

# Attitude, Practice and its Associated Factors towards Diabetes Complications among Type 2 Diabetic Patients at Addis Zemen District Hospital, Northwest Ethiopia

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## Research article

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# Abstract

**Background** The aim of this study was to assess the level of attitude, practices, and its associated factors towards complications of diabetes mellitus among type 2 diabetes patients. **Methods** A cross-sectional study was conducted among Type 2 diabetes patients visiting the diabetes clinic at Adiss Zemen District Hospital in Northwest Ethiopia. Interviewer administered structured questionnaire was used to collect data from 402 patients. Multivariable logistic regression was used to determine factors associated with attitudes and practices towards diabetes complications. AOR with 95% CI and p-value less than 0.05 was considered to identify significant associated factors. **Results** Two third of the study participants 65.2% (95% CI: 60.2, 69.4) had a good attitude level while less than half of study participants 48.8% (95% CI: 44.0, 53.5) had a good practice on diabetes complications. Educational status of: read and write (AOR=2.32, 95% CI=1.26 4.27), primary school (AOR= 4.31, 95% CI= 2.06, 9.02), high school and above (AOR=2.79, 95% CI=1.41, 5.50), and urban residence (AOR=1.80, 95% CI=1.12 2.91) were significant factors for good attitude while educational status of: read and write (AOR=1.96, 95% CI=1.06, 3.61), high school and above (AOR=2.57, 95% CI=1.32, 5.02) were associated with diabetes complication practices. **Conclusions** Greater proportion of diabetes patients had relatively good attitude but poor practice towards diabetes complication prevention. Residence was significant contributing factor for good attitude whereas educational status was significantly associated with both attitude and practice. The current study suggests the need of structured educational programs about diabetes complications on a regular basis to improve patient's attitude and practice.

# Introduction

Diabetes Mellitus(DM) is a serious, chronic disease that occurs either by impaired insulin secretion or insulin resistance or both(1). DM is one of the four priority non-communicable diseases (NCDs) targeted for prevention and control by World Health Organization 2011(2). It was estimated that in 2019 there were 500 million people with diabetes worldwide (3) and predicted to be 693 million by 2045(4).Type 2 diabetes will be the predominant public health problem in Africa which is expected to be 28 million by 2030(5) and 41.6 million in 2045(6). There were 2, 652,129 cases of diabetes in Ethiopia in 2017 making it the first among the top five countries of Africa for several people with diabetes with an age of 18-99 years(6). Studies in various parts of Ethiopia also showed that the prevalence of diabetes varies from 0.3% to 7.0%(2).

Diabetes is identified as the main cause of premature death and disability(2,6,7). Most of death and disability is caused by diabetic complications that damage the heart, blood vessels, eyes, kidneys, and nerves(8,9). Such damage increases the chance of foot ulcers, infection, and the eventual need for limb amputation(10). Diabetic retinopathy, one of main diabetic complication, is an important cause of blindness. Diabetes is also among the leading causes of kidney failure(7). According to the WHO report in 2016, DM is attributed to 2% death among all causes of death in Ethiopia, which is mainly attributed by its complications(7). Studies conducted on prevalence of acute and chronic complication in different parts of Ethiopia showed that the prevalence for: retinopathy 5.0% to 43.4%, neuropathy 6.0% to 41.0%, foot ulcer 1.7% to 17%, nephropathy 1-20%, hypertension 3% to 39%, and erectile dysfunction 1% to 22%(11).

The international diabetic Federation (IDF) estimated that the total health expenditure due to diabetes was \$3.3 billion worldwide in 2017. Most countries spend between 5% and 20% of their total health costs on diabetes

mainly to prevent and treat diabetic complications(6). All major complications of diabetes are preventable by good control of blood glucose levels, blood pressure, and cholesterol levels. This requires a high level of education of the person with diabetes in managing their condition, and access to insulin, oral medications, and monitoring equipment(12).

There is increasing amount of evidence that patient education is the most effective way to lessen the complications of diabetes and its management by improving their attitude and practice(13). Adverse attitudes and psychological problems such as depression are common among diabetes patients and can lead to poor diabetes management leading to diabetic complication(14,15). There is strong evidence that individual who are educated and diligent with their diabetes self-care achieve better and durable diabetic control(16,17). Furthermore, previous studies on knowledge, attitude and Practice on diabetes have supported the needs of greater awareness of prevention, diagnosis, and risk factor Control in diabetes(18). Good attitude towards DM complication helps motivate patients to change any harmful dietary and lifestyle habits(19).

Though there are few literatures on the prevalence of diabetic complications, there is no published data on attitude and practices towards complications of diabetic among type 2 diabetic patients in Ethiopia. Thus, this study was conducted to assess the attitude and practices and its associated factor of diabetic complication among patients who attend Adiss Zemen Hospital, Northwest Ethiopia. The information generated from this study will provide important input for its prevention strategies, which in turn help to improve quality of care for type 2 type 2 diabetic patients and to reduce the burden associated with diabetes complications.

## **Methodology**

### **Study setting, design, and Period**

Institution based cross-sectional study was conducted from April 02, 2019 to June 02, 2019 at Addis Zemen District Hospital, South Gondar, Northwest Ethiopia. Addis Zemen District Hospital is found in Addis Zemen town which is an administrative town of Libo Kemkem District, South Gondar Zone, Amhara regional state. It is located 90 kilometers far from Bahir Dar (the capital city of Amhara Regional State) and 656 kilometers from Addis Ababa in the north direction

### **Study population and eligibility criteria**

Type 2 diabetic patients who came to diabetic clinic during the data collection period were included except those who were in a severe illness that limits them to respond for questionnaires and those who were health professionals.

### **Sample size determination and sampling technique**

The sample size was calculated using a single population proportion formula considering  $p=50\%$  (magnitude of good practice towards DM complications), 95% level of confidence, and 5% margin of error. Then sample size became 384. After adding a 5% non-response rate, the sample size becomes 404. Systematic random sampling techniques were employed to select the study participants.

### **Data collection instrument and procedure**

A structured pretested interviewer-administered questionnaire was used to collect data regarding to attitude, practice and associated factors. The questionnaire contained 9 attitude and 13 practice related questions towards diabetes complications adapted from literatures(20–23). It also includes important socio-demographic variables like: age, sex, residence, marital status, occupation, educational status, income, family history of DM, and duration since diagnosis as diabetic. The questionnaire was prepared in English and translated to Amharic and then translated back to English by a language expert to check its consistency and wording. Five Bachelor degree holder nurses were recruited for the data collection. In socio-demographic variables educational level was categorized as follows; cannot read and write, primary school and can read and write, informal education and can read and write, secondary school and above. Main aim here was to identify weather they can read and write, not to miss the positive effect of reading and writing on their attitude and practice. If the study participant went to primary school but couldn't read and write obviously they will be put under unable to read and write. In Ethiopia, there are people who attend informal education and religious education but did not attend primary school and able to read and write, for such candidates we group them in able read and write. Settling in country side outside of big cities or towns in Ethiopia is referred as rural residents(24).

### **Assessment of Attitude**

We have used 9 questions adapted from different similar studies and literatures (25,26) to assess the attitude of the patients each question had a three choices of responses (agree, neither agree nor disagree, and disagree). A score of "1" was given for favorable attitude (correct answer) and "0" for unfavorable attitude (incorrect answer) of each respective attitude questions(20). All possible correct answers were summated out of 9. Accordingly, the attitude of the patient was calculated by summing the correct answers and calculating the mean value as 5 with maximum possible correct answers and 9. The participant who mentioned less than mean (5) correct answers rated as poor attitudes. The participant who mentioned  $\geq 5$  correct answers rated as good attitude.

#### *Attitude questions and their respective response score*

- 1. Do you think you can lead a normal life if you take appropriate measures for diabetes? Agree "1" neither agree and disagree and disagree "0"*
- 2. Regular exercise prevents further complication? Agree "1", neither agree and disagree and disagree "0"*
- 3. Glycemic control has no role in preventing diabetic complications? Disagree "1", while agree and neither agree and disagree given score of "0"*
- 4. My diabetic diet spoils my social life? Agree and neither agree and dis agree scored as "0" but disagree scored as "1"*
- 5. Do you believe that you could prevent diabetic complications? Agree "1" neither agree and disagree "0"*
- 6. Do you agree that dietary modification is important to prevent diabetic complication? Agree "1" neither agree and disagree "0"*
- 7. Do you agree Weight reduction is important to prevent diabetic complication? Agree "1" neither agree and disagree "0"*
- 8. I avoid telling people I have diabetics? Agree and neither agree and dis agree scored as "0" but disagree scored as "1"*

9. *Diabetic is the worst thing that has ever happened to me? Agree and neither agree and disagree scored as "0" but disagree scored as "1"*

### **Assessment of Practice**

There were 13 questions which assess the practice of the patients about diabetic complications, 10 questions had a "Yes", or "No" response, "Yes" indicates a practice of recommended activity. A score "1" was given for "Yes", and "0" for "No". The remaining three measures of practice questions scored as follows: How often have you done physical work or exercise in the last week? Those who respond "Never" was given a score of "0" but the remaining recommended options (daily, almost daily, 2-3 times per day and once a week) were given a score of "1". For question "How often do you drink alcohol?" the response never was scored as "1" which is recommended response for diabetic patients while the remaining responses (rarely, nearly every day, 2-3 times/day, and weekly) given a score of "0". Finally since the recommended type water for foot care is warm water but not too hot or too cold for the question "What type of water do you use to wash your feet?" warm but not hot water was recorded as "1" and cold water recorded as "0".

Accordingly the practice of the patients calculated as a summation of their answers with the maximum possible score of 13 and patients whose mean practice level was  $\geq 8$  diabetic complication prevention activities were labeled as having good practice whereas those who practiced less than 8 were categorized poor level of practice(20,27,28).

### **Practice Questionnaires**

1. *Do you ever forget to take your medicine/ insulin?*
2. *Are you careless at times about taking your medicine?*
3. *When you feel better do you sometimes stop taking your medicine?*
4. *Sometimes if you feel worse when you take the medicine, do you stop taking it?*
5. *How often have you done physical work or exercise in the last week?*
6. *Do you modify your diet according to the recommendations of your physician?*
7. *How often do you drink alcohol?*
8. *Do you smoke cigarette?*
9. *Will you wear footwear as recommended by your health worker when you go to exercise?*
10. *What type of water do you use to wash your feet?*
11. *Do you take care when you cut your toe nails?*
12. *Do you conduct periodic kidney examination?*
13. *Do you take regular checkup of eye by eye specialist?*

### **Data quality management/control**

One day training was given for data collectors and supervisors about the data collection procedure and ethical issues. Pretest was conducted on 60 type 2 DM patients at the University of Gondar specialized Hospital DM clinic. There data collection was closely supervised by two health officer supervisors and investigators. The

collected data were checked for its completeness in a daily meeting. Data clean up and crosschecking was done before analysis.

## Data processing and analysis

The data were checked for completeness and entered to Epi Info version 7 and were exported to SPSS Version 20 software. Descriptive statistics such as frequencies and percentage were used. Bivariate analysis was carried out for all independent variables with an outcome variable and variables with P-value  $\leq 0.2$  were entered in to multivariable logistic regression model to identify the independent associated factors of attitude and practice. Adjusted odds ratio with 95% CI and p-value less than 0.05 was considered to declare significant associated factors.

## Results

### Socio demographic characteristics

A total of 404 patients were included in the study of which 402 responded, yielding a response rate of 99.5%. Of the total participants, 225 (56%) were females and 243 (60.4%) were urban dwellers. Most of the respondents, 150 (37.3%) were aged 45-70 years. The majority 304 (75.6%) of the participants were orthodox Christians and 348 (86.6%) were from Amhara ethnic group. One hundred and eighteen (29.4%) study participants had a family history of diabetic mellitus. Out of the total respondents, 242 (61.3%) were married, 110(27.4%) are unable to read and write, were urban dwellers, 85 (21%) were farmers, and 156 (38.8%) had a monthly income below 500 Ethiopian birr (**Table 1**).

**Table 1:** Socio demographic characteristics of Type 2 adult DM patients at Adiss Zemen District Hospital, Gondar, Ethiopia, 2019(N=402)

*Abbreviations: ETB=Ethiopian Birr, DM= Diabetes mellitus, NGO= Non-governmental organizations*

### Attitude of type 2 diabetic patients towards complications of diabetes

Two-thirds of the study participants 65.2% (95% CI: 60.2, 69.4) possessed good attitude levels. Most (74.1%) of the respondents agreed that diabetic complications could be prevented. Nearly three quarters (74.1%) of respondents thought they could lead a normal life if they take appropriate measures for diabetes. Over two-third of the participants 69(16.9%) believed that diabetic complications can be prevented by having good glycemic control. The majority (79.9%) of participants agreed that regular exercise can prevent complications of diabetes. Dietary modification and weight reduction was considered important to prevent diabetic complications by 91.8% (n=369) and 46.3% (n=186) respondents, respectively. One hundred thirty-five (33.6%) respondents believed that their diabetic diet spoils their social life. Furthermore, 214(53.2%) respondents thought diabetics were the worst thing that ever happened to them (**Table 2**).

**Table 2:** Frequency distribution of participant's response on attitude related questions on DM complications among Type 2 adult DM patients at Adiss Zemen District Hospital, Gondar, Ethiopia, April, 2019(N=402)

Variables	Frequency	Percent (%)	Variables	Frequencies	%
Sex			<b>I can lead a normal life if I take appropriate measures for diabetes</b>		
Male	177	44.0	Agree	298	74.1
Female	225	56.0	Disagree	64	15.9
Age			Neither nor disagree	70	10
18-30	134	33.3	<b>Regular exercise prevents further complication</b>		
31-45	118	29.4	Agree	321	79.9
45-70	150	37.3	Disagree	25	6.2
Level of Education			Neither nor disagree	56	13.9
Cannot read and write	110	27.4	<b>Glycemic control has no role in preventing complications</b>		
Informal education can read and write	124	30.8	Agree	68	16.9
Primary school and can read and write	77	19.2	Disagree	333	82.8
Secondary school and above	91	22.6	Neither nor disagree	1	2
Marital status			<b>Diabetic spoils my social life</b>		
Married	202	50.2	Agree	135	33.6
Divorced	37	9.2	Disagree	232	57.7
Widowed	49	12.2	Neither nor disagree	35	8.7
Single	114	28.4	<b>I could prevent diabetic complications</b>		
Occupation			Agree	298	74.1
Farmer	85	21.1	Disagree	40	10
Government worker	46	11.4	Neither nor disagree	64	15.9
Merchant	104	25.9	<b>Dietary modification is important to prevent diabetic complication</b>		
Housewife	77	19.2	Agree	369	91.8
NGO worker	90	22.4	Disagree	29	7.2
Religion			Neither nor disagree	4	1
Orthodox	304	75.6	<b>Weight reduction is important to prevent diabetic complication</b>		
Muslim	68	16.9	Agree	186	46.3
Protestant	30	7.5	Disagree	104	25.9
Ethnicity			Neither nor disagree	112	27.9
Amhara	348	86.6	<b>I don't tell people as I have diabetics</b>		
Kimant	35	8.7	Agree	38	9.5
Tigrie	19	4.7	Disagree	349	86.8
Residence			Neither nor disagree	15	3.7
Rural	159	39.6	<b>Diabetes is the worst thing that have ever happened to me</b>		
Urban	243	60.4	Agree	214	53.2
Duration of DM			Disagree	173	43
(1-5)	270	67.2	Neither nor disagree	15	3.7
(6-10)	93	23.1	<b>Total attitude level</b>		
>10	39	9.7	Good attitude	262	65.2
Type of medication they use			Poor attitude	140	34.8
Oral	133	33.1			
Injectable	218	54.2			
Both	51	12.7			
Family history of DM					
Yes	118	29.4			
No	284	70.6			
Income( ETB)					
<500	156	38.8			
500-1500	68	16.9			
1501-2500	86	21.4			
>2500	92	22.9			

### Factors associated with attitude towards complications of diabetes

The residence and educational status of the respondents had a significant influence on attitude. Subjects who informal school and can read and write were 2.3 times (AOR=2.32, 95% CI=1.26, 4.27) more likely to have good attitude as compared to those who cannot read and write. Type 2 diabetic patients who attained primary school and can read and write were 4 times (AOR= 4.31, 95% CI= 2.06, 9.02) more likely to have good attitude than those who cannot read and write. Similarly, those who conquered secondary school and above were 2.8 times (AOR=2.79, 95% CI=1.41, 5.50) more likely to have good attitude than those who cannot read and write.

Patients from urban area were 1.8 times (AOR=1.80, 95% CI=1.12, 2.91) more likely to have a good attitude than those who live in a rural area (**Table 3**).

**Table 3:** Factors affecting good attitude towards DM complication among Type 2 adult DM patients at Adiss Zemen Hospital, Gondar, Ethiopia, April 2019.

\*significant at P-value $\leq$ 0.05, \*\* significant at P-value $\leq$ 0.01

**Abbreviations:** *ETB=Ethiopian Birr, DM= Diabetes mellitus, NGO= Non-governmental organizations, COR= Crude Odds Ratio, AOR= Adjusted Odds Ratio*

### Practice of type 2 diabetic patients towards complications of diabetes

Almost half of the respondents 48.8% (95% CI: 44.0, 53.5) had good practice towards diabetic complications. More than two-third of the patients 280(69.7%) reported that they never forgot to take their medication. One hundred nine (27.1%) and 179(44.5%) respondents said that they stopped their medication when they felt better and felt worse, respectively. Only about 21(5%) respondents performed exercise daily. The majority (86.6%) of them change their diet according to the recommendations of their physician. Most (80.1%) of respondents monitor their blood glucose level in hospital. One hundred fifty-one (37.6%) of respondents monitor their blood glucose level monthly. Greater than 239 (59%) of respondents reported daily feet examination. Only 48(11.9%) of respondents use hot water to wash their foot and 45.5% take care when they cut their nail. Regular kidney and eye checkup was practiced by 29.9% and 7.7% of study participants, respectively. Nearly all, 96.8% of respondents do not smoke and 188(46.8%) of the participants never drink alcohol (**Table 4**).

**Table 4:** Response distribution of practice on DM complications related questions among Type 2 adult DM patients at Adiss Zemen District Hospital, Gondar, Ethiopia, April, 2019

Variables	Attitude status		COR(95%CI)	AOR(95%CI)
	Good attitude	Poor attitude		
<b>Level of Education</b>				
Can't read and write	49	61	1	
Informal school and Can read and write	88	36	3.04(1.77,5.22)**	2.32(1.26, 4.27)**
Primary school and can read and write	60	17	4.39(2.28,8.47)**	4.31(2.06, 9.02)**
Secondary school and above	65	26	3.11(1.73,5.62)**	2.79(1.41, 5.50)**
<b>Marital status</b>				
Married	144	58	1	1
Divorced	25	12	0.84(0.40,1.78)	0.96(0.41, 2.22)
Widowed	22	27	0.33(0.17,0.62)*	0.51(0.24, 1.08)
Single	71	43	0.67(0.41,1.08)	0.41(0.22, 1.72)
<b>Occupation</b>				
Farmer	48	36	1	1
Government employee	29	17	1.25(0.60, 2.62)	1.33(0.58, 3.04)
Merchant	72	32	1.65(0.91, 3.01)	1.56(0.79, 3.06)
House wife	56	21	1.96(1.01,3.79)*	2.18(0.95, 4.49)
NGO worker	56	34	1.21(0.66, 2.22)	1.12(0.57, 2.19)
<b>Residence</b>				
Rural	87	72	1	
Urban	175	68		
<b>Duration of DM</b>				
1-5	186	84	2.13(1.40, 3.24)**	1.80(1.12,2.91)**
6-10	56	37	1	
>=10	20	19	0.68(0.41, 1.11)	0.79(0.46, 1.38)
			0.47(0.24, 0.93)*	0.55(0.25,1.25)
<b>Income(ETB)</b>				
<500	110	46	1	1
500-1500	36	32	0.47(0.26,0.85)*	0.55(0.28, 1.08)
1501-2500	50	36	0.58(0.34, 1.01)*	0.52(0.27, 1.99)
>2500	66	26	1.06(0.60, 1.88)	0.69(0.35,1.37)

<b>Variables</b>	<b>Frequencies</b>	<b>%</b>
<b>Forget to take medicine/ insulin</b>		
Yes	122	30.3
No	280	69.7
<b>Careless at times about taking medicine</b>		
Yes	114	28.4
No	288	71.6
<b>Stop taking medicine when feel better</b>		
Yes	109	27.1
No	293	72.9
<b>Stop taking medicine when feel worse</b>		
Yes	179	44.5
No	223	55.5
<b>Physical work or exercise in the last week</b>		
Never	186	46.3
Once a week	43	10.7
2-3 times per week	99	24.6
Almost daily	53	13.2
Daily	21	5.2
<b>Duration of physical work or exercise</b>		
<10Minutes/day	57	14.2
10-20Minutes/day	74	18.4
20-30Minutes/day	36	9.0
>30Minutes/day	49	12.2
<b>Diet modification according to the recommendations of physician</b>		
Yes	348	86.6
No	54	13.4
<b>Monitoring blood glucose</b>		
Self- monitoring	68	16.9
Local pharmacy	12	3.0
Hospital	322	80.1
<b>Barriers for self-blood glucose monitoring</b>		
Too expensive	128	31.8
Too painful	6	1.5
Don't know how to test	77	19.2
Other	123	30.6
<b>Frequency of blood glucose monitoring</b>		
Monthly	151	37.6
Every 2 month	165	41.0
Every 3 month	86	21.4
<b>checking feet</b>		
Never	41	10.2
Daily	239	59.5
Once a week	6	1.5
Rarely	116	28.9
<b>Drinking alcohol</b>		
Never	188	46.8
Weekly	34	8.5
2-3 times weekly	50	12.4

Nearly every day	29	7.2
Rarely	101	25.1
<b>Cigarette smoking</b>		
Yes	13	3.2
No	389	96.8
<b>Wearing footwear during exercise as recommended by health professionals</b>		
Yes	196	48.8
No	206	51.2
<b>Type of water used to wash feet</b>		
Cold water	354	88.1
Warm water but not hot	48	11.9
<b>care during cutting toe nails</b>		
Yes	183	45.5
No	219	54.5
<b>Periodic kidney examination</b>		
Yes	120	29.9
No	282	70.1
<b>Regular checkup of eye by eye specialist</b>		
Yes	31	7.7
No	371	92.3
<b>Practice level</b>		
Good practice	196	48.8
Poor practice	206	51.2

Abbreviations: DM=Diabetic mellitus

### Factors associated with practice towards complications of diabetes

Educational status was the single independent factor associated with patients practice towards diabetic complications. The odds of good practice towards prevention of complications of diabetes were two times (AOR=1.96, 95% CI=1.06, 3.61) more likely among type 2 diabetic patients who were informal school and can read and write, four times (AOR= 4.31, 95% CI= 2.06, 9.02), more likely among participants attains primary school and can read and write and two point six times (AOR=2.57, 95% CI=1.32, 5.02) more likely among who attains secondary school and above than those who cannot read and write (**Table 5**).

**Table 5:** Factors affecting good practice towards DM complication among Type 2 adult DM patients at Adiss Zemen Hospital, Gondar, Ethiopia, April, 2019.

\*significant at P-value≤0.05, \*\* significant at P-value ≤0.01

Abbreviations: DM= Diabetes mellitus, NGO= Non-governmental organizations, COR= Crude Odds Ratio, AOR= Adjusted Odds Ratio

## Discussion

Variables	Practice level		COR(95%CI)	AOR(95%CI)
	Good practice	Poor practice		
<b>Age</b>	N			
18-30	81	53	1	1
31-45	53	65	0.53(0.32,0.88)*	0.69(0.35, 1.40)
>=45	62	88	0.46(0.29,0.74)*	0.59 (0.30, 1.15)
<b>Level of education</b>				
Can't write and read	33	77	1	1
Informal school and can Read and write	67	57	2.74(1.60, 4.70)**	1.96(1.06, 3.61) *
Primary school and can read and write	38	39	2.27(1.24, 4.16)*	1.53(0.78, 3.01)
Secondary school and above	58	33	4.10(2.27, 7.40)**	2.57(1.32, 5.02)**
<b>Marital status</b>				
Married	94	108	1	
Divorced	18	19	1.09(0.54, 2.20)	1.13 (0.51, 2.52)
Widowed	16	33	0.56(0.29, 1.08)	0.99(0.46, 2.12)
Single	68	46	1.70(1.07, 2.71)	1.11(0.58, 2.13)
<b>Occupation</b>				
Farmer	38	47	1	
Government employee	12	34	0.44(0.20,.96)	0.39(0.17,1.90)
Merchant	59	45	1.62(0.91,2.89)	1.49(0.79, 2.82)
House wife	37	40	1.14(0.62,2.12)	1.33(0.68, 2.59)
NGO worker	50	40	1.55(0.85,2.81)	1.41(0.73, 2.72)
<b>Resident</b>				
Rural	63	96	1	
Urban	133	110	1.84(1.23,2.77)*	1.49(0.94, 2.37)
<b>Duration of DM</b>				
≤5	147	123	1	
6-10	36	57	0.53(0.33,0.86)*	0.65(0.38, 1.13)
≥10	13	26	0.42(0.21,0.85)*	0.57(0.26, 1.27)
<b>Level of income</b>				
<500	80	75	1	
500-1500	28	40	0.67(0.37, 1.18)	1.07(0.55, 2.08)
1501-2500	33	53	0.59(0.35, 1.01)	0.82(0.43, 1.55)
>2500	55	37	1.41(0.84, 2.38)	1.71(0.89, 3.25)

The present study discloses important information on the level of attitude and practice towards diabetes complications and its associated factors among type 2 DM patients in Ethiopia at Addis Zemen District Hospital. This study showed that over two third (65.2%) of the study participants had a good attitude level while less than half (48.8%) of study participants had a good practice on DM complications. This finding is supported by a study done in Bangladesh which reported that 66.4% of participants had a good attitude but regarding practice only 20.1% were in good practice(20), which is lower than the finding of the present study. The possible justification may be due to socio-economic and cultural differences.

Most (79.9%) of the respondents reported that they could prevent diabetic complications. This finding is in line with the finding of the same study in Bangladesh where the majority of study participants had reported that they could prevent diabetic complications(20), while in other studies it was only 52.7%, 55.6% and 62.3% in Ethiopia, India and Pakistan respectively(22,29,30). In this study, good glycemic control was assumed to prevent diabetic complications by only 16.9% of respondents. On the contrary, the study done in Bangladesh

showed that majority (66.4%) of study participant considered good glycemic control as one of the ways to prevent it(20).

This variation could be due to a lack of awareness of type 2 diabetic patients about effect of uncontrolled blood glucose levels. This in turn may be due to lack of counseling by health professional about the effect of poor glycemic control, as it is the major cause of DM complications, because of their work overload. Only 37.6% of respondents of the current study monitor their blood glucose level monthly which is lower than the finding of a study done in Bangladesh (95.8%)(20).

This difference could be due to low awareness of patients on the importance of glycemic control to prevent diabetic complications since only 16.9% of respondents believe that good glycemic control is important to prevent diabetic complication.

Most (79.9%) participants of the current study believed that regular exercise prevents further complication is in agreement with a study conducted in Bangladesh (70%)(20), and less than the study in Indies 97.3%(31).

However, only 5% respondents performed exercise on a daily basis which is comparable with the study conducted in Pakistan (8.6%)(32); but less than the study conducted in Oman (40%)(31), Indies (40.3%)(33), Bangladesh (57%)(20), and west Ethiopia(63.5%)(23). This low activity in the current study might be due to a lack of habit of exercise or a lack of commitment to do exercise by the study participants. It might also due to inappropriateness of the living environment to do exercise.

Dietary modification was considered as important to prevent diabetic complications by 91.8%. This finding is consistent with the result of a study done in Indies (95.9%)(31). Regarding practice, 86.6% of participants practiced dietary modification which is higher than compared to previous studies done in India(31), Oman(33), and west Ethiopia(23), which reported a 49.7%, 56% and 69.5% of dietary modification practice, respectively. This higher value in Ethiopia as compared to other countries could be due to the content of diet recommended by health professionals is almost similar with what they are practicing regularly. In Ethiopia, the most commonly consumed food is in Amharic 'injera (34). Injera is composed primarily from teff, the smallest grain in the world which is grown primarily in Ethiopia. It is the best choice for helping to control blood glucose(35). More than fifty nine percent of respondents reported about daily feet examination. This finding, is higher than the study done in Nigeria (40.9%)(36) and Bangladesh(20), where less than 50% of respondents reported about regular feet examination(20). On the other hand, this finding is lower than the finding of the study done in Saudi Arabia (79.5%)(21) and Pakistan (94.4%)(37). This variation could be due to a difference in culture and socioeconomic status.

Only 7.7% of the current study participants visited an eye specialist. The same finding is reported in Pakistan (10%)(32). This could be due to lack of awareness about eye complication or due to absence of an eye specialist at the diabetic center, since the research was conducted at district hospital which is known that there is a lack of specialists.

The current study revealed that 29.9% of the study participants have periodical kidney examination which is lower than the study conducted in Bangladesh (64%)(20). This may due to lack of a laboratory facility for real examination or lack of awareness about diabetic complications.

The present study showed that educational status was significantly associated with a good attitude. This finding is supported by other study(20,38) Subjects who can read and write, primary school, and secondary school and above were 2, 4.3 and 2.8 times more likely to have a good attitude than who cannot read and write, respectively. This could be explained by type 2 diabetic patients who are educated has a higher chance of accessing and reading different materials like leaflets, manuals and books and can communicate with health care professionals with no barrier. This in turn helps them to gather information and improve their attitude towards DM complications.

Residence was also found to be significantly associated with a good attitude. Those who were from urban areas had nearly two times a good attitude than those who lived in rural areas. It is consistent with other study(38). This might be due to a difference in an access to information. In urban areas there are different ways of accessing information like television, internet and other technology Medias which are not available in rural areas. In addition, in Ethiopia setup health facilities are mostly located in urban areas, which create a good opportunity for DM patients to have frequent visits and contact with health professionals. This helps patients to have more information about DM complications and to improve their attitude.

Educational status was found to be significantly associated with practice. This is supported by other studies(18,20,23,30,39). Patients who can read and write and high school and above were 2 and 2.6 times more likely to have a good practice for prevention of diabetic complication than those who cannot read and write, respectively. This might be because educated participants are able to read necessary information easily from different written documents; this in turn helps them to improve their level of practice. As the level of education increases, the chance of attending different conferences and seminars on DM also increases. This helps patients to increase their awareness and to improve their practice.

## **Limitations**

Since the data about attitude and practice of DM complications were self-reported, there may be recall bias and they may respond only socially acceptable responses that may cause an overestimation of some results. Additionally, the study was conducted on all type 2 diabetic patients without considering their diabetic complication history status and complication status during data collection period which affect their attitude and practice level positively or negatively.

## **Conclusions**

A greater proportion of DM patients has relatively good attitude but poor practice. Educational status was significantly associated with both good attitude and practice, whereas residence was significant contributing factors for only a good attitude. The current study suggests the need of well-organized health educational programs and counseling on complications of diabetes at a regular basis to improve their attitude and practice towards it.

## **List Of Abbreviations**

DM: Diabetic Mellitus, NGO: Non-governmental Organization, AOR: adjusted odds ratio; CI: Confidence interval; COR: crude odds ratio; SPSS: Statistical package for social sciences; IDF: International Diabetic Federation

# Declarations

## Ethics approval and consent to participate

Ethical approval for the study was obtained from the Institute of Public Health College of Medicine and Health Sciences, University of Gondar. Written informed consent was obtained from all study participants and confidentiality was kept. All the study subjects had answered voluntarily and confidently the administered pre-tested questionnaires.

## Consent for publication

Not applicable

## Availability of data and materials

The data will be available upon request from the corresponding author upon request.

## Competing interests

None of the authors have any conflicts of interest to declare.

## Funding

Not applicable

## Authors' contributions

YB designs the study, performed data analysis and drafted the manuscript. <sup>1</sup>YA involved with designing the study, data analysis, and reviewed the manuscript. <sup>2</sup>YA participated with data analysis, designing the study and reviewed the manuscript. All authors read and approved the final manuscript.

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