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Glycemic Control and Associated Factors among Type II Diabetic Patients on Chronic Follow up at Southwest Ethiopia

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Research Article

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ABSTRACT

Background: Diabetes is a group of metabolic disorders that affect the body's ability to process and use glucose for energy. Type-II diabetes mellitus results from the combination of resistance to insulin action and inadequate insulin secretion. Diabetes mellitus is one of the most common chronic diseases among adults. Good glycemic control reduces the risk of diabetic complications. Despite this, achieving good glycemic control remains a challenge in diabetic patient.

Objective: Purpose of our study was to assess glycemic control and associated factors among type II diabetic patients on chronic follow-up at Jimma Zone, Southwest Ethiopia.

Materiald and methods: Hospital-based cross sectional study design was conducted. Patients' information such as socio-demographic characteristics, medication adherence was obtained through interviews. Structured questionnaire was used for patient interview and card reviews from February to March 2017. A total of 174 patients with type II diabetes were included for the final analysis using SPSS 20. Statistical significance was set at $P<0.05$.

Results: Mean age of participants was 50 (SD ± 14.83). Among the total study participants, 54% were males. About 66 (37.9%) of study participants were illiterate. Among study participants 72 (41.4%) earned low monthly income. Mean duration of diabetes is 2.19 (SD ± 0.87) years. The proportions of patients with low, medium and high adherence to medication were 23.6%, 35.6% and 40.8%, respectively. About 63.8% had poor glycemic control level. The factors which are statistically associated with poor glycemic control were educational status (COR=3.656, P=0.002), low monthly income (COR=3.682, P=0.010) and longer duration of diabetes (COR=1.820, P=0.003), lack of regular follow-up (COR=3.456, P=000), lack of family support (COR=2.885, P=0.002).

Conclusion: Longer duration (>10 years) of the disease, having low monthly income, and lack of regular follow up were significantly associated with poor glycemic control.

INTRODUCTION

Diabetes mellitus (DM) comprise of a group of common metabolic disorders that share the phenotype of hyperglycemia. Type-II DM is a heterogeneous group of disorders characterized by variable degree of insulin resistance, impaired insulin secretion and increased glucose production [1]. Diabetes also imposes significant economic burdens with medical expenditures attributable to hospitalizations, medications, outpatient visits and treatment of chronic complications [2].

Diabetes mellitus (DM) is a major public health problem worldwide, that requires continuing medical care and ongoing

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patient self-management education and support to prevent acute complications and to reduce the risk of long-term complications. The prevalence of type II diabetes mellitus is rapidly increasing all over the world in which the number of adults with diabetes in the world will rise from 135 million in 1995 to 300 million in the year 2025 [3].

Type 2 diabetes is associated with increased morbidity and mortality compared with the general population [4]. Although the importance of strict glycemic control in type 2 diabetes has been debated, poor control is never a desired outcome and patients with poor control may experience many symptoms of diabetes, possible cognitive impairment and immune dysfunction [5].

In Africa, International Diabetes Federation (IDF), estimated about 19.8 million adults were estimated to have diabetes and regional prevalence of DM is 4.9%. Out of this more than 50% lives in four highly populated countries namely: Nigeria, South Africa, Ethiopia and Tanzania [6]. About 80% of diabetes deaths occur in low and middle income countries. Ethiopia with national prevalence of 3.36%, 23,869 diabetes related deaths and with mean 25 USD diabetes related expenditure per person is highly affected. Poor glycemic control is the most common cause of hospital admissions and complications in diabetes [7].

Type II diabetes was believed to be a disease occurring mainly in developed countries, but recent findings reveal a rise in number of new cases of type 2 DM with an earlier onset and associated complications in developing countries [8].

Longitudinal study from 2000 to 2002 in San Diego found that patients who were uninsured, had diabetes for a longer period of time, used insulin or multiple oral agents, or had high cholesterol had higher A1C values over time indicating poorer glycemic control. The younger subjects also had poorer control [9].

A study conducted in Jordan in 2010 found 65.1% of the patients have poor glycemic control (HbA1c<7%) and In the multivariate analysis, increased duration of diabetes (>7 years vs. ≤ 7 years) (P ≤ 0.0005), not following eating plan as recommended by dietitians (P ≤ 0.0005), negative attitude towards diabetes and increased barriers to adherence scale scores were significantly associated with increased odds of poor glycemic control among type II diabetes patients [10].

Across sectional study conducted in south India, 2012 found that 51% of the patients had good glycemic control (HbA1C<7%) and patients in age group <55 years (p=0.03) are more likely to have good glycemic control as compared to those who are >55 years. Longer duration of disease (>6 years) is also associated with poor glycemic control (p=0.0006) as compared to those with shorter duration of disease (<6 years) [11].

A study conducted in older (greater than75 year) Mexican American diabetes showed that, of the 209 diabetic subjects with an HbA_1c test, 73 (34.9%) had good glycemic control (HbA_1c<7%) and 136 (65.1%) had poor glycemic control (HbA_1c>7%) [12]. Participants with poor glycemic control were significantly more likely to have <8 years of education, longer disease duration (≥ 15 years) disease and have more complication [13].

A hospital-based cross-sectional study conducted at the University of Gondar Referral Hospital, Ethiopia in 2013 found that 64.7% of diabetic patients poorly controlled their glycemic level (HbA1c>7%) and Being on insulin treatment (95% CI=1.25, 5.04) and reporting poor medication adherence (CI=1.76, 5.80) were found to be associated with poor glycemic control among type II diabetes patients [14].

A study conducted among diabetic patients in Jimma university specialized hospital, Ethiopia, 2010, found that only 18.1% of patients achieved adequate level of glycemic control [15].

Another study conducted in Jimma university included indicates that the most frequent co-morbidity with diabetes was hypertension (61.2%) followed by obesity (10.8%), chronic renal failure (6%), coronary heart disease (5.3%), dyslipidemia (3.1%), and other disease such as TB, anemia, osteoarthritis, asthma and hyperthyroidism with individual frequency of less than 3%. All constituted 13.62% of the total co-morbid disease [16]. A study done in the same area, Jimma University Specialized Hospital, indicates that more than two-third (70.9 %) of the patients had poor blood glycemic control [17].

MATERIALS AND METHODS

The Hospital based cross sectional study was conducted. The study was conducted from 01 February to 01 March 2017 in Jimma Zone located in South West Ethiopia. Jimma Zone Hospital, Limmu Genet Hospital, provides service to both in patient and out patients. Diabetic Mellitus ambulatory clinic unit is one of the specialty units of the hospital, which provides medical services for registered diabetic patients.

Study Population and Sampling

All type 2 diabetic patients attending diabetes clinic at Limmu Genet Hospital, aged ≥ 18 years and who had been on treatment for at least 6 months were included while patients with mental disorders, seriously ill patients, and incomplete record were excluded from the study.

Data Collection Procedures

Data was collected through face to face interview and chart review using structured questionnaire. The questionnaire

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contains information about socio demographic characteristics of the patient, clinical, behavioral and questions for medical record review.

Data Analysis Procedures

Data were analyzed using statistical package for social science (SPSS) version 20. Descriptive statistics like frequency, proportion, mean, median and standard deviation was employed to describe socio demographic, clinical and behavioral characteristics of patients. Bivariate logistic regression analysis was conducted to test association between glycemic control and independent variables.

RESULTS

Socio-Demographic Characteristics

Males comprised 94, (54%) of the sex category. Majority 127, (73%) of the patients were in the age group of 40 and above years. The mean age of the studied Population was 50.18 (SD=14.831) years. Patients with Illiterate 66, (37.9%) constituted the highest percentage of educational status category. Majority, 131 (75.3%) of the participants were married. More than half, 75 (43.1%) earned low monthly family income. Additionally about 76 (43.7%) of the study patients don't have regular follow up to their prescribed medication and about 71 (40.8%) patients don't had family support on their medication as well as disease related issue **(Table 1)**.

Table 1. Socio demographic characteristics and clinical characteristics of type 2 diabetes patients at Limmu Genet Hospital, Ethiopia from February to March 2017.

Variables	Frequency	Percentage	P-value	COR (CI 95%)
Sex				
Male	94	54	0.349	0.742 (0.397-1.385)
Female	80	46		1
Age				
<20				
20-29	2	1.1	0.944	0.900 (0.049-16.594)
30-39	16	10.9	0.611	0.474 (0.27-8.464)
40-49	29	16.7	0.394	0.286 (0.016-5.095)
50-59	36	20.7	0.894	0.824 (0.047-14.389)
>60	31	17.8	0.732	0.611 (0.036-10.274)
	60	34.5		1
Educational status				
Illiterate	66	37.9	0.002	3.656 (1.624-8.234) 3.825 (1.556-9.404) 7.20 (2.001-25.909)
Primary	58	33.3	0.003	1
Secondary	37	21.3	0.003	
College and above	13	7.5		
Marital status				
Single	35	20.1	0.501	0.771 (0.361-1.645)
Married	131	75.3	0.999	0.000 (0.000....)
Divorced/separated	8	4.6		1
Monthly Family Income (ETB)*				
Very low (≤ 445)				1.353 (0.670-2.732) 3.682 (1.362-9.961) 7.650 (0.751-77.96) 2.550 (0.152-42.76) 1
Low (446-1200)	71	40.8	0.399	
Average (1201-2500)	75	43.1	0.01	
Above average (2501-3500)	22	12.6	0.86	
High (≥ 3501)	4	2.3	0.515	
	2	1.1		
Regular Follow up				
No	76	43.7	0	3.456 (1.752-6.815)
Yes	98	56.3		1
Family support				
Yes	103	59.2	0.002	2.885 (1.464-5.686)

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No	71	40.8		1
Type of support			0.027	
Financial	52	50.5	0.759	0.428 (0.202-0.907)
Remembering to take drug	41	39.8		0.761 (0.133-4.359)
Remembering and finance	10	9.7		1

*Based on the Ethiopian Civil Service monthly salary scale for civil servants

Disease Related Characteristics

Overall, patients were treated with anti-diabetics for an average of 2.19 (SD=0.87) Years, ranging from under five years, 53 (30.5%) through 5-10 years, 35 (20.1%) to over ten years, 86 (49.4%) **(Figure 1)**.

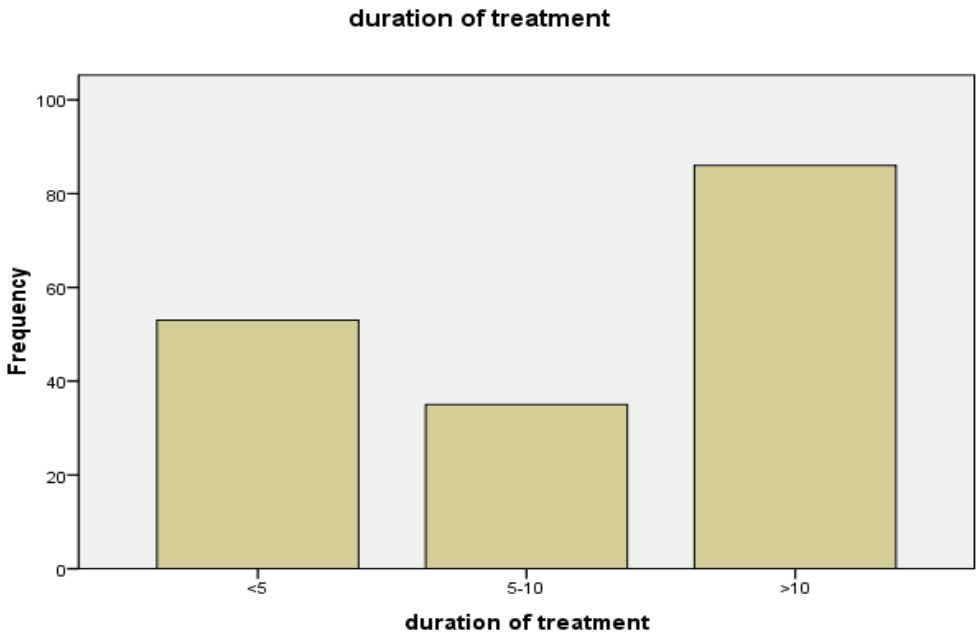

Figure 1. Duration of type 2 diabetes among patients attending the diabetic clinic of Limmu Genet Hospital February to March 2017.

Diabetic Complication and Co-Morbidities

On patient medical record review, 76 (43.7%) patients were found to have at least one long term diabetic complication, among which neuropathy accounted for the highest Percentage 50 (28.7%). Similarly, 83 (47.7%) patients had at least one co-morbid-condition, hypertension being the major type of co-morbidity 63 (36.2%) **(Table 2)**.

Table 2. Presence of co-morbidities and diabetic complications among type 2 diabetic patients attending the diabetic clinic at Limmu Genet Hospital at February to March 2017.

Variables	Frequency	Percent	P-value	COR (CI 95%)
Complications				
Diabetic Complications				
Present	76	43.7	0.537	1.460 (0.438-4.864)
Absent	98	56.3		1
Type of Diabetic Complication				
Neuropathy	50	28.7	0.887	0.876 (0.142-5.396)
Retinopathy	10	5.7	0.501	1.752 (0.343-8.964)
Retinopathy	2	1.1	1	0.571 (0.00-...)
Retinopathy+neuropathy	11	6.3		1
Co-morbidities				
Co-morbidities				
Absent	91	52.3		1

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Present	83	47.7	0.5	1.647 (0.636-2.932)
Type Co-morbidities				
Hypertension	63	36.2	0.615	1.229 (0.550-2.744)
Ischemic Heart Disease	14	8	1	0.536 (0.00...)
Dyslipidemia	4	2.3	1	0.302 (0.00...)
Hypertension+IHD	2	1.1		1

Prescribed Anti-Diabetic Medications

Assessment of the prescribed anti-diabetic medications among the patients revealed that combination of oral medication 83 (47.7%) were the most commonly prescribed drugs followed by Insulin 37 (21.3%). Enalapril was found to be the major type of non-ant diabetic medication which was prescribed for 67 (38.5%) patients **(Table 3)**.

Table 3. Prescribed anti diabetic medications for type 2 diabetic patients attending the diabetic clinic of Limmu Genet Hospital at February to March 2017.

Variables	Frequency	Percent	P-value	COR (CI 95%)
Anti-diabetic medication				
Metformin	34	19.5	0.404	0.559 (0.142-2.192)
Glibenclamide	4	2.3		
Insulin	37	21.3	0.313	0.610 (0.233-1.593)
Metformin+glibenclamide	83	47.7		
Insulin+metformin	15	8.6	0.99	0.513 (0.232-1.133)
			0.526	2.235 (0.186-26.908)
				1
Other Medications				
Enalapril	67	38.5	0.229	0.636 (0.305-1.329)
Others*	96	55		1

* ASA: Atorvastatin; Vitamin B6+B3 (neurobin), Atenolol+ASA, amylodipine

Medication Adherence among Diabetic Patients

Assessment of patients' responses to the 8-item Morisky adherence predictor scale showed that 71 (40.8%) patients had high adherence, 62 (35.6%) had have medium adherence and about 41 (23.6%) had low adherence to the prescribed regimen of their anti-diabetic medications **(Table 4)**.

Table 4. Rate of anti-diabetic medication adherence among patients attending the diabetic clinic of Limmu Genet Hospital at February to March 2017.

Morisky scale	Frequency	Percent	P-value	COR (CI 95%)
High adherence	71	40.8	0.488	0.776 (0.379-1.588)
Medium adherence	62	35.6	0.917	1.043 (0.47-2.297)
Low adherence	41	23.6		1

Glycemic Control among Diabetic Patients

Poor glycemic control had seen in 111 (63.8%) respondents. Fasting blood glucose result of last three clinic visit was obtained from patient's medical record to determine glycemic level of the patients. The average the last three fasting blood glucose measurements were used to determine patient's glycemic control status.

Mean fasting blood glucose (FBS) of the whole respondents was 130.38 mg/dl .Proportion of patients with good glycemic control at level of FBS 81-130 mg/dl was 63 (36.2%), most 100 (57.5%) had FBS>131 mg/dl and only 11 (6.3%) had FBS<80 mg/dl **(Table 5)**.

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Table 5. Magnitude of glycemic control among type 2 diabetes patients attending Limmu Genet Hospital from February to March 2017.

Glycemic control (mg/dl)	Frequency	Percent
<80	11	6.3
81-130	63	36.2
>131	100	57.5

Factors associated with poor glycemic control

Assessment of factors associated with poor glycemic control by statistical association test reveal that; educational status (p=0.002), monthly income (P=0.010), regular follow up (p=000), duration of treatment (p=0.003) and family supports (p=0.002) were statistically significant. Patients with educational status secondary and above were more likely to attain adequate glycemic control compared to those of illiterate and primary school. Similarly, compared to patients who get monthly income of greater than average, those patients who get monthly income of less than average were more likely to attain inadequate glycemic control. Additionally patients who follow their ant-diabetic medications regularly and those get support from their family are more likely to attain adequate glycemic control **(Table 6)**.

Table 6. Factors associated with poor glycemic control among type 2 DM patients at Limmu Genet Hospital at February to March 2017.

Variables	Frequency	Percentage	P-value COR (CI 95%)
Educational status			
Illiterate	66	37.9	0.002 3.656 (1.624-8.234)
Primary	58	33.3	0.003 3.825 (1.556-9.404)
Secondary	37	21.3	0.003 7.20 (2.001-25.909)
College and above	13	7.5	1
Monthly Family Income (ETB)			
Very low (≤ 445)	71	40.8	0.3991.353 (0.670-2.732)
Low (446-1200)	75	43.1	0.010 3.682 (1.362-9.961)
Average (1201-2500)	22	12.6	0.86 7.650 (0.751-77.96)
Above average (2501-3500)	4	2.3	0.515 2.550 (0.152-42.76)
High (≥ 3501)	2	1.1	1
Duration of treatment			
<5	53	30.5	1
05-Oct	35	20.1	0.178 1.312 (0.762-4.309)
>10	86	49.4	0.003 1.820 (0.151-0.677)
Regular Follow up			
No	76	43.7	0.000 3.456 (1.752-6.815)
Yes	98	56.3	1
Family support			
No	71	40.8	0.002 2.885 (1.464-5.686)
Yes	103	59.3	1

DISCUSSION

This study assessed magnitude of glycemic control and factors affecting glycemic control among type 2 diabetic patients at LGH, Jimma zone Ethiopia. The mean fasting blood glucose of the overall study subjects were 130.38 mg/dl. This finding is less than the study done in Jimma specialized hospital, Ethiopia where mean fasting blood glucose was 171 ± 63 mg/dl [18]. And also in line with study in Addis Ababa where mean fasting blood glucose was 190 ± 89.6 mg/dl [19]. But this finding is much higher than the American Diabetic Association recommendation [18].

Our study found that proportion of patients with poor glycemic control is 63.8%. This finding is less than a study conducted at Jimma specialized hospital where proportion of patients with poor glycemic control is 70.9% [17,20]. The study conducted in Ambo, Amman Jordan and Gondar came up with proportion of poor glycemic control of 50%, 65.1%, 64.7%, respectively which is similar with this finding [10,21,22]. This finding is also far higher than from developed countries such as 12.9% in United States [23]. This variation could be due to knowledge difference of respondents between developing and developed countries, absence of uniform guidelines in assessing glycemic control for physicians to set the score cut-off and the presence health insurance and the difference in health insurance coverage and access to primary care.

Significant difference of poor glycemic control was observed among illiterates than college/university graduates. This study results that low education level patients more likely correlated with poor glycemic control. In contrast to this, study done in the United Kingdom which shown that patients with low educational level had better compliance and also patients with low

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educational level have more trust in the physicians' advice [24]. The possible explanation could be illiterate patients had low diabetes knowledge, low self-management behaviors, lower self-efficacy and lower continuity of care.

Hypertension and coronary heart diseases were the most frequent co morbidities among type-II diabetes patients in our study. These findings are consistent with the established theory of metabolic syndrome, which is strongly associated with CVD in T2DM. Similar to other studies, no significant correlations were found between hypertension and number of co morbidities in patients with poor glycemic control [25].

The duration of diabetes mellitus was correlated with the outcome of glycemic control (HbA1c). Previous work in Hong Kong has also shown that patients with longer duration of diabetes and more complex treatment regimens were associated with poorer glycemic control [23]. A study conducted by Juarez et al also showed that patients who had had diabetes for 10 years were more than nine times are more likely to have poor glycemic control than those who had had diabetes for 3 years [26]. A longer duration of diabetes negatively affects glycemic control, possibly because of progressive impairment of insulin secretion over time as a result of β-cell failure. Therefore, as the disease progresses, most patients require an increase in their pharmacotherapy to maintain glycemic control.

Patients with no health insurance were significantly more likely to have poor glycemic control as compared with patients with health insurance. In this study, Lack of health insurance affects accessibility and affordability of medicines and diagnostic services in T2DM patients. As a result, lack of health insurance has been linked to poor glycemic control. Interestingly, the study conducted by Harris et al did not show an association between health insurance coverage and glycemic control among patients [25]. The observed differences could probably be explained by differences in population characteristics, resource utilizations, human resources and other support facilities in different settings.

Limitations of the Study

Our Study is cross sectional where causal relationship between the independent and dependent variables cannot be established. Also using fasting plasma glucose to assess adequacy of glycemic control was also recognized by the researchers. Non-availability of HbA1c assay in the study center.

However, this study gave some useful insight into the magnitude of the glycemic control among the study population and provides useful baseline information for consultative, comparative and future research purposes in the study center.

CONCLUSION AND RECOMMENDATION

This finding obtained from statistical association that longer duration of disease, low level of educational standard, low level monthly income and lack of adequate follow up were associated with poor glycemic control. Further researches should be conducted using HbA1c.

REFERENCES

1. Ramphal R. Endocrinology and metabolism. In: Fauci AS, Braunwald E, Kasper DL. eds. Harrison Principles of Internal Medicine. 17thed. New York, NY: McGraw Hill Medical. 2008:949-956.
2. American Diabetes Association: Economic costs of diabetes in the U.S. in 2007. Diabetes Care. 2008;31:596-615.
3. King H, et al. Global burden of diabetes, 1995–2025: prevalence, numerical estimates and projections. Diabetes Care. 1998;21:1414-1431.
4. Gall MA, et al. Albuminuria and poor glycemic control predict mortality in NIDDM. Diabetes. 1995;44:1303-1309.
5. Blaum CS, et al. Characteristics related to poor glycemic control in NIDDM patients in community practice. Diabetes Care. 1997;20:7-11.
6. Cho N, et al. International diabetes federation atlas report: Global burden of diabetes. Belgium, Brussels. 2013.
7. Mooradian A. Cardiovascular disease in type II diabetes mellitus: Current management guidelines. Arch Intern Med. 2003;163:33-40.
8. Gill G, et al. Non communicable diseases in the developing world. Diabetes Int. 1999;9:58.
9. Wallace, et al. Poor glycemic control in type 2 diabetes, conspiracy of disease, suboptimal therapy and attitude. Q J Med. 2000;93:369-374.
10. Benoit SRFR, et al. Predictors of glycemic control among patients with type 2 diabetes: A longitudinal study. BMC Public Health. 2005;5:36-44.
11. Khattab M, et al. Factors associated with poor glycemic control among patients with type 2 diabetes. J Diabetes. 2010;24:84-89.
12. Otiniano EM, et al. factors associated with poor glycemic control in older Mexican American diabetes aged 75 years and orders. J Diabetes Complication. 2012;26:181-184.

e-ISSN:2319-9865
p-ISSN:2322-0104

13. TVD, et al. Self-care activities, diabetic distress and other factors which affected the glycaemic control in a Tertiary Care Teaching Hospital in South India. J Clin Diagn Res. 2013;7:857-860.

14. Abebe, et al. Level of sustained glycemic control and associated factors among patients with diabetes mellitus in Ethiopia: A hospital-based cross-sectional study. Diabetes Metab Syndr Obes. 2015;50:65-71.

15. Angamo MT, et al. Determinants of glycemic control among insulin treated diabetic patients in southwest Ethiopia: Hospital based cross sectional study. PLoS ONE. 2013;8:4.

16. Hailu E, et al. Self-care practice and glycaemic control amongst adults with diabetes at the Jimma University Specialized Hospital in south-west Ethiopia: A cross-sectional study. Afr J Prm Health Care Fam Med. 2012;4.

17. Wube TN, et al. Medication adherence in diabetes mellitus and self-management practices among type-2 diabetics in Ethiopia. N Am J Med Sci. 2011;3:418-423.

18. American Diabetic Association: A.D. Standards of medical care in diabetes. J Diabetes Care. 2013;S11-S66.

19. Feleke Y and Enquselassie F. An assessment of the health care system for diabetes in Addis Ababa, Ethiopia. Ethiop J Health Dev. 2005;19:204-208.

20. Tefera K et al. Factors associated with glycemic control among adult patients with type 2 diabetes mellitus: A cross-sectional survey in Ethiopia. 2014.

21. Woldu MA, et al. Factors associated with poor glycemic control among patients with type 2 diabetes mellitus in Ambo Hospital, Ambo, Ethiopia. Endocrinol Metab Synd. 2014;3:143.

22. Abebe, et al. Level of sustained glycemic control and associated factors among patients with diabetes mellitus in Ethiopia: A hospital-based cross-sectional study. Diabetes Metab Syndr Obes. 2015;50:65-71.

23. Ali MK, et al. Characteristics associated with poor glycemic control among adults with self-reported diagnosed diabetes—National Health and Nutrition Examination Survey, United States, 2007-2010. MMWR Morb Mortal Wkly Rep. 2012;61:32-37.

24. Juarez DT, et al. Factors associated with poor glycemic control or wide glycemic variability among diabetes patients in Hawaii, 2006-2009. Prev Chronic Dis. 2012;9:1-10.

25. Harris M, et al. Racial and ethnic differences in glycemic control of adults with type 2 diabetes. Diabetes Care. 1999;22:403-408.

26. Senior V, et al. Self-reported adherence to cholesterol-lowering medication in patients with familial hypercholesterolemia: The role of illness perceptions. J Cardiovasc Drugs Ther. 2004;18:475-481.