic complications.

Recommendation: We recommend that JUSH diabetic clinic staff arrange a schedule and educate patients on the day of the visit.

Keywords: Diabetes, Artificial Intelligence, Machine Learning, Glucose, Insulin.

Introduction

Background Information

Diabetes mellitus is a common, chronic metabolic syndrome characterized by hyperglycemia as a cardinal biochemical feature. Diabetcs mellitus is not a simple entity but rather a heterogeneous group of disorders in which their distinct genetic patterns and other etiologic mechanisms lead to impairment of glucose tolerance [1].

Diabetes mellitus (DM) is classified as type 1, type 2, gestational Diabetes, and others with specific etiologies underlying the disease. The primary forms of DM are classified according to those caused by deficiency of insulin secretion due to pancreatic B-cell damage (type 1DM) and those that are a consequence of insulin resistance occurring at the level of skeletal muscle, liver, adipose tissue with various degrees of B- cell impairment (type 2DM).

Morbidity and mortality stem from acute metabolic derangements and from long-term complications that affect small and large vessels, resulting in retinopathy neuropathy, nephropathy, ischemic heart disease, and arterial obstruction with gangrene of extremities. In general, unregulated DM causes disturbance of the body's glucose, ketone bodies, electrolyte, and water levels. This will result in dehydration, ketoacidosis, and, in extreme cases, may proceed to diabetic coma and death.

Though medical and nutritional therapy and regular exercise are the first-line approaches in managing DM, especially for those who have impaired blood glucose levels, health education is the cornerstone to involve patients in the management [2].

The majority of people with type I DM in developing countries die early of acute complications such as DKA and infections, which remain life-threatening. Complications of DM still carry a mortality of 6-10% of patients who do not live long enough to develop life-threatening chronic complications.7) In contrast, in many developed countries where medical care is readily available, the prognosis of DM patients depends mainly on the course of the characteristic long-term complication of the disease rather than on acute complications such as DKA and severe infections [3].

The metabolic dysregulation associated with DM causes secondary pathophysiologic changes in multiple organ systems that burden the individual with DM and the health care system. In the USA, DM is a leading cause of end-stage renal disease, nontraumatic lower extremity amputation, and adult blindness. It also predisposes to cardiovascular diseases [4-18].

Diabetes mellitus is a disease affecting a vast population worldwide. In contradiction with the long-standing conventional wisdom that it is a rich country's disease, it is increasingly a primary concern of developing countries, especially in sub-Saharan Africa [19].

Statement of the Problem

The worldwide prevalence of DM has risen dramatically over the past two decades, from an estimated 30 million cases in 1985 to 177 million in 2000. World Health Organization has predicted a worldwide rise in the prevalence of DM that is expected to affect 300 million people by 2025. This progression is more flagrant in countries, particularly sub-Saharan Africa. In these countries, the expansion of DM is part of a broader demographic, nutrition, and epidemiologic transition from transmissible to non- transmissible diseases. Several factors are causing this transition, including the aging of the population and lifestyle changes (e.g., sedentary, obesity, unhealthy dietary habits, alcohol consumption, and smoking.

In 2005, the prevalence of DM in the USA was estimated to be 0.22% in those < 20 years and 9.6% in those > 20 years. In individuals >60 years, the prevalence was 20.9%. Worldwide estimates project that in 2030, the most significant number of individuals with Diabetes will be 45-64 years of age. The estimated prevalence of DM in Africa is 1% in rural and up to 5-7% in urban sub-Saharan Africa. It is predetermined to increase from 3.8 in 2010 to 47 by 2030, and Ethiopia's predetermined value will increase from 2.5% to 3.5% by 2030.

Incidence of both type 1 and type 2 DM has considerable geographic variation. Scandinavian countries have the highest incidence of type I DM. The Pacific Rim has a much lower rate of type 1 DM: Northern Europe and the United States have an intermediate rate, and the prevalence of type 2 DM is highest in certain Pacific islands.

Diabetes is a major cause of mortality, but several studies indicate that Diabetes is likely underreported as a cause of death. In the United States, Diabetes was listed as the sixth leading cause of death in 2002. A recent estimate suggested that DM was the fifth leading cause of death worldwide and was responsible for almost 3 million deaths annually worldwide.

Prolonged and elevated levels of glucose in the blood, which, if left unchecked and treated, result in serious long-term complications. The risk of Diabetes to be legally blind is 25 times more than an individual without DM. Renal disease is the leading cause of death and disability in people with Diabetes. It is also a leading cause of nontraumatic lower extremity amputation in the USA.

The global management of diabetes patients involves the use of drugs and the adoption of better lifestyles, the latter via education. The morbidity and mortality related to Diabetes complications pose a great threat and burden to a nation's economy. So, educating patients to adopt healthy lifestyles is essential for preventing complications.

Patients' lack of understanding hinders proper guidance about the disease. Even in developed countries, proper guidance and

communication could lead to improper compliance. Education is likely to be effective if we know the characteristics of patients, such as their educational level and level of understanding.

In developing countries like Ethiopia, where the educational level is low, the chance of improper guidance about the disease due to a lack of understanding of patients' characteristics is high.

This study will highlight the need for better health information to improve the lifestyle of DM patients through large-scale awareness programs. This will enhance the public's knowledge of Diabetes, thus reducing the burden of the condition.

Literature Review

It is well understood that diabetic treatment requires patient involvement for better disease control. This can be achieved through group education and patient counseling, which is not practical in our country.

Research done in the German Department of Diabetes inpatient diabetics showed that the existence of DM-related complications was a significant predictor of poor knowledge. It also showed a group of DM inpatients who were less informed and showed a knowledge deficit on the test. Type 2 DM patients achieve lower results in the knowledge test compared to type 1 diabetics.

A study done in Ankara on awareness of DM and associated factors in 4 health centers by the year 1997- 2000 showed that awareness of DM among Dm patients is deficient and is mainly determined by their educational level [20].

A study done in Pakistan highlighted that proper education and awareness programs can change the public's understanding of DM. Another study showed that intensive DM education and care management can improve patient outcomes, glycemic control and quality of life in patients with DM [21].

In a study done in Nepal, Department of Hospital and Clinical Pharmacy, municipal Teaching Hospital College of MD Sciences 2008, Noapal, 56.59% of patients were male and 43.41% female. The most significant group of patients was in the age group of 51-60 years. It showed a low knowledge score, which suggests the need for educational intervention to improve the awareness of DM patients.

Hospital-based studies done in Tikur Anbesa Hospital showed that the prevalence of Diabetes has increased from 1.9% in 1990 to 9.5 in 1999. WHO estimated the number of diabetic cases in Ethiopia to be 800,000 by 2030m. Due to the widening of social differences and economic status, circumstantial evidence shows that the urban population is facing the highest level of overweight and obesity.

Hypoglycemia is also very hazardous for Ethiopian diabetic patients. A community-based study done on 57 type 1 DM elderly patients related to skill and knowledge of safety of self-management showed that 26% experienced hypoglycemia in the last year, 8% didn't know what actions to take with hypoglycemia, and 46% didn't know any hypoglycemia symptoms. The study showed that severe deficiency in primary education and self-management skills would result in morbidity and mortality.

Research done in the diabetic clinic of Tikur Anbesa Teaching Hospital, Addis Ababa, Ethiopia 1999, showed that 20.1% did not attend any educational program. Knowledge of chronic complications was inferior when compared to other areas.

In a study conducted in 1984 on 1000 DM patients at Yekatit 12 Hospital Addis Ababa, Ethiopia, the Average age at death was 50.7 years, the average duration of DM before death was 10.7 years, only 5% of patients survived for more than 25 years, 46% did not complete their first decade after diagnosis. Most of the deaths were in a diabetes state.

In developing countries, the average life expectancy of Dm patients may be 20-30 years as compared with 50 years for non-diabetic. Patients with type 1 DM can have a normal life expectancy, but on average, their life span is several years shorter in developing countries. This is because of a lack of proper diabetic care.

In a study conducted on 106 DM patients drawn from health centers and 123 DM patients from three regional Hospitals in Addis Ababa, 89.9% of the patients had regular follow-ups. About 24% of patients had attended diabetic education sessions.

A retrospective study on 69 patients in Metu Hospital from 1980-1981 showed that the prevalence was 1.2/100 with 33.3% type I and 66.7% type 2 DM. The mean age was found to be 44.5 years & 30% of people with Diabetes were females.

Research done in JUSH in 2005 showed that among 500 registered DM patients, 320 participated. The mean age was 43+ 16, and farmers, accounting for 27.4%, were the most affected category. The proportion of type I and type II patients was 48.8% and 49.1%.

A community-based study in Jimma town 2007 shows that type II DM is the most common form of DM, accounting for 90-95% of cases. 28.2% were males & 77.8% females making sex ration of M: F= 03:1, 56.3 house wives 63.1 orthodox Christianity.

Significance of the Study

Although diabetes mellitus is a noncurable disease, it is possible to prevent acute and chronic complications that result in disability and death. This is done by providing information about their illness and involving them in managing the disease. Information on diabetes awareness is of paramount importance as the economic and social effects of the disease are extreme against a limited resource. This is especially true for our country, Ethiopia.

The study will identify different factors associated with DM patients' awareness that attending physicians can utilize to provide information and improve their understanding of their patients. It will also serve as a baseline for further studies.

Objectives
General objectives

This study aims to determine the level of awareness of diabetic patients about their illness and its complications among patients on follow-up at the JUSH diabetic clinic.

Specific Objective
- To assess the level of awareness of DM patients about their illness.
- To describe the distribution of the study population concerning socio-demographic background.
- To assess the knowledge of DM patients about complications (Acute and chronic).
- To find out different factors associated with awareness of Dm patients about DM and its complications.

Method and Materials
Study Area and Period
The study was conducted at the JUSH adult diabetic follow-up clinic, 354 km from Addis Ababa in southwest Ethiopia. JUSH is the only referral Hospital in the Jimma Zone that provides services for clients from the Jimma Zone and its surroundings. JUSH provides services for approximately 9000 inpatients & 80,000 out-patient attendances in a year coming to the Hospital from the catchment population of about 15 million.

Study Design
A cross-sectional study was conducted to assess the awareness of DM patients who are being followed up at the JUSH diabetic follow-up clinic about their illness and its complications.

Population
Source Population
The source population was all adult (> 18 years) diabetic patients (n= 2044) who are registered and having follow-ups at the JUSH diabetic follow-up clinic.

Study Population
The study population was all sampled adult diabetic patients who visited a diabetic follow-up clinic during the data collection period.

Sampling Technique and Sample Size
Sample Size
The sample size was determined using the following formula assuming a 95% confidence interval, 5% margin of error and 50% awareness level among the study population.
Thus:

$$n= \frac{Z_{2/2} P(1-P)}{d_2}$$

Where n minimum sample size required
   p= an estimate of the prevalence rate for the population
   d= the margin of sampling error tolerated (0.05)
   $Z_{1/2}$ standard normal score at 95% confidence interval = 1.96

$$n= \frac{(1.96)2 (0.5) (0.5)}{(0.05)2} = 384$$

The following formula adjusted this number since the study population is less than 10,000. The total number of patients on follow-up at the DM clinic is 2044.

nf= nowhere N= total source population, which is found to be 2044

$\frac{1+no}{N}$ from the register book kept at the DM clinic

$$nf= \frac{384}{1+\frac{384}{2044}}$$

nf= 323

10 to 20% less than the sample size was tolerated as there might be nonrespondents.

Sampling Technique
A convenience sampling technique was used to identify the respondents. This is due to the small number of diabetic patients attending the diabetic clinic and the short study period. So, the required information was collected from patients who visited the clinic during the study period. The data was collected within four consecutive weeks.

Data Collection Technique
Data collectors were trained on how to collect the data, and adequate information regarding the questionnaire was given to minimize personal bias. Then, data was collected by interviewing using a structured questionnaire. Four medical interns conducted data collection.

Data Analysis and Interpretation
The collected data was checked for completeness and analyzed manually. The analyzed data was expressed using appropriate frequency distribution and cross-tabulation for selected variables. The chi-square test was computed to identify factors significantly associated with participants' awareness. After analysis, data was interpreted (with a CI of 95%, at 1-= 0.95), and p-value < 0.05 was taken as statically significant. Finally, the results were compared with those of other studies and discussed. Data was presented in writing & tables.

Quality Control
The data collectors interpreted or translated the questionnaire into the respondents' language so that they could understand the questions before they answered.

Ethical Considerations
The following ethical considerations were taken to respect the patient's rights and the Hospital's regulations.
1. The purpose of the study was explained to the patients.
2. Confidentiality was maintained by not writing the names of respondents.
3. Written consent was obtained from respective authorities, and a formal letter was written from the Jimma University student's research program (JU SRP) to the JUSH diabetic follow-up clinic before commencing the data collection process.

Data Collection and Measurement
Variables
Independent variables
- Age
- Sex
- Religion
- Ethnicity
- marital status
- occupation,
- Educational status
- types of Diabetes
- Duration since diagnosis

Dependent Variables
- Awareness

Data collection Instrument

The instruments were adopted from similar literature and adapted according to the local context. The questionnaires have two parts: a socio-dimorphic and general information part with 12 questions and an awareness part with 20 questions.

Limitation of the Study

Convenience sampling, which was used, limits the validity of the study. However, this non-probability sampling method was selected due to the short study period and the small number of patients attending the clinic on selective days.

Result

In this study, 290 diabetic patients volunteered to participate, and 5 patients were not willing to participate out of 295 patients who came during the study period. The respondent rate in this study was 91.48%.

One hundred fifty-eight (54.48%) were males, and 132 (45.52%) were females. The most common age group was > 55, which constituted 98(33.81%), followed by the age groups of 46-55 years, 80(27.58%). Most patients were Islam by religion 180(62.07) and Oromo by ethnicity 202(69.66%). 96(33.10%) were illiterate, 88(30.34%) were farmers followed by house wife 68(23.45%) (Table 1). 46(15.86% of patients had a family history of DM.

Concerning awareness about Diabetes, 228(78.62%) know that DM is hereditable, and 244 (84.14%) know that DM is not curable. Among 220(75.86%) who knew factors that make blood glucose control difficult, 186 (84.55%) knew at least one risk factor that is dietary, followed by stress (41.81%).

Regarding knowledge about the complications of DM, among 234 (80.69%) of the study population which claims to know hypoglycemia as one of the complications, 190(81.20%) knew at least one symptom, which is sweating, and 158(67.52%) of them knew the loss of consciousness. Among 194 patients who knew the causes of hypoglycemia, 176(90.72%) knew at least one reason, that is, missed meals and vigorous exercise known by 122(62.91%) as a cause, and 108(88.5%) took precautions before vigorous exercise.

Among 210(72.41) patients who knew what to do when they experienced hypoglycemia, 180(85.71) patients knew they had to take sugar, and only 60 (20.68%) knew they had to go to a nearby health institute.

Among the 238(82.07%) patients who knew they had hyperglycemia, 91% knew at least two symptoms: increased urination and thirst. 195 (67.24%) and 112(38.62%) patients knew that missed medication and a non-diabetic diet were the causes of hyperglycemia, respectively.

Among the study population, 132 (45.52%) knew about chronic complications. From chronic complications, eye disease was known by 123 (42.41%), foot ulcer & gangrene known by 146 (62.93%), Heart disease known by 81(27.93%), and 282(97.44%) knew that alcohol is not allowed for diabetic patient 268(92.41) knew that they have to take proper foot care. Almost all patients knew people with Diabetes should have regular BP measurements.

According to the operational definition, 210 (72.14%) patients had good awareness of people with Diabetes.

The study showed a significant association between awareness and duration since diagnosis. (Table 5)

Most of the patients (92.41%) got most of the information from the health institute. Only 18.62% attended an educational program. Tables:1

Table 1: Socio-Demographic Characteristics of People with Diabetes in JUSH Diabetic Follow-up Clinic, Jimma, SWE, May 2021.

Socio-demographic characteristics		Male		Female		Total	
		No	%	No	%	No	%
Age in years	15-30	14	8.86	24	18.18	38	13.10
	31-45	30	18.99	44	33.33	74	25.51
	46-55	38	24.05	42	31.81	80	27.56
	>55	76	48.1	22	16.68	98	33.81
	Total	158	100	132	100		
Ethnicity	Amhara	24	15.19	20	15.15	44	15.17
	Oromo	106	67.09	96	72.72	202	69.66
	Tigre	4	2.53	4	3.03	8	2.76
	Gurage	10	6.33	6	4.55	16	5.52
	Others	14	8.86	6	4.55	20	6.8
Religion	Christian	58	36.71	52	39.39	110	37.93
	Islam	100	63.29	80	60.61	180	62.07
	Others	-	-	-	-		
	Total	158	100		100		100

Religion	Illiterate	48	30.38	48	36.36	96	33.10
	Can read & write	30	18.99	18	13.64	48	16.55
	elementary	42	26.58	34	25.76	76	26.21
	High school	26	16.46	20	15.15	46	15.86
	College/University	12	7.59	12	9.09	24	8.28
Marital status	single	10	6.33	16	12.12	26	8.97
	married	138	87.34	94	71.21	232	8.0
	widowed	6	3.8	14	10.61	20	6.89
	divorced	4	2.53	8	6.06	12	4.14
Occupation	gov't employee	32	20.25	16	12.12	48	16.55
	Farmer	68	43.04	20	15.15	88	30.34
	merchant	44	27.85	4	3.03	48	16.55
	H. wife	-	-	68	51.52	68	23.45
	Student	9	2.53	10	7.58	14	4.83
	Others	50	6.33	14	10.60	24	8.28
	Total %	158	100	132	100	290	100

Table 2: Distribution of People with Diabetes by Duration of Diagnosis and type of Dm Among People with Diabetes in Jush Diabetic follow-up Clinic, Jimma swe, may 2021.

		Male		Female		Total	
		No	%	No	%	No	%
Duration of Dm since diagnosis (year)	<5	72	45.57	64	48.48	136	46.90
	5-9	40	25.32	28	21.21	68	23.45
	10-14	18	11.39	26	19.70	44	15.17
	15+	28	17.72	14	10.61	42	14.48
	Total	158	100	132	100	290	100
types of Diabetes	type 1	32	20.25	62	46.97	94	32.41
	type2	126	79.75	70	53.03	196	67.59
	Total	158	100	132	100	290	100

Table 3: Distribution of People with Diabetes by level of Awareness about Diabetes about Symptoms, signs, Complications and Management In Diabetic Patients Having follow-ups at JUSH Diabetic follow up clinic, Jimma, SWE, May 2021.

	Yes		No		Total	
	No	%	No	%	No	%
DM is a condition in which blood glucose levels are high	282	97.24	8	2.76	290	100
Symptoms of DM	260	89.65	30	10.35	290	100
Does DM have hereditary	228	78.62	62	21.38	290	100
is DM curable	46	15.86	244	84.14	290	100
Factors that make BGL control difficult	220	75.86	70	24.4	290	100
Acute complication	230	79.31	60	20.69	290	100
Hypoglycemia	234	80.69	56	19.31	290	100
Causes of hypoglycemia	194	66.90	96	33.10	290	100
Symptoms of hypoglycemia	270	93.10	20	6.90	290	100
Diabetic feeds	258	88.97	32	11.03	290	100
is alcohol allowed	282	97.24	8	2.76	290	100
Frequent foot care	268	92.41	22	7.59	290	100
Proper foot shoe	268	92.41	22	7.59	290	100
Chronic complication	132	45.52	58	54.48	290	100
regular BP Measurement	290	100	0	0	290	100
checked for an eye problem	276	95.17	14	4.83	290	100

	No	%	No	%	No	%
does exercise help control DM	258	88.97	32	11.03	290	100
percussion before exercise	108	37.24	182	62.76	290	100
Causes of hyperglycemia	236	81.38	54	18.62	290	100
Do you know hyperglycemia	138	82.07	52			

Table 4. Distribution of People with Diabetes by Comprehensive Level of Awareness About DM in People with Diabetes Attending JUSH Diabetic follow-up clinic, Jimma, SWE, May 2021.

the comprehensive level of awareness	Male		Female		Total	
	No	%	No	%	No	%
good	110	69.62	100	75.76	210	72.41
Poor	48	30.38	32	24.24	80	27.59
Total	158	100	132	100	290	100

Table 5: The Association of Awareness with Educational Status Duration Since dx, types of DM, and Gender of Diabetic Patients who are on Follow up at Diabetic follow-up clinic of JUSH, Jimma, SWE, May 2021

		Awareness		Total	X2	P- value
		good	poor			
Educational status	Illiterate	70	26	96	0.018	0.893
	Literate	140	54	194		
	Total	210	80	290		
Duration since dx in years	<4	86	50	136	11.005	0.004
	5-9	56	12	68		
	>10	68	18	86		
	Total	210	80	290		
Types of DM	Type 1	76	20	96	3.276	6.070
	Type 2	134	60	194		
	Total	210	80	290		
Gender	Male	110	48	158	1.356	0.244
	Female	100	32	132		
	Total	210	80	290		

Discussion

This study tried to explore the state of DM patients' follow-up at the JUSH diabetic clinic, especially in light of patient's knowledge about their illness and its complications.

The overall knowledge of patients in the study concerning their illness and its complicating is satisfactory as 72.14% of the study population score above 60% as in the operational definition. Compared to a study done in Germany, the Department of Diabetology in people with Diabetes showed a group of DM patients that showed knowledge defects on the test (21). The level of awareness is relatively good in our study. This can be because inpatient diabetics are usually with complications, which may be attributed to their lack of knowledge.

Our study also showed better awareness compared to a survey done in Ankara on awareness of DM and associated factors in 4 health centers by the year 1997-2000, which showed that awareness of DM patients is very low and mainly determined by educational level (20). The different results from our study may contribute to the difference in the study period, which is very short in this study, which makes the use of the nonprobability sampling technique necessary. It may also be due to increased attempts to create awareness of DM patients from time to time.

There is also better awareness in our study area compared to a study done in Nepal by the Department of Hospital and Clinical Pharmacy, Maniple Teaching Hospital College of MD Sciences 2008, which shows a low knowledge score. (3) The relatively good awareness in our study may be due to close-ended questions, which make participants biased.

This study shows comparable awareness of chronic complications with research done in the diabetic clinic of Tikur Anbesa Teaching Hospital. Addis Ababa, Ethiopia, 1999, showed inferior knowledge of chronic complications of DM compared to other areas. (8)

Research conducted in the Nepal Department of Hospital and Clinical Pharmacy showed that 56.59% of patients were males. The largest group of patients was in the age group of 51-60(3). This shows a comparable socio-demographic distribution with the study area.

Our study has no association between knowledge and type of DM.

However, research done in the German Department of Diabetology on inpatient diabetics showed a significant association between knowledge and type of DM (21).

Conclusion and Recommendation
Conclusion
The study found that diabetic patients had a strong understanding of follow-up at JUSH's diabetes clinic. The chronic problem was not well understood. The duration since diagnosis was found to be substantially linked with awareness. The study found that age, gender, type of diabetes mellitus, and length of diabetes were all substantially linked with the development of diabetic complications.

Recommendation
Even if overall awareness in the study population was good, there was a lack of awareness of the specific complications of the disease.

I recommend that JUSH diabetic clinic staff and physicians give health education in the patients' language, especially on chronic complications of DM. The schedule should be arranged on the same day as the patient's visit.

The media and non-governmental organizations should be involved in teaching the community about symptoms, complications, preventive measures and what patients have to do.

It may need a large-scale study to clarify these results, and I also recommend conducting a community-based study.

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