

## Assessment of Diabetes Knowledge and its Associated Factors among Type 2 Diabetic Patients in Mekelle and Ayder Referral Hospitals, Ethiopia

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### Abstract

**Background:** Poor patient understanding of diabetes is believed to impede appropriate self-care management, thus accelerating cardiovascular complications, stroke, and kidney failure.

**Objective:** To assess diabetes knowledge level and associated factors among type 2 diabetic patients in Mekelle hospital and Ayder referral hospitals, Mekelle City, Tigray, Northern Ethiopia.

**Method:** Institutional based cross sectional method was used and 310 study subjects was selected using systematic random sampling technique and the data was collected using interviewer administered structured questionnaire. Scoring method was employed to classify respondents' knowledge level.

**Result:** A total of 310 male and female adult type 2 diabetic patients were interviewed from the total of about 1000 diabetes patients who have regular follow up in the hospitals using standardized structured questionnaire and the response rate was 96.8%. This study analyzed respondents' diabetes knowledge level and of the total only 44.0% of the respondents scored 'good' on the total diabetes knowledge questions. This result showed that there was significant association between diabetes family history and diabetes knowledge level [ $P < 0.025$ , AOR (95% CI) = 1.860 (1.077-3.209)].

**Conclusion:** Despite the important role of diabetes knowledge were recognized to be useful and effective in achieving diabetes control and preventing its serious complication, findings of this study confirm previous findings concerning the diabetes knowledge level. Generally diabetes knowledge level was suboptimal among type 2 diabetic patients in Ayder referral hospital endocrinology and Mekelle hospital chronic care unit.

**Keywords:** Type 2 diabetic patients; Diabetes knowledge; Diabetes management

### Introduction

Diabetes is a general term for a group of metabolic disorders that affect the body's ability to process and use sugar (glucose) for energy. The prevalence of diabetes has reached epidemic proportions. World Health Organization predicts that developing countries will bear the brunt of this epidemic in the 21<sup>st</sup> century. According to International Diabetes Federation (IDF) diabetes Atlas, 5<sup>th</sup> edition 2012 report, currently; more than 80% of people with diabetes live in Low and Middle Income Countries. An estimated 366 million people were living with diabetes in 2011. The number is expected to grow to 552 million by 2030 and the largest age group currently affected by diabetes is between 40-59 years. The global prevalence of diabetes is 8.3%. However, the African region is expected to experience the highest increase in coming years with estimated increase in prevalence rates of 98% for sub-Saharan Africa, and 94% for North Africa and the Middle East [1-4].

The IDF Atlas 5<sup>th</sup> edition 2012 report revealed that in 2011, 14.7 million adults in the Africa region are estimated to have diabetes, with a regional prevalence of 3.8%. This would rise to 28 million by 2030

with prevalence of 4.3%, an increase of 80%, as such exceeding the predicted worldwide increase of 55%. Type 2 diabetes is responsible for 85-95% of all diabetes in high-income countries but Type 2 diabetes accounts for well over 90% of diabetes in Sub-Saharan Africa even in other low- and middle-income countries and population prevalence proportions ranged from 1% in rural Uganda to 12% in urban Kenya. Based on the IDF Atlas 5<sup>th</sup> edition, 2012 report number of cases of diabetes in Ethiopia to be estimated about 1.4 million in 2011 [5,6].

The greatest weapon in the fight against diabetes mellitus is knowledge. Information can help people assess their risk of diabetes, motivate them to seek proper treatment and care, and inspire them to take charge of their disease for their lifetime. In view of the increasingly high incidence of complications in diabetic patients, it would be valid to assess the perception of the primary healthcare patient of his or her actual disease state and the problems that may arise. Proper management requires life style changes and adequate Diabetes Knowledge of which is considered a key component of diabetes management. Differences in knowledge level have been described depending on level of education, gender and social classes. Assessment of the level of knowledge on diabetes among persons with diabetes can assist in targeting public health efforts to reduce diabetes related complications [5,7-9].

Today's nurse is faced with challenges of providing high quality evidence-based care to clients/patients in traditional as well as new innovative health care settings for both acute and chronic illnesses. A situation where diabetes patients visit clinics regularly and their blood glucose levels still remain high despite the treatment they receive is a problem that calls for attention. This is a very common observation in many diabetes patients. Sometimes, slight symptoms that these patients could take care of at home bring them back to the hospitals for medical checks. A good number of them, however, report to the hospital with severe complications, like gangrene that may lead to amputation and possible premature death, this might be because of lack of appropriate self care practices [10,11].

Furthermore, although the studies cited above have begun to illuminate our understanding of some of the predictors of differences in diabetes self-care, we currently lack an in-depth understanding or information of diabetes knowledge level and associated factors of type 2 diabetes patients especially this is more obviously true in Ethiopia, Mekelle Hospital and Ayder referral hospital. The major problematic condition about diabetes knowledge status is that there are limited research findings on patients who are found in sub Saharan Africa especially in Ethiopia, even there is no enough published material and little research is done. So the aim of this study was to assess knowledge level to diabetes and its associated factors in patients with type 2 diabetes who have follow up in Mekelle Hospital and Ayder referral hospital diabetes clinic, Mekelle City.

## Methods and Materials

### Study setting, period and design

Study area was Mekelle City it has two governmental and three private hospitals. Ayder referral hospital was commenced its function in 2007 with 500 beds. The hospital is one of the major referral & teaching hospital found in the region and the serves gives for patients from every corner of the region, some area of Afar and Amara regions with total annual flow of 32,000 patients. The second one is Mekelle Hospital, a Regional hospital for the area, that serve as a referral and teaching hospital, which was established in 1954 E.C with 162 beds and the total annual flow of 4276 patient. The study period was from Sep. 2012 to July 2013. The study design was institutional based cross-sectional study design.

### Source population, study population and eligibility criteria

The source population was all patients who visit the diabetes clinic of the hospitals during the study period. The study population was all Type 2 diabetic patients who visit the hospitals' diabetes clinic at the time of data collection period and fulfilling the inclusion criteria. Study subjects included in this study were those who were with age of greater than 18 years, diagnosed with type 2 diabetic and made follow up for at least one month. Study subjects excluded from this study were those who were unable to answer the questions because of impaired cognitive status.

### Sample size determination and sampling procedures

The final sample size for this study was 310. Proportion allocation was employed to allocate the sample size among the two hospitals. Systematic random sampling technique was utilized for this study.

## Data collection procedure and tool

Data was collected using standardized structured questionnaire and three diploma completed Nurses with previous experience of data collection and multi lingual ability were recruited. Continuous follow up and supervision were made by the supervisors and principal investigators throughout the data collection period. Data collection was accomplished within twelve weeks duration (April 1<sup>st</sup> week to July, 2013). Interviewer administered structured questionnaire data collection tool was used, it contains four parts, Part I was used to collect socio demographic data, part II was used to collect clinical status data of the study subjects, part III is DKQ (Diabetes Knowledge Questionnaire) which was used to measure the patients knowledge to diabetes. The DKQ was adopted contextually [12].

## Data quality assurance, entry and analysis

To assure data quality, training and orientation was given for the data collectors by the principal investigators and the questionnaire was pre-tested prior to the actual data collection on 10 respondents outside study area and the respondents were excluded from the actual study. The questionnaire was initially prepared in English and then translated in to Tigrigna version. The Tigrigna version was again translated back to English to check for consistency of meaning. However since the dominant ethnic group is Tigrian with Tigrigna language then the study subjects was interviewed with Tigrigna version questionnaire. Moreover questionnaire was pre-tested and necessary corrections and amendment was considered. The collected data was reviewed and checked for completeness and consistency by principal investigators on daily bases at the spot during the data collection time. The data was recorded, cleaned and analyzed using Statistical package for social sciences (SPSS) version 16 software statistical packages. Frequencies and proportions were used to describe the study population in relation to relevant variables. Logistic regression was computed to assess statistical association via calculating Crude Odds and Adjusted odds ratio to see the influence of independent variables on dependent variables, and significance of statistical association was assured or tested using 95% confidence interval and P-value (<0.05). Independent variables were Socio-demographic characteristics and Clinical or disease state and dependent variables were Diabetes knowledge level of the patients.

## Ethical consideration and operational definition

Ethical clearance was secured from the Mekelle University, college of health science research review committee. Official letter of permissions was obtained from Tigray regional health Beaura, Ayder referral Hospital and Mekelle hospital medical director offices and respondents were well informed about the purpose of the study, then information was collected after written consent from each participant was obtained. Information was recorded anonymously and confidentiality and beneficence were assured throughout the study period.

## Results

### Socio-demographic characteristics of the respondents

Of all respondents 173(57.7%) and 127(42.3%) were Male and Female respectively. The majority of the study participants 207(69%) were in the age group of 40 to 69 years. From the total respondents one hundred three (34.3%) were unemployed and majority of the

study participants 171(57%) were had very low monthly income (Table 1).

Sr. No	Variable	Category	Frequency	
			NO	%
1	Gender	Female	127	42.3
		Male	173	57.7
2	Age <sup>a</sup>	25-39 years	75	25.0
		40-54years	110	36.7
		55-69 years	97	32.3
		70-84years	18	6.0
3	Monthly income <sup>b</sup>	Very low	171	57.0
		Low	66	22.0
		Average	41	13.7
		Above average	22	7.3
4	Ethnicity	Tigrrian	286	95.3
		Amara	14	4.7
5	Educational Level	Illiterate	140	46.7
		Elementary	80	26.7
		High school	37	12.3
		College university	43	14.3
6	Marital Status	Married	220	73.3
		Divorced	10	3.3
		Widowed	7	2.3
		Single/never married	63	21.0
7	Occupation	Employed	87	29.0
		un employed	103	34.3
		Merchant	14	4.7
		House servant	70	23.3
		Daily laborer	26	8.7
8	Religion	Orthodox Christian	264	88.0
		Muslim	36	12.0

**Table 1:** Socio demographic data of the respondents study done in Ayder referral and Mekelle hospitals, 2012/13 (N=300)

<sup>a</sup>Age category was adopted from research article ( study done in Africa) [19]

<sup>b</sup>Monthly income category: Very Low <445 Birr, Low=446-1200 Birr, Average=1201-2500 Birr, Above Average=2501-3500 Birr and High >3501 Birr (Based on the Ethiopian Civil service monthly salary for civil servants)

### Health status data

The mean age in which diabetic disease occurred was 44.53 with SD of  $\pm 11.07$  years [(95% CI) (33.46-55.60)] with minimum age of 27 and maximum age of 69. The mean duration of diabetes was 5.63 with SD of  $\pm 7.6$  years with minimum of 1 year and maximum of 33 years. More than half respondents 176 (58.7%) had multiple injection treatment (two injections per day). Of all respondents 124(41.3%) had oral hypoglycemic agent. Two hundred thirty two (77.3%) of the respondents did not have family history of diabetes and only 44 (14.7%) respondents had glucometre at home. Of all respondents, only 38 (12.7%) had long term diabetic complication confirmed medically. Almost more than half of the respondents 168 (56%) had poor knowledge about diabetes mellitus [13-19] (Table 2).

Sr. No	Variable	Category	Frequency	
			NO	%
1	Age in which diabetes mellitus (DM) start	25-39 years	114	38.0
		40-54 years	122	40.7
		55-69 years	64	21.3
2	Duration of DM	less than 5 years	207	69.0
		6-10 years	59	19.7
		11 and above years	34	11.3
3	Family History of DM	No	232	77.3
		Yes	68	22.7
4	Treatment intensity	Oral hypoglycemic agent	124	41.3
		Insulin therapy	176	58.7
5	Currently do you have glucometry at home	No	256	85.3
		Yes	44	14.7
6	Diabetes Complication	No	262	87.3
		Yes	38	12.7
7	Diabetes knowledge level	Poor Knowledge	168	56.0
		Good knowledge	132	44.0

**Table 2:** Health status and diabetes knowledge data of respondents study done in Ayder referral and Mekelle hospitals, 2012/13 (N=300)

### Diabetes knowledge level of respondents versus socio demographic and health related data

Of the total only 132 (44.0%) of the respondents scored 'good' on the total diabetes knowledge questions. There was association between monthly income (P=0.001), education (P<0.001) and occupation (P=0.02) with diabetes knowledge level but there was significant association with diabetes family history which means those respondents with diabetes family history were twice the chance of scoring good diabetes knowledge as compared with those without [P<0.025, AOR (95% CI)=1.860 (1.077-3.209)], while no significant associations were found between diabetes knowledge and the

respondents' other demographic and diabetes-related characteristics (Table 3,4).

Factor	Diabetes knowledge level		COR	CI of 95%	AOR	CI of 95%
	Poor	Good				
	No. (%)	No. (%)				
<b>Gender P-value= 0.362</b>						
Female	75(25.0)	52(17.3)	1			
Male	93 (31.0)	80(26.7)	1.241	(0.781-1.971)		
<b>Total</b>	<b>168(56.0)</b>	<b>132(44.0)</b>				
<b>Age P-value=0.740</b>						
25-39years	45 (15.0)	30 (10.0)	2.333	(0.700-7.773)	1.735	(0.469-6.414)
40-54years	57(19.0)	53(17.7)	3.254	(1.008-10.511)*	2.382	(0.692-8.196)
55-69 years	52(17.3)	45(15.0)	3.029	(0.930-9.864)	2.934	(0.878-9.801)
70-84years	14(4.7)	4(1.3)	1		1	
<b>Total</b>	<b>168(56.0)</b>	<b>132(44.0)</b>				
<b>Monthly income P-Value=0.001</b>						
Very low	111(37.0)	60(20.0)	1		0.793	(0.242-2.599)
Low	32(10.7)	34(11.3)	1.966	(1.105-3.496)*	1.277	(0.394-4.143)
Average	15(5.0)	26(8.7)	3.207	(1.578-6.515)*	1.515	(0.510-4.501)
Above average	10(3.3)	12(4.0)	2.22	(0.906-5.439)	1	
<b>Total</b>	<b>168(56.0)</b>	<b>132(44.0)</b>				
<b>Level of education P-Value&lt;0.001</b>						
Illiterate	92(30.7)	48(16.0)	1		0.424	(0.143-1.256)
Elementary	42(14.0)	38(12.7)	1.734	(0.990-3.038)	0.608	(0.218-1.695)
High school	19(6.3)	18(6.0)	1.816	(0.872-3.779)*	0.612	(0.215-1.745)
College university	15(5.0)	28(9.3)	3.578	(1.746-7.333)*	1	
<b>Total</b>	<b>168(56.0)</b>	<b>132(44.0)</b>				
<b>Marital status P-Value=0.725</b>						
Married	121(40.3)	99(33.0)	1.091	(0.620-1.920)		
Divorced	7(2.3)	3(1.0)	0.571	(0.135-2.416)		

Widowed	4(1.3)	3(1.0)	1	(0.206-4.845)		
Single/never married	36(12.0)	27(9.0)	1			
<b>Total</b>	<b>168(56.0)</b>	<b>132(44.0)</b>				
<b>Occupation: P-Value=0.002</b>						
Employed	38(12.7)	49(16.3)	3.5	(1.334-9.183)*	1.536	(0.485-4.858)
un employed	59(19.7)	44(14.7)	2.024	(0.782-5.236)	1.803	(0.682-4.767)
Merchant	6(2.0)	8(2.7)	3.619	(0.921-14.214)	1.633	(0.337-7.906)
House servant	46(15.3)	24(8.0)	1.416	(0.522-3.839)	1.261	(0.426-3.731)
Daily laborer	19(6.3)	7(2.3)	1		1	
<b>Total</b>	<b>168(56.0)</b>	<b>132(44.0)</b>				

**Table 3:** Logistic Regression Analysis result of Diabetes knowledge level among Type 2 diabetes study subjects in Mekelle & Ayder hospital, Ethiopia 2012/13, (N=300)

\*\*Statistically associated Variable, P=<0.05, COR: Crude odds Ratio; AOR: Adjusted Odds Ratio

\*Variable were showed Statistical Association in COR but lost during AOR Analysis, NB: P-Value is, Value of COR analysis result

Variables	Diabetes knowledge level		COR	CI of 95%	AOR	CI of 95%
	Poor	Good				
	No. (%)	No. (%)				
<b>Age in which diabetes started P-value=0.757</b>						
25-39years	66(22.0)	48(16.0)	1.212	(0.647-2.271)		
40-54years	62(20.7)	60(20.0)	1.613	(0.869-2.993)		
55-69 years	40(13.3)	24(8.0)	1			
<b>Total</b>	<b>168(56.0)</b>	<b>132(44.0)</b>				
<b>Duration of diabetes P-Value=0.244</b>						
less than 5 years	110(36.7)	97(32.3)	1.26	(0.604-2.629)		
6-10 years	38(12.7)	21(7.0)	0.789	(0.332-1.877)		
11 and above years	20(6.7)	14(4.7)	1			
<b>Total</b>	<b>168(56.0)</b>	<b>132(44.0)</b>				
<b>Family History of diabetes P-Value=0.025</b>						

No	138(46.0)	94(31.3)	1		1	
Yes	30(10.0)	38(12.7)	1.86	(1.077-3.209)	1.86	(1.077-3.209)**
<b>Total</b>	<b>168(56.0)</b>	<b>132(44.0)</b>				
<b>Treatment intensity P-Value=0.565</b>						
Oral hypoglycemic agent	67(22.3)	57(19.0)	1.146	(0.721-1.820)		
Insulin therapy	101(33.7)	75(25.0)	1			
<b>Total</b>	<b>168(56.0)</b>	<b>132(44.0)</b>				
<b>Presence of glucometry P-Value=0.012</b>						
No	151(50.3)	105(35.0)	1			
Yes	17(5.7)	27(9.0)	2.284	(1.185-4.401)		
<b>Total</b>	<b>168(56.0)</b>	<b>132(44.0)</b>				
<b>Diabetes Complication P-Value=0.426</b>						
No	149(49.7)	113(37.7)	1.319	(0.667-2.606)		
Yes	19(6.3)	19(6.3)	1			
<b>Total</b>	<b>168(56.0)</b>	<b>132(44.0)</b>				

**Table 4:** Logistic Regression Analysis result of Diabetes knowledge level among Type 2 diabetes study subjects in Mekelle & Ayder hospital, Ethiopia 2012/13, (N=300)

\*\*Statistically associated Variable,  $P < 0.05$ , COR: Crud odds Ratio; AOR: Adjusted Odds Ratio

\*Variable were showed Statistical Association in COR but lost during AOR Analysis, NB: P-Value is, Value of COR analysis result

## Discussion

In Ethiopia, there is limited information about the diabetes knowledge of patients with type 2 diabetes mellitus. Thus this study has tried to assess the diabetes knowledge level and associated factors among type 2 diabetes patients in Ayder referral Hospital endocrinology unit and Mekelle Hospital chronic care unit, Mekelle City, Ethiopia. In this study 94.0% respondents were found to be in the age group of 25 to 69 years and 6.0% of the respondents were in the age group of 70-84 years. Similarly study done in Ethiopia (Tikur Anbesa specialized hospital), Egypt showed that 73% , 66% respondents were in the age group of 30-60 years and 28%, 44% of respondents were 61 and above years respectively [20-31].

Diabetes outcome depends mainly on the patient' sound knowledge of self-care and the disease that is dependent upon their knowledge of the disease, including health-related behaviour and care-seeking which are guided and determined by individually and culturally defined

beliefs about health, illness and health-care. It is reported that patients with low diabetes knowledge levels are least likely to comply with diabetes management and instructions from health-care professionals. As far as we know, this is the first study investigating diabetes knowledge using a validated instrument among diabetes patients who have follow-up in Ayder referral hospital and Mekelle hospital. Overall, 96.0% of the respondents correctly answered the Diabetes knowledge questionnaire. In this study of adults with diabetes mellitus and having different types of treatment, the results showed that lower than half of 132 (44.0%) respondents had good knowledge about diabetes this showed that the present study results were lower than study finding done in U.A.E 69% and higher than study done in Zimbabwe 20.7% [32-39].

A study done in Ethiopia revealed that 93.7% of the respondents had general knowledge about diabetes. Multiple logistic-regression analyses were used to estimate the independent associations between poor knowledge and socio-demographic variables and diabetes-related characteristics accordingly no significant differences were detected in respondents' diabetes' knowledge with one exception which is reporting family history of diabetes was significantly associated with knowledge [ $P < 0.025$ , AOR (95% CI)=1.860 (1.077-3.209)], but significant association was obtained between respondents' age, monthly income, level of education and occupation and level of diabetes knowledge and lost during covariant analysis. Similarly a study done in China revealed that there was significant association of respondents' education level and family history of diabetes with diabetes knowledge and studies done in U.A.E and Zimbabwe indicated that there was significant association of respondents' attitude, diabetes complication and gender with their knowledge level ( $r = 0.320$ ,  $p < 0.001$  and  $r = 0.270$ ,  $p < 0.001$ ) and (OR= 3.5; 95% CI 1.2-10.6,  $p = 0.028$ ,  $b = 1.250$ ) [20,30,33,40-49] respectively.

## Conclusion

Despite the important role of diabetes knowledge in the management of diabetes were recognized to be useful and effective in achieving diabetes control and preventing its serious complication, findings of this study confirm previous findings concerning diabetes knowledge level among people living with type 2 diabetes: More than half number of the respondents score poor knowledge on diabetes and this were more problematic and This result also showed that there was significant association between diabetes family history and diabetes knowledge level. Generally diabetes knowledge level was sub-optimal among type 2 diabetic patients in Ayder referral hospital endocrinology and Mekelle hospital chronic care unit.

## Competing Interests

In this manuscript there is no any competing interest declaration from anybody or organization about finance, and non financial competing interests such as political, personal, religious, ideological, academic, intellectual, commercial or any other.

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