Assessment of Self Care Management and its Associated Factors among Type 2 Diabetes Patients in Mekelle Hospital and Ayder Referral Hospitals, Mekelle City, Tigray, Northern Ethiopia, 2012/13

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Objective: Was to assess self-management and its associated factors among type 2 diabetes patients in Mekelle hospital and Ayder referral hospitals, Mekelle City, Tigray, Northern Ethiopia, 2012/13.

Method: The research design was institutional based cross sectional method and 343 study subjects were selected using systematic random sampling technique and the data was collected using interviewer administered structured questionnaire, data was analyzed and cleaned using SPSS version 16. Frequencies and proportions were computed. Bivariate and Multivariate logistic regression was computed to assess statistical association between the outcome variable and selected independent variables and significance of statistical association was assured or tested using 95%CI and P-value (<0.05).

Keywords: type 2 diabetic patients, diabetes manage-ment, physical exercise & anti diabetes agent.

GJMR-F Classification: NLMC Code: WD 200

ASSESSMENTOFSELFCAREMANAGEMENTANDITSASSOCIATEDFACTORSAMONGTYPE2DIABETESPATIENTSINMEKELLEHOSPITALANDAYDERREFERRALHOSPITALSMEKELLECITYTIGRAYNORTHERNETHI

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Result: A total of 310 male and female adult type 2 diabetes patients were interviewed using standardized structured questionnaire and the response rate was 96.8 %. Of all respondents 57.7% were Male. The majority of the respondents 69% were in the age group of 40 to 69 years. Mean age of patients was 50.02 ± 12.01 years. The mean age in which diabetic disease occurred was 44.53 ± 11.07 years. The mean duration of diabetes was 5.63 ± 7.6 years. More than half respondents 58.7% had multiple injection treatment (two injections per day). Of all respondents only 12.7% had long term diabetic complication confirmed medically.

The majority 86.0% of the study participants were not adhered to Self-Monitoring of Blood Glucose. Those who have glucometer at home were eleven times less risk not to be adhered to the practice when compared with those who didn't have [$P<0.001$, AOR (95% CI) = 10.722 (4.095-28.075)] and those who are with monthly income of above average were adhered nigh times more than counterpart [$P<0.001$, AOR (95% CI) = 9.036(1.742-46.879)]. A total of 83.7% respondents were adhered with prescribed anti-diabetic drugs and there was significant association between prescribed medication adherence condition and monthly income[$P=0.015$, AOR (95% CI) = 2.761(1.106-6.892)].

From the total respondents 74.0% were reported adhered to physical activity that meet the recommended guidelines and those who were emplyment and age had statistically significant association with their adherence condition to physical activity [$P=0.001$, AOR(95% CI)= 4.349(1.191-15.884) and [$P=0.453$, AOR(95%CI)= 0.375 (0.150-0.940)] respectively. Of all respondents 51.3% were adhered to the recommended diabetic foot care practices and Education, marital status and monthly income were found to have statistically significant association with adherence to diabetic foot care practices [$P=<0.001$,AOR (95% CI) =10.525 (1.256-3.297)] and [$P=<0.001$, AOR (95% CI) =2.101 (1.060-4.165)] respectively. Over all Self-care management were reported adhered in 51.0%respondents. Education level, Marital status and diabetes complication were found to have statistically significant association with adherence level to overall diabetes self-care management [$P<0.001$, AOR (95% CI) = 4.194 (1.213- 14.510), [$P<0.001$, AOR (95%CI) = 0.343(0.162-0.726)] and [$P=<0.004$, AOR (95% CI) = 2.860 (1.109-7.375)]

Conclusion: Generally adherence to self-care management was suboptimal among type 2 diabetic patients in Ayder referral hospital endocrinology and Mekelle hospital chronic care unit.

Keywords: type 2 diabetic patients, diabetes management, physical exercise & anti diabetes agent.

I. 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 three most common forms of diabetes are type 1diabetes, type 2 diabetes, and gestational diabetes. Type 2 diabetes mellitus comprises an array of dysfunctions resulting from the combination of resistance to insulin action and inadequate insulin secretion. It is characterized by hyperglycemia and associated with micro vascular (i.e., retinal, renal, possibly neuropathic), macro vascular (i.e., coronary, peripheral vascular), and

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neuropathic (i.e., autonomic, peripheral) complications (1, 2).

The prevalence of diabetes has reached epidemic proportions. World Health Organization predicts that developing countries will bear the brunt of this epidemic in the 21st century. According to IDF diabetes Atlas, 5th 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. By 2030 this "record" is expected to move to the 60-79 age groups with some 196 million cases. While the global prevalence of diabetes is 8.3%, the prevalence varies from 10% in the Western Pacific to 4% in the African region. 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 (1,3,4).

The IDF Atlas 5th edition 2012 report (ARF) revealed that in 2011, 14.7 million adults in the Africa Region are estimated to have diabetes, with a regional prevalence of 3.8%. The top six countries with the highest number of people with diabetes make up just over half of the total number in the region. 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 5th edition, 2012 report number of cases of diabetes in Ethiopia to be estimated about 1.4 million in 2011.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 (5,6,7,8).

When it is not prevented and properly managed diabetes is one of the major causes of premature illness and death worldwide. Non- communicable diseases including diabetes account for 60% of all deaths worldwide and more than 80% of diabetes deaths occur in low- and middle-income countries According to IDF Atlas 5th edition 2012 report Diabetes caused 4.6 million deaths in 2011 globally. World Health Organization projects that diabetes deaths will double between 2005 and 2030 (9).

Statistics for medical complications from diabetes are also concerning. Proportions of patients with diabetic complications in sub Saharan region ranged from 7-63% for retinopathy, 27-66% for neuropathy, and 10-83% for nephropathy. Diabetes is likely to increase the risk of several important infections in the region, including tuberculosis, pneumonia and sepsis.

Assessment of the level self-care management among persons with diabetes can assist in targeting public health efforts to reduce complications. and Self-care practices are believed to play an important role in diabetes management this is because ,there is a significant link between blood glucose control using self-care practices and the later development of diabetes complications and with improved glycemic control the patient could decrease the risk of these complications (5) So the aim of this study was to assess diabetes self-care management and the influence of demographic characteristics and clinical status on their self-care management in patients with type 2 diabetes attending in Mekelle Hospital and Ayder referral hospital diabetes clinic, Mekelle City.

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. Diabetes being a chronic illness requires continues self care practices by sufferers so that they can contribute meaningfully in the management of their lives. An essential ingredient that has been missing from the health care delivery system in Ethiopia is the lack of diabetes self care knowledge by the diabetic patients. Diabetes self care knowledge is considered an essential part of clinical management: simply prescribing the correct amount of insulin and oral agents and drawing up meal plan is not always enough to meet blood glucose targets. Poor patient understanding of diabetes is believed to impede appropriate self-care management, thus accelerating cardiovascular complications, stroke, and kidney failure.

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, as

cited by Okolie, V. Uchenna and Ehiemere, O. Ijeoma et al. The Behavioral Risk Factor Surveillance System for North Carolina revealed that 83% of respondents with type 2 diabetes mellitus performed blood glucose monitoring and more than 93% had visited a health care provider for diabetes care in the past year. Other researchers have suggested that self-care activities vary extensively according to the nature of the activity itself, with taking of medication often occurring as recommended and exercise frequently falling below recommended levels. For example, results from one study showed that 97% of respondents with diabetes always or usually took their medication, whereas only 41% always or usually exercised, as cited by Nancy E. Schoenberg (10,11).

Because of the importance of self-care activities to achieve and maintain desirable blood glucose levels or glycemic control, researchers increasingly have begun to investigate correlates of perceived barriers to type 2 diabetes self-care behaviors. For example study found that the following personal characteristics were associated with problems in type 2 diabetes mellitus self-care: lower education and socioeconomic status, higher level of depression, male gender, being unmarried and younger age (30-49 years old). However, although it is useful to identify general characteristics that relate to poor self-care behaviors, it may be of greater utility from a public health perspective to identify and understand inconsistent self care practices and associated factors of diabetes patients, as cited by Nancy E. Schoenberg (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 level and associated factors of type 2 diabetes patients to ward diabetes self-care practices especially this is more obviously true in Ethiopia, Mekelle Hospital and Ayder referral hospital. To promote optimal self-care practices, it is important to understand the level to which adults with type 2 diabetes mellitus integrate self-care recommendations into their lives as well as its associated factors and their knowledge status. The major problematic condition about diabetes self care practices and their 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. To address these deficits, this research explores patients' diabetes self-care management status and its associated factors in Mekelle Hospital and Ayder referral hospital diabetes clinic, Mekelle City.

II. Methodology

a) Study area and period

Mekelle, the capital city ofTigray Region and the largest city in northern Ethiopia.It is located approximately 780 km from the capital, Addis Ababa. It has two governmental and three privet hospitals. Ayder referral hospital is the only University Hospital in Mekelle, Tigray region which was established in 2000 E.C 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 & 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 1954E.C with 162 beds and the total annual flow of 4276 patient. The two governmental hospitals are chosen to the study because the patient flow is significant and both serve to the region as referral and teaching hospital beside to this those hospitals are hospitals with a facility or clinic that serve as follow up clinic for all diabetes patients came from every corner of the region including from neighboring Afar and Amara regions. The study period will be from Sep. 2012 to July 2013.

b) Study design

The study design was institutional based cross-sectional study design.

c) Source population

The source population was all patients who visit the diabetes clinic of the hospitals during the study period (April 1st week to May 2nd week, 2013).

d) Study population

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.

e) Inclusion criteria

Study subjects included in this study were those who full fill the following inclusion criteria

1. Age greater than 18 years.
2. Diagnosed with type 2 diabetes and made follow up for at least one months and consented.

f) Exclusion criteria

Study subjects excluded from this study were those who full fill the following exclusion criteria, they are those who

1. Were unable to answer the questions because of altered mental state or mentally unstable
2. Diagnosed as type 1 and gestational diabetics.

g) Sample size determination

The sample size for the study was determined using the following assumptions and single population

proportion formula: where Z^2. Standard normal score at 95%confidence interval = 1.96, d = degree of accuracy or margin of error 0.02 to get maximum sample size., n_o - Sample size desired (initial), n_f - Final sample size, N = Estimated annual patients flow of type II diabetes in the two hospitals: 750, P = 5.0%, which is population proportion prevalence of diabetic in Ethiopia(urban), So initial sample size was calculated as follow. n_o = $(1.96)^2$ *0.05*0.95/ $(0.02)^2$ = 456. Since the total population was less than 10,000, correction formula was used to determine The final sample size, as a result the final sample size was 285, Thus by adding 10 % for possible non-response rate, a total sample size of 310 was obtained. Proportion allocation was employed to allocate the sample size among the two hospitals.

h) Sampling procedure

Systematic random sampling technique was utilized for this study. K value was calculated as K= nf/N, where nf = final sample size = 310 and N = total Number of type 2 diabetes patients who are attending the units per week=25. Xo total number of days use for data collection = 48, Ko= nf/Xo 310/48 = 6 and K = N/ko 12/6 = 2. So using the K value, patients was selected using patient registration number in every 2 number intervals and the first study subject was selected by lottery method and averagely 26 study subjects was interviewed weekly.

i) Data collection procedure

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. 1st week to July, 2013).

j) Data collection Tool

Interviewer administered structured questionnaire data collection tool was used, it contains three 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 the original SDSCA, which was used to measure five areas or domains of diabetes self-care practices: diet, exercise, medication, and self-blood glucose monitoring. Beside to this the revised SDSCA also it contain items on foot care and smoking. SDSCA questionnaires will be adopted contextually(48).

k) Study variables

i. Independent variables

Socio-demographic characteristics: Age, Religion, Marital status, education level, Sex, monthly income, ethnicity, and occupation.

Clinical or disease state: Age of diabetes onset, Duration of the disease, Family history of diabetes, Complications of diabetes, Treatment intensity

ii. Dependent Variable

The outcome variables of the study was self-care managements (Self glucose monitoring, physical exercise, diet management, foot care and overall diabetes self-care management)

l) Pre-test

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.

m) Data quality assurance

To assure data quality, training and orientation was given for the data collectors by the principal investigators. 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.

n) Data entry and analysis

The data was recorded, cleaned and analyzed using 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 Odds ratio, and significance of statistical association was assured or tested using 95% confidence interval and P-value (<0.05). Bivariate and Multivariate analysis were employed to examine the relationship or statistical association between the outcome variable and selected independent variables. Results were presented using tables, figures and texts.

o) Ethical consideration

Ethical clearance was secured from the Mekelle University, college of health science IRB (research committee). Official letter of permissions was obtained from Tigray regional health Bureau, Ayder referral Hospital and Mekelle hospital medical director office and respondents ware well informed about the purpose of the study, then information was collected after written consent from each participant obtained. Respondents were allowed to refuse or discontinue participation at any time they want. Information was recorded anonymously and confidentiality and beneficence were assured throughout the study period.

p) *Operational definitions*

1. *Self-care management:* is defined as activities that individuals initiate and perform on their own behalf in maintaining life, health, and wellbeing.

2. *Adherence with Physical activity regimen:* was determined as 30 minutes moderate activity for at least 3 days per week or total score of $\geq$ 50%

3. *Foot Care:* was determined as proper care of the foot, including nail and skin care, and the selection of appropriate footwear daily(for 3 days and above per week) or total score of $\geq$ 50%

4. *Adherence with dietary regimen:* was recorded when the patient strictly followed the prescribed dietary regimen for 3 days or more days per week or total score of $\geq$ 50%.

5. *Adherence with anti-diabetic drugs:* was recorded when diabetic patient took all medications, done all self-management in accordance with prescription or total score of $\geq$ 80%.

6. *Adherence with Self measurement of blood glucose:* was recorded when the patient practice for 3 or more days per week or total score of $\geq$ 50%

7. The total score of each item of the questionnaire was calculated out of 100. Considering to the total score, the level of self-care practice was classified into: Not adhered (<49%), adhered (50% and above) .this scoring method is adopted from previously done researches (25, 49)

q) *Dissemination of the results*

The result of this study will be disseminated to ENA, EDA, Ayder referral hospital and Mekelle hospital medical director and nursing service offices and TRHB research unit. Moreover, efforts will be made to publish the paper in scientific journals.

III. Results

a) *Socio-demographic characteristics of the respondents*

A total of 310 male and female adult type 2 diabetes patients were interviewed using standardized structured questionnaire and included in the analysis. Questioners of ten respondents were excluded from the analysis for gross incompleteness and inconsistency of responses, made a response rate of 96.8 %. 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. Mean age of patients was 50.02±12.01 years [(95% CI) (38.01-62.03)] with minimum of 30 and maximum of 78 years of age. Majority of respondents 264(88%) were orthodox Christian by religion and Tigrian 286 (95.3%) by ethnicity. A significant number 140 (46.7%) of the respondents did attend formal education. Two hundred twenty (73.3%) of respondents were married at the time of study period. 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).

Table 1: Socio demographic data of the respondent

Sr. No	Variable	Category	Frequency	
			NO	%
1	Gender	Female	127	42.3
		Male	173	57.7
2	Age[a]	25-39 years	75	25.0
		40-54 years	110	36.7
		55-69 years	97	32.3
		70-84 years	18	6.0
3	Monthly income[b]	Very low	171	57.0
		Low	66	22.0
		Average	41	13.7
		Above average	22	7.3
4	Ethnicity	Tigrian	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	OrthodoxChristian	264	88.0
		Muslim	36	12.0

a Age category was adopted from research article (study done in Africa)
b Monthly income category: Very Low <445 Birr, Low=446-1200Birr, Average=1201-2500Birr,
Above Average= 2501-3500Birr and High >3501Birr (Based on the Ethiopian Civil service monthly salary for civil servants)

b) Health status data of the respondents

The mean age in which diabetic disease occurred was 44.53±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± 7.6years with minimum of 1 year and maximum of 33 years. More tha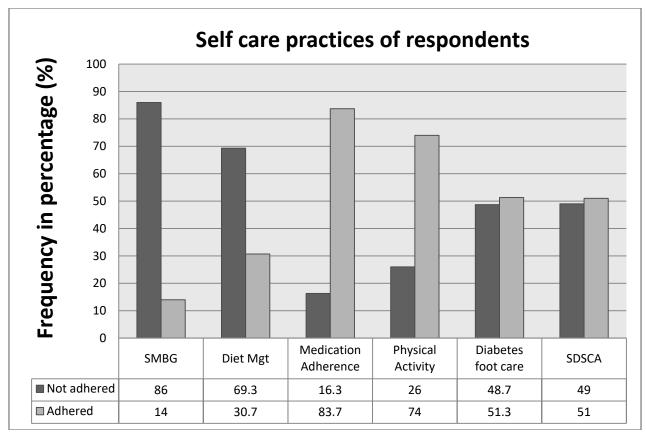n half respondents176 (58.7%) had multiple injection treatment (two injections per day). Of all respondents 124(41.3%) had oral hypoglycemic agent. Two hundred thirty two (77.3%) of the respondents did not have family history of diabetes and only 44 (14.7%) respondents had glucometre at home. Of all respondents only 38 (12.7%) had long term diabetic complication confirmed medically. (Table2).

Table 2: Health status data of respondents research done in Ayder referral hospital and Mekelle hospital Endocrine Unit, Ethiopia, 2012/13 (N=300)

Sr. No	Variable	Category	Frequency	
			NO	%
1	Age in which 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

c) All Self-care management Domains Adherence Condition of respondents

Respondents' self-care management were, the majority 258 (86.0%) respondents were not adhered to SMBG practice. A total of 251(83.7%) respondents were adhered to anti-diabetic medication. The majority 208 (69.3%) respondents were not adhered to recommended diet management practices. From the total respondents two hundred twenty two (74.0%) were reported adhered to physical activity that meet the recommended guidelines. Of all study participants, 154 (51.3%) respondents were adhered to the recommended diabetic foot care practices. Overall self-care practices (SDSCA) were reported as adhered in 153(51.0%) participants. Of all respondents 311(97%) were adhered to prescribed anti-diabetic medications. (Fig1 show the detail).

Self care practices of respondents

	SMBG	Diet Mgt	Medication Adherence	Physical Activity	Diabetes foot care	SDSCA
■ Not adhered	86	69.3	16.3	26	48.7	49
□ Adhered	14	30.7	83.7	74	51.3	51

Figure 1: A Bar graph showing Self-care management adherence level of type 2 diabetes Patients in Ayder referral hospital and Mekelle hospital Endocrine Unit, Ethiopia, 2012/13 (N=300)

d) Adherence to Self-Monitoring of Blood Glucose (SMBG) Practice

The majority 258(86.0%) of the study participants were not adhered to Self-Monitoring of Blood Glucose which means, monitored less than 1-2 times per week, even almost all participants said that they did SMBG practices when they had symptoms of hyperglycemia or hypoglycemia or at the time of health care visit and only 42(14.0%) were adhered which means monitored at least 2 times a week. Presence of glucometer at home, and Monthly income was found to have statistically significant association with adherence to SMBG practice. Those who have glucometer at home were eleven times less risk not to be adhered to the practice when compared with those who didn't have [P<0.001, AOR (95% CI) = 10.722 (4.095-28.075)] and those who are with monthly income of above average were adhered nigh times more than counterpart [P<0.001, AOR (95% CI) = 9.036(1.742-46.879)]. Table 5 shows the details of Logistic regression analysis result of SMBG practice and health status data and demographic characteristics.

Table 3: Logistic regression analysis result of Adherence to SMBG practice and Socio demographic & clinical data among Type 2 diabetic study subjects in Mekelle & Ayder Hospitals, Ethiopia 2012 (N=300)

Factor	SMBG Practices		COR	CI of 95 %	AOR	CI of 95%
	Not adhered	Adhered				
	No. (%)	No. (%)				
Monthly income P-Value=<0.001						
Very low	159(53.0)	12(4.0)	1.00		1.00	
Low	57(19.0)	9(3.0)	2.092	(0.837-5.227)	1.964	(0.637-6.049)
Average	30(10.0)	11(3.7)	**4.858**	**(1.963-12.026)***	2.919	(0.643-13.260)
Above average	12(4.0)	10(3.3)	**11.042**	**(3.966-30.743)***	9.036	(1.742-46.879)**
Total	258(86.0)	42(14.0)				
Level of education P-value=0.001						
Illiterate	129(43.0)	11(3.7)	1.00		1.00	
Elementary	67(22.3)	13(4.3)	2.275	(0.967-5.353)	2.133	(0.711-6.403)
High school	31(10.3)	6(2.0)	2.270	(0.779-6.612)	0.918	(0.187-4.513)
College university	31(10.3)	12(4.0)	**4.540**	**(1.832-11.246)***	0.296	(0.055-1.600)
Total	258(86.0)	42(14.0)				
Occupation: P-Value=0.012						
Employed	67(22.3)	20(6.7)	1.00		1.00	
un employed	92(30.7)	11(3.7)	**0.401**	**(0.180-0.892)***	0.799	(0.235-2.719)
Merchant	10(3.3)	4(1.3)	1.340	(0.379-4.736)	0.679	(0.149-3.100)
House servant	65(21.7)	5(1.7)	**0.258**	**(0.091-0.727)***	0.460	(0.115-1.840)
Daily laborer	24(8.0)	2(0.7)	**0.279**	**(0.061-1.285)***	0.755	(0.107-5.327)
Total	258(86.0)	42(14.0)				
Age in which diabetes started P-Value=0.269						
25-39 years	98(32.7)	16(5.3)	2.449	(0.782-7.671)	1.00	
40-54 years	100(33.3)	22(7.3)	**3.300**	**(1.085-10.037)***	1.283	(0.514-3.200)
55-69 years	60(20.0)	4(1.3)	1.00		0.335	(0.082-1.364)
Total	258(86.0)	42(14.0)				
Family History of Diabetes P-Value=0.030						
No	205(68.3)	27(9.0)	1.00		1.00	
Yes	53(17.7)	15(5.0)	**2.149**	**(1.067-4.326)***	0.978	(0.390-2.455)
Total	258(86.0)	42(14.0)				
Diabetes Complication P-Value=0.401						
No	227(75.7)	35(11.7)	1.465	(0.599-3.581)		
Yes	31(10.3)	7(2.3)	1.00			
Total	258(86.0)	42(14.0)				
Diabetes knowledge level P-Value=0.130						
No	149(49.7)	19(6.3)	1.00			
Yes	109(36.3)	23(7.7)	0.604	(0.314-1.164)		
Total	258(86.0)	42(14.0)				
Presence of Glucometre at home P-Value=<0.001						
No	235(78.3)	21(7.0)	1.00		1.00	
Yes	23(7.7)	21(7.0)	**10.217**	**(4.870-21.438)***	10.722	(4.095-28.075)**
Total	258(86.0)	42(14.0)				

NB: P-Value is, Value of COR analysis result

** Statistically associated Variable

*Variable were showed Statistical Association in COR but lost during AOR Analysis,

P=<0.05

e) Adherence to diet management of the respondents

The majority 208 (69%) of the study participants were not adhered to recommended diet management practices which means, apply the recommended diet management practices for about less than 1-2 times per week, and only 92(30.7%) study participants were Adhered which means follow the recommended diet management practices at least 3-4 times a week. Variables like education level and marital status were showed statistically significant association with adherence to diet management practices. Respondents with high level of education (college or university graduates) and who are single were about four and two times more likely to be engaged in diet management practices when compared with their counter parts [P<0.001, AOR (95% CI) = 4.481 (1.166-17.222)] and [P=0.002, AOR (95% CI) = 2.416(1.157-5.044)] respectively. Table6 shows the details of Logistic regression analysis result of diet management practice adherence condition and health status data and demographic characteristics.

Table 4: Logistic regression analysis result of Adherence to diet management and Socio demographic & clinical data Among Type 2 diabetic study subjects in Mekelle & Ayder Hospitals, Ethiopia 2012 (N=300)

Factor	Diet management		COR	CI of 95 %	AOR	CI of 95%
	Not adhered	Adhered				
	No. (%)	No. (%)				
Gender P-Value=0.012						
Female	98(32.7)	29(9.7)	1.00		1.00	
Male	110(36.7)	63(21.0)	**1.935**	(1.154-3.247)*	1.422	(0.750-2.697)
Total	208(69.3)	92(30.7)				
Age P-value=0.08						
25-39 years	45(15.0)	30(10.0)	3.333	(0.888-12.514)		
40-54 years	74(24.7)	36(12.0)	2.432	(0.662-8.943)		
55-69 years	74(24.7)	23(7.7)	1.554	(0.413-5.846)		
70-84 years	15(5.0)	3(1.0)	1.00			
Total	208(69.3)	92(30.7)				
Monthly income P-Value=0.061						
Very low	125(41.7)	46(15.3)	1.00		1.00	
Low	43(14.3)	23(7.7)	1.453	(0.791-2.672)	0.956	(0.431-2.122)
Average	29(9.7)	12(4.0)	1.124	(0.530-2.387)	0.252	(0.075-0.845)
Above average	11(3.7)	11(3.7)	**2.717**	(1.103-6.694)*	0.945	(0.235-3.796)
Total	208(69.3)	92(30.7)				
Level of Education P-Value= <0.001						
Illiterate	113(37.7)	27(9.0)	1.00		1.00	
Elementary	56(18.7)	24(8.0)	1.794	(0.949-3.389	1.564	(0.721-3.394)
High school	18(6.0)	19(6.3)	4.418	(2.047-9.535)	**4.195**	(1.516-11.604)**
College university	21(7.0)	22(7.3)	**4.384**	(2.112-9.104)*	4.481	(1.166-17.222)**
Total	208(69.3)	92(30.7)				
Marital status P-Value=0.002						
Married	162(54.0)	58(19.3)	1.00		1.00	
Divorced	8(2.7)	20(.7)	0.698	(0.144-3.384)	0.840	(0.168-4.202)
Widowed	5(1.7)	2(0.7)	1.117	(0.211-5.917)	1.224	(0.193-7.764)
Single/never married	33(11.0)	30(10.0)	**2.539**	(1.424-4.527)*	2.416	(1.157-5.044)**
Total	208(69.3)	92(30.7)				
Occupation P-Value=0.037						
Employed	47(15.7)	40(13.3)	1.00		1.00	
un employed	79(26.3)	24(8.0)	**0.357**	(0.192-0.665)*	0.479	(0.192-1.191)
Merchant	11(3.7)	3(1.0)	0.320	(0.084-1.229)	0.237	(0.048-1.171)
House servant	54(18.0)	16(5.3)	**0.348**	(0.173-0.701)*	0.455	(0.161-1.286)
Daily laborer	17(5.7)	9(3.0)	0.622	(0.250-1.547)	0.849	(0.250-2.883)
Total	208(69.3)	92(30.7)				
Age in which Diabetes started P-Value=0.006						
25-39 years	70(23.3)	44(14.7)	**2.724**	(1.310-5.665)*	1.00	
40-54 years	86(28.7)	36(12.0)	1.814	(0.867-3.796)	1.588	(0.773-3.262)
55-69 years	52(17.3)	12(4.0)	1.00		1.158	(0.457-2.932)
Total	208(69.3)	92(30.7)				

** Statistically associated Variable   P=<0.05

*Variable were showed Statistical Association in COR but lost during AOR Analysis,

NB: P-Value is, Value of COR analysis result

f) *Adherence to Prescribed medication*

A total of 251(83.7%) study participants were adhered with prescribed anti-diabetic drugs but out of the total study subjects 49(16.3%) were non-adhered. Of the total adhered respondents 147(49.0%) and 104 (34.7%) were Male and Female respectively and out of all not adhered respondents 26(8.7%) and 23(7.7%) were male and female respectively. Treatment intensity of the study participants were oral hypoglycemic agent 124(41.3%) and insulin therapy 176(58.7%). Multinomial logistic regression analysis result showed that there was significant association between prescribed medication adherence condition and monthly income, those who had higher income were three times adhered than those who had very low monthly income[P=0.015,AOR (95% CI) = 2.761(1.106-6.892)]. But no association were shown to other health status data and socio demographic characteristics.Table7 shows the details of Logistic regression analysis result of adherence to Anti-diabetes medication and health status data and demographic characteristics.

Table 5: Logistic regression analysis result of Adherence to Medication and Socio demographic& clinical data Among Type 2 diabetic study subjects in Mekelle & Ayder Hospitals, Ethiopia 2012 (N=300)

Factor	Medication Adherence		COR	CI of 95 %	AOR	CI of 95%
	Not adhered	Adhered				
	No. (%)	No. (%)				
Monthly income P-Value=0.015						
Very low	37(12.3)	134(44.7)	1.00		1.00	
Low	6(2.0)	60(20.0)	**2.761**	**(1.106-6.892)***	**2.761**	**(1.106-6.892)****
Average	4(1.3)	37(12.3)	2.554	(0.855-7.627)	2.554	(0.855-7.627)
Above average	2(0.7)	20(6.7)	2.761	(0.617-12.355)	2.761	(0.617-12.355)
Total	49(16.3)	251(83.7)				
Level of education P-value=0.019						
Illiterate	28(9.3)	112(37.3)	1.00			
Elementary	15(5.0)	65(21.7)	1.083	(0.539-2.176)		
High school	3(1.0)	34(11.3)	2.833	(0.811-9.899)		
College university	3(1.0)	40(13.3)	3.333	(0.961-11.567)		
Total	49(16.3)	251(83.7)				
Occupation: P-Value=0.123						
Employed	10(3.3)	77(25.7)	2.310	(0.750-7.118)		
un employed	17(5.7)	86(28.7)	1.518	(0.531-4.338)		
Merchant	3(1.0)	11(3.7)	1.100	(0.229-5.282)		
House servant	13(4.3)	57(19.0)	1.315	(0.441-3.925)		
Daily laborer	6(2.0)	20(6.7)	1.00			
Total	49(16.3)	251(83.7)				
Marital status P-Value=0.040						
Married	31(10.3)	189(63.0)	1.905	(0.953-3.810)		
Divorced	0(0.0)	10(3.3)	5.048	(0.000 -).		
Widowed	3(1.0)	4(1.3)	0.417	(0.084-2.075)		
Single/never married	15(5.0)	48(16.0)	1.00			
Total	49(16.3)	251(83.7)				
Family History of Diabetes P-Value=0.608						
No	37(12.3)	195(65.0)	1.00			
yes	12(4.0)	56(18.7)	0.885	(0.433-1.811)		
Total	49(16.3)	251(83.7)				
Diabetes Complication P-Value=0.335						
No	43(14.3)	219(73.0)	0.955	(0.376-2.423)		
yes	6(2.0)	32(10.7)	1.00			
Total	49(16.3)	251(83.7)				
Diabetes knowledge level P-Value=0.923						
Poor	28(9.3)	140(46.7)	1.00			
Good	21(7.0)	111(37.0)	1.057	(0.570-1.962)		
Total	49(16.3)	251(83.7)				
Presence of Glucometre at home P-Value=<0.001						
No	44(14.7)	212(70.7)	1.00			
Yes	5(1.7)	39(13.0)	1.619	(0.604-4.339		
Total	49(16.3)	251(83.7)				

** Statistically associated Variable   P=<0.05

*Variable were showed Statistical Association in COR but lost during AOR Analysis,

NB: P-Value is, Value of COR analysis result

g) Adherence to Physical activity regimen of respondents

From the total respondents two hundred twenty two (74.0%) were reported adhered to physical activity that meet the recommended guidelines and 78 (26.0%) were not adhered. Respondents who were in the age group of 40-54 years and those who were employed had statistically significant association with their adherence condition to physical activity and those who are in the age group of 40-54 years were about four times more likely to be engaged in physical activity when compared with those who are in the age group of 25-39 years [P=0.001, AOR(95% CI)=4.349(1.191-15.884) and those who are employed were 70 % likely to protected from the risk or be engaged in physical activity as compared to unemployed one [P=0.453, AOR(95%CI)= 0.375(0.150-0.940)]. Table8 shows the details of Logistic regression analysis result of physical Activities regimen adherence condition and health status data and demographic characteristics.

Table 6: Logistic regression analysis result of Adherence to Physical activity and Socio demographic & clinical data Among Type 2 diabetic study subjects in Mekelle & Ayder Hospitals, Ethiopia 2012/13 (N=300)

Factor	Physical Activity		COR	CI of 95 %	AOR	CI of 95%
	Not adhered	Adhered				
	No. (%)	No. (%)				
Age P-Value=0.001						
25-39 years	18(6.0)	57(19.0)	3.958	(1.358-11.541)*	1.00	
40-54 years	14(4.7)	96(32.0)	8.571	(2.894-25.384)*	4.349	(1.191-15.884)**
55-69 years	36(12.0)	61(20.3)	2.118	(0.766-5.855)	1.478	(0.349-6.256)
70-84 years	10(3.3)	8(2.7)	1.00		1.074	(0.165-6.994)
Total	78(26.0)	222(74.0				
Level of education P-value=0.003						
Illiterate	47(15.7)	93(31.0)	1.00		1.00	
Elementary	19(6.3)	61(20.3)	1.623	(0.870 -3.025)	1.650	(0.800-3.404)
High school	6(2.0)	31(10.3)	2.611	(1.018-6.697)*	2.515	(0.805-7.859)
College university	6(2.0)	37(12.3)	3.116	(1.228-7.908)*	1.963	(0.532-7.247)
Total	78(26.0)	222(74.0				
Occupation: P-Value=0.453						
Employed	12(4.0)	75(25.0)	0.815	(0.212-3.140)	1.00	
un employed	44(14.7)	59(19.7)	0.175	(0.049-0.620)*	0.375	(0.150-0.940)**
Merchant	5(1.7)	9(3.0)	0.235	(0.046-1.193)	0.294	(0.079-1.095)
House servant	14(4.7)	56(18.7)	0.522	(0.137-1.989)	1.149	(0.407-3.239)
Daily laborer	3(1.0)	23(7.7)	1.00		2.701	(0.559-13.039)
Total	78(26.0)	222(74.0)				
Age in which diabetes started P-Value=0.003						
25-39 years	22(7.3)	92(30.7)	2.861	(1.447-5.659)*	1.00	
40-54 years	30(10.0)	92(30.7)	2.098	(1.099-4.007)*	0.758	(0.211-2.720)
55-69 years	26(8.7)	38(12.7)	1.00		0.927	(0.217ˉ3.964)
Total	78(26.0)	222(74.0				
Family History of Diabetes P-Value=0.030						
No	65(21.7)	167(55.7)	1.00			
yes	13(4.3)	55(18.3)	1.647	(0.844-3.215)		
Total	78(26.0)	222(74.0				
Diabetes Complication P-Value=0.043						
No	63(21.0)	199(66.3)	2.060	(1.013-4.188)*	1.00	
yes	15(5.0)	23(7.7)	1.00		0.569	(0.238-1.358)
Total	78(26.0)	222(74.0				
Diabetes knowledge level P-Value=0.330						
Poor	40(13.3)	128(42.7)	1.00			
Good	38(12.7)	94(31.3)	0.773	(0.461-1.297)		
Total	78(26.0)	222(74.0				
Gender P-Value=0.290						
Female	37(12.3)	90(30.0)	1.00			
Male	41(13.7)	132(44.0)	1.324	(0.788-2.224)		
Total	78(26.0)	222(74.0				

** Statistically associated Variable   P=<0.05

*Variable were showed Statistical Association in COR but lost during AOR Analysis,

NB: P-Value is, Value of COR analysis result

h) Adherence to Diabetic Foot care of respondents

Among 300 study participants 154(51.3) respondents were adhered to the recommended diabetic foot care practices and 146(48.7%) were not adhered. Education, marital status and monthly income were found to have statistically significant association with adherence to diabetic foot care practices. Respondents who are college graduates and with higher monthly income were about eleven and two times more likely to be engaged in the practices when compared with the counterpart [P=<0.001, AOR (95% CI) =10.525 (1.256-3.297)] and [P=<0.001, AOR (95% CI) =2.101 (1.060-4.165)] respectively. But single respondents were about 70% protected from not to be adhered to diabetes foot care practices, [P=<0.001, AOR (95% CI) =0.317 (0.146-0.689)]. Table 9 shows the details of Logistic regression analysis result of diabetic foot care practice adherence condition and health status data and demographic characteristics.

Table 7: Logistic regression analysis result of Adherence to diabetes foot care and Socio demographic & clinical data Among Type 2 diabetic study subjects in Mekelle & Ayder Hospitals, Ethiopia 2012 (N=300)

Factor	Diabetes foot care		COR	CI of 95 %	AOR	CI of 95%
	Not adhered	Adhered				
	No. (%)	No. (%)				
GenderP-Value=0.328						
Female	66(22.0)	61(20.3)	0.795	(0.502-1.258)		
Male	80(26.7)	93(31.0)	1.00			
Total	146(48.7)	154(51.3)				
Age P-Vale=0.014						
25-39 years	33(11.0)	42(14.0)	6.364	(1.699-23.840)*	0.441	(0.066-2.931)
40-54 years	48(16.0)	62(20.7)	6.458	(1.768-23.593)*	1.041	(0.202-5.374)
55-69 years	50(16.7)	47(15.7)	4.700	(1.278-17.280)*	2.112	(0.505-8.837)
70-84 years	15(5.0)	3(1.0)	1.00			
Total	146(48.7)	154(51.3)				
Level of education P-value=<0.001						
Illiterate	97(32.3)	43(14.3)	1.00			
Elementary	34(11.3)	46(15.3)	3.052	(1.725-5.399)*	2.394	(1.225-4.680)**
High school	9(3.0)	28(9.3)	7.018	(3.053-16.134)*	4.866	(1.736-13.637)**
College university	6(2.0)	37(12.3)	13.911	(5.465-35.411)*	10.525	(2.861-38.728)**
Total	146(48.7)	154(51.3)				
Marital Status P-Value=<0.001						
Married	124(41.3)	96(32.0)	0.286	(0.154-0.530)	0.317	(0.146-0.689)**
Divorced	4((1.3)	6(2.0)	0.554	(0.139-2.208)*	0.574	(0.118-2.794)
Widowed	1(0.3)	6(2.0)	2.217	(0.248-19.791)	3.480	(0.338-35.798)
Single/never married	17(5.7)	46(15.3)	1.00		1.00	
Total	146(48.7)	154(51.3)				
Monthly income P-Value=<0.001						
Very low	105(35.0)	66(22.0)	1.00			
Low	25(8.3)	41(13.7)	2.609	(1.454-4.683)*	2.101	(1.060-4.165)**
Average	11(3.7)	30(10.0)	4.339	(2.037-9.244)*	1.294	(0.457-3.665)
Above average	5(1.7)	17(5.7)	5.409	(1.905-15.358)*	1.869	(0.462-7.559)
Total	146(48.7)	154(51.3)				
Age in which diabetes started P-Value=0.002						
25-39 years	45(15.0)	69(23.0)	2.733	(1.450-5.152)*	2.605	(0.760-8.921)
40-54 years	60(20.0)	62(20.7)	1.842	(0.989-3.431)	1.566	(0.655-3.748)
55-69 years	41(13.7)	23(7.7	1.00		1.00	
Total	146(48.7)	154(51.3)				
Diabetes Complication P-Value=0.024						
No	121(40.3)	141(47.0)	2.241	(1.099-4.571)*	1.861	(0.743-4.664)
yes	25(8.3)	13(4.3)	1.00		1.00	
Total	146(48.7)	154(51.3)				
Diabetes knowledge level P-Value=0.04						
No	94(31.3)	74(24.7)	1.00		1.00	
yes	52(17.3)	80(26.7)	1.954	(1.230-3.106)*	1.446	(0.831-2.516)
Total	146(48.7)	154(51.3)				

** Statistically associated Variable   P=<0.05

*Variable were showed Statistical Association in COR but lost during AOR Analysis,

NB: P-Value is, Value of COR analysis result

i) **Adherence to overall self-care management (SDSCA) of respondents**

Self-care managements were reported adhered in 153 (51.0%) respondents, and not adhered in 147 (49.0%) respondents. Respondents who are college graduates, Married and diabetes complication were found to have statistically significant association with adherence level to overall diabetes self-care management and about four times more likely to be engaged in overall self-care management when compared with illiterate respondents [P<0.001, AOR (95% CI) =4.194 (1.213- 14.510)and marital status showed that significant association but it is protective which means respondents who are married had 70% chance to be engaged in the practice as compared with their counterpart [P<0.001, AOR (95%CI)=0.343(0.162-0.726)]. Similarly those respondents who are without diabetes complication were adhered two times more than the counterpart [P=<0.004, AOR (95% CI) =2.860 (1.109-7.375)]. Table10 shows the details Logistic regression analysis result of overall self-care practice adherence condition and health status data and demographic characteristics.

Table 8: Logistic regression analysis result of Adherence to SDSCA and Socio demographic & clinical data Among Type 2 diabetic study subjects in Mekelle & Ayder Hospitals, Ethiopia 2012 (N=300)

Factor	SDSCA		COR	CI of 95 %	AOR	CI of 95%
	Not adhered	Adhered				
	No. (%)	No. (%)				
Gender P-Value=0.041						
Female	71(23.7)	56(18.7)	1.00		1.00	
Male	76(25.3)	97(32.3)	1.618	(1.020-2.567)*	1.244	(0.720-2.150)
Total	147(49.0)	153(51.0)				
Age P-Vale=0.001						
25-39 years	31(10.3)	44(14.7)	4.968	(1.493-16.535)*	0.639	(0.108-3.768)
40-54 years	45(15.0)	65(21.7)	5.056	(1.562-16.361)*	1.441	(0.309-6.722)
55-69 years	57(19.0)	40(13.3)	2.456	(0.753-8.013)	1.417	(0.384-5.226)
70-84 years	14(4.7)	4(1.3)	1.00		1.00	
Total	147(49.0)	153(51.0)				
Level of education P-value=<0.001						
Illiterate	93(31.0)	47(15.7)	1.00		1.00	
Elementary	37(12.3)	43(14.3)	2.300	(1.311-4.035)*	1.698	(0.868-3.322)
High school	11(3.7)	26(8.7)	4.677	(2.128-10.279)*	2.471	(0.942-6.478)
College university	6(2.0)	37(12.3)	12.202	(4.809-30.963)*	4.194	(1.213-14.510)**
Total	147(49.0)	153(51.0)				
Marital Status P-Value=<0.001						
Married	124(41.3)	96(32.0)	0.264	(0.141-0.493)*	0.343	(0.162-0.726)**
Divorced	4(1.3)	6(2.0)	0.511	(0.128-2.043)*	0.669	(0.142-3.151)
Widowed	3(1.0)	4(1.3)	0.454	(0.092-2.250)*	0.657	(0.108-3.987)
Single/never married	16(5.3)	47(15.7)	1.00		1.00	
Total	147(49.0)	153(51.0)				
Monthly income P-Value=<0.001						
Very low	100(33.3)	71(23.7)	1.00		1.00	
Low	33(11.0)	33(11.0)	1.408	(0.796-2.491)	1.223	(0.623-2.401)
Average	10(3.3)	31(10.3)	4.366	(2.012-9.477)*	1.374	(0.486-3.880)
Above average	4(1.3)	18(6.0)	6.338	(2.057-19.528)*	2.743	(0.677-11.106)
Total	147(49.0)	153(51.0)				
Age in which diabetes started P-Value=<0.001						
25-39 years	43(14.3)	71(23.7)	3.152	(1.662-5.978)*	2.010	(0.606-6.670)
40-54 years	62(20.7)	60(20.0)	1.848	(0.988-3.456)	1.197	(0.499-2.870)
55-69 years	42(14.0)	22(7.3)	1.00		1.00	
Total	147(49.0)	153(51.0)				
Diabetes Complication P-Value=0.004						
No	120(40.0)	142(47.3)	2.905	(1.383-6.100)*		
yes	27(9.0)	11(3.7)	1.00		1.00	
Total	147(49.0)	153(51.0)			2.860	(1.109-7.375)**
Presence of Glucometre at home P-Value=0.002						
No	135(45.0)	121(40.3)	1.00		1.00	
yes	12(4.0)	32(10.7)	2.975	(1.467-6.036)*	2.324	(0.904-5.977)
Total	147(49.0)	153(51.0)				

** Statistically associated Variable   P=<0.05

*Variable were showed Statistical Association in COR but lost during AOR Analysis,

NB: P-Value is, Value of COR analysis result

SDSCA= means summarized diabetes self-care activities (over all the five domain of self-care management)

IV. DISCUSSION

In Ethiopia, there is limited information about the diabetes self-care managements of patients with type 2 diabetes mellitus. Thus this study has tried to assess the diabetes self-care management level and its associated factors among type 2 diabetes patients in Ayeder referral Hospital endocrinology unit and Mekelle Hospital chronic care unit, Mekelle City, Ethiopia. In this study the majority of subjects 94.0% were found to be in the age group 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 in the age group of

30-60 years and 28%, 44% of respondents were 61 and above years respectively. The present study showed that 58.7% and 41.3% of the sample were taking insulin injection and oral hypoglycemic agent respectively compared to 35% and 57% in a study done in Egypt and 64% and 32% in a study done in Tikur Anbesa Specialized hospital, Ethiopia. But study carried out in United States revealed that Three-quarters of the patients received hypoglycemic agents (oral or insulin) (19, 26, 30).

Diabetes outcome depends mainly on the patient' sound self-care management that is dependent upon their health-related behavior and care-seeking which are guided and determined by individually and culturally defined beliefs about health, illness and health-care. As far as we know, this is the first study investigating Self-care management using a validated instrument among diabetes patients who have follow-up in Ayder referral hospital and Mekelle hospital.

Diabetes self-management behaviors such as diet and exercise involve depend on guidance from a health care provider, meal preparation in a family context, exercising with a partner or in a group. Glucose monitoring is a relatively quick and straightforward procedure; diabetes is managed via a regimen of control via self-care management. Health professionals advise adults living with type 2 diabetes to control blood sugar levels by controlling diabetogenic life style like diet management, maintaining regular exercise, and adhered regularly to prescribed medications. The extent to which individuals are able to adhere to such recommendations varies and entirely dependent on various factors like diabetes knowledge level. Despite the increasing prevalence of diabetes, improved understanding of the disease, and a variety of new medications, glycemic control does not appear to be improving. SMBG is one strategy for improving glycemic control; however, patients' adherence is suboptimal and a proper education and follow-up are crucial, cited by Eman M. Mahfouz, and Hala I (19,30).

The finding of this study also showed that only 14% were adhered to SMBG practices. This result is higher than a study done in Ethiopia 5%, India 3% and Nigeria 8% but lower than Pakistan 61%, U.S.A 78% of respondents were check blood glucose regularly. But almost similar with studies done in Ethiopia (TASH) 16%, Malaysia 15%. A study done in Malaysia showed that level of education; family income; duration of diabetes; and treatment regime (insulin) and in Ethiopia (TASH) showed that level of education, monthly income and presence of glucometre at home was significant predictors of SMBG practice. Similarly in this study monthly income and presences of glucometer at home showed that significant association to SMBG practices. Although SMBG is recognized to be useful and effective in achieving diabetes control, this study has found that only a minority of respondents with diabetes were perform SMBG (Self-Monitoring of Blood Glucose) practices this is probably related to a lack of awareness on its importance in the management of diabetes and there are relevant financial barriers to purchase the device and its strips (8,14,16, 17,18,30,42).

In this study only 16.3% were unable to adhere with prescribed medicine. This result was lower from study result of Ethiopia (3%), Egypt (9%), Malaysia (46%) and Nigeria (46%). This study indicated that there was significant association between medication adherence and monthly income. But study done in Ethiopia showed that type of diabetes medication (injection or pills) had significant association and in Nigeria report that lack of finance, drug side effect, and perceived inefficacy of the prescribed medications had significant association with the practice.. Concerning adherence to the diet management practices; this study showed that only 30.7% of respondents were adhered. This is higher than a study done in Ethiopia(TASH) 21% but lower than a study done in Egypt 81%, India women 52% and men 32% and Iran 96% male and 100% female were followed the recommended diet instructions. Study done in U.A.E indicated that only 24% respondents were read food labeling. 76% reported being unable to distinguish clearly between low and high carbohydrate index food items and no one reported counting calorie intake. 46% reported that they had never been seen by dietician since their diagnosis. Their overall risk profile, notably body weight, lipid profile and blood pressure, was very unfavorable; more than half of the study sample had uncontrolled hypertension and uncontrolled lipid profile and the majority was overweight (36%) or obese (45%). Abdominal obesity was particularly common (59%). Only 31% had an HbA1c of less than 7%. As this study indicated that Similar to the SMBG practice adherence condition, adherence to diet management practices were lower than the other studies, this might be because of financial barrier, Poor perception toward the importance of fruits and vegetables, lack of awareness on the importance of the practices and most respondents had not any idea even how to prepare and follow healthy diet plan at all, Socio-cultural variation and life style difference (16, 19, 20, 23, 30).

A study in Ethiopia (TSAH) and Egypt showed that there was a statistically significant difference between marital status, education and adherence to dietary management of diabetes, nearly one quarter (26%) of illiterates were not adhered to dietary management of diabetes and also revealed that younger age group and shorter disease duration had a positive impact on dietary management practices adherence condition (19, 30).

Similarly this study also showed that subjects with high level of education and who are single were more adhered to dietary management practices than the counterpart but other socio demographic data, health

status data and diabetes knowledge level did not show significant association this might because of small sample size. In this study 74.0% respondents were adhered to physical activity that meets the recommended guidelines. This result is higher than studies done in Ethiopia (TASH) 53.0%, U.A.E only 3%, in India only 9% of the male and 4% of the women adhered to the practices, it is also higher than studies done in Malaysia 46 % and in Iran 66% male and 46% female respondents were active in daily life, in U.S.A 52% of respondents were exercise once a week or more. The result is higher than the other study this might be because of most patients did not live sedentary life, as they have physical exercise daily at least simple walk for half an hour each day. Study in Malaysia indicated that there was significant association between level of education, Age and anti-hyperglycemic medication type and self-care practices. Study in Ethiopia (TSAH) revealed that there was significant association between marital status, level of education, monthly income and diabetic complication and adherence to physical activities. But this study showed that there is significant association between age, occupation and adherence to physical activities (16, 17, 20, 25, 26, 31).

In this study almost half (51.3%) of all respondents were adhered to the recommended diabetic foot care practices. This result is higher than studies done in Nigeria only 10% had adherence to practices of DM foot care. But lower than studies done in, Ethiopia (TASH) 67%, Chandigarh 63.3%, Pakistan 68%, U.S.A 64% of all respondents had adherence to practices. The result of this study showed that level of education, marital status and monthly income showed that significant association but study done in Ethiopia (TASH) showed that male and older participants were less adherent to diabetic foot care practices, while study in Nigeria revealed that illiteracy and low socioeconomic statues were significantly associated with poor practices (27, 28, 29,31,40).

In this study almost half 51.0% respondents were adhered to overall self-care management domains. This result is lower than study done in Ethiopia (TASH) 56%, Iran 74%, Finland 81% respondents were adhered to the overall self-care management domains. The result of this study is lower than the other studies this might be because of financial barrier, lack of awareness on the importance of the practices, Socio-cultural variation and life style difference. A study done in Iran indicated that insulin therapy, high educational status, and duration of diabetes had positive effects on level of self-care practice. This study also revealed that educational level, marital status and diabetes complication were an important variable in improving self-care practice or showed that significant association with the overall self-care managements (SDSCA). But study done in Ethiopia indicated that only level of education showed that significant association. Another study in Finland

revealed that poor metabolic control, smoking and living alone were associated with neglect of self-care managements but gender, Co-morbidity and diabetic complication increase the risk, but had no significant association with adherence to or neglect of self-care practice. In contrary this study showed that gender, age and diabetic complication had significant association on adherence condition to overall self-care management domains (18, 20, 31).

V. Strengths and Limitations of the Study

a) *Strength*
1. Use of contextually adopted standardized questionnaire.
2. High response rate.
3. Since there is no similar study conducted in the area, it can contribute a lot as baseline information for future studies.

b) *Limitations*
1. Social desirability bias due to sensitive and personal question related to diabetic self care especially about financial issues.
2. Limitation of related literatures to compare and discuss some of the findings.
3. Because the data are cross-sectional, the direction of causal relationship between variables can't always be determined.

VI. Conclusion and Recommendation

a) *Conclusion*
Despite the important role of self-care practices in 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 self-care managements among people with type 2 diabetes: Prescribed medications adherence practice was accomplished as recommended in majority respondents, but the other aspects of self-care management domains were more problematic. SMBG practice and diet management practices especially warrants. However self-monitoring of blood glucose and diet management practices are said to be the cornerstone of self-care management activities and glycemic control. Generally adherence to self-care management was suboptimal among type 2 diabetic patients in Ayder referral hospital endocrinology and Mekelle hospital chronic care unit.

b) *Recommendations*
Hence Interventions aiming at improving diabetes control should be multifaceted and should involve more effective measures of awareness creation on the importance of the self-care management and more frequent clinic visits. Family members should be

informed about their important roles in encouraging patients to undergo a glycemic control or self-care practice. Increase access to health education through a multidisciplinary approach via IEC programme this could improve the glycemic control in patients with diabetes mellitus. Policy decisions for improving diabetes outcome should target barriers to health care access and utilization and focus on developing programs to help population groups at high-risk of neglecting their self-care practice.

Similarly healthcare personnel must increase patients' awareness toward the importance of all types of self-care practices domains and strongly promote the practice among diabetic patients via strengthening IEC program and providing quality care at all level and the diabetic association, Staff members of the endocrinology and chronic care units and department of internal medicine need to participate in strengthening the overall awareness of the patients toward their self-care management and providing equitable service to all patients regardless of patients socio-economic status.

As to the adherence to the prescribed diet and SMBG practices, patients should be well informed and the diet regimens are recommended to be simplified. In nursing, we can provide informational and emotional support by planning the care together, listening to the people and respecting their expertise. It is also suggested that nursing research should be carried out to investigate adherence to self-care management in a broader social context and larger sample size. Further studies are needed in order to achieve a deeper understanding about the subjective experience of being chronically ill, but still feeling healthy and doing well.

c) *Practice implications of the Study in nursing profession*

This study should contribute to the development of effective nursing education strategies to promote health for adults with sub-optimal diabetes self-care practices. This study should also contribute to the nurse researcher as a base line data in order to carried out in a broader social context and larger sample size to investigate adherence to self-care and achieve a deeper understanding about the subjective experience of being chronically ill, but still feeling healthy and doing well. Finally this study should contribute to the development of effective Nursing practices in order to promote health and be adhered to self-care practices.

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