Adherence Of Diabetic Patients To Medication And Self-Care Practice And Factors Associated With Non-Adherence At Shashemene Referral Hospital, West Arsi Zone, Oromia Region, South East Ethiopia.

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Abstract

Background: Diabetes mellitus is a chronic and progressive disorder that has profound effect on almost every aspect of daily activities. Inadequate adherence to prescribed medication is a major problem in diabetes mellitus and is usually responsible for therapeutic failure. This in turn leads to unnecessary health cost increment.

Objective: To assess adherence to anti-diabetic medication and self-care practice and associated factors for non-adherence in Shashemene referral hospital, west Arsi zone, Oromia region, southern Ethiopia.

Method and participants: a cross sectional study design was conducted to determine the level of adherence to anti-diabetic treatment and self-care and associated factors for non-adherence among diabetic patients seeking medical follow-up whose age was 18 years and above and were volunteer and cross-sectional review of case charts in Shashemene referral hospital, Using structured questioner, from (January 24-Feb.7/2014). Data was collected, compiled and analyzed using the statistical package for social sciences (SPSS v20) to determine the level of adherence to anti-diabetic treatment and self-care practice and associated factors for non-adherence among diabetic patients in Shashemene referral hospital.

Result: A total of 280 diabetic patients comprising 154 (55%) male and 126 (45%) females were included in this study. Sixty five (23.2%) of the diabetic patient were non-adherent to their medication and 75% were non-adherent to self-care practices. Factors like side effect and complexity of regimen, failure to remember, educational level, monthly income and age of respondents as well as healthcare providers' related factors like frequency of counseling, dose patient served on each visits were significantly associated with non-adherence to medication and self-care practices.

Conclusion: In conclusion non-adherence to medication and self-care practices among diabetic patient in this study was high particularly among patients with side effect and complexity of regimen and failure of remembering of patients. Non-adherence was associated with factors like age, educational level, monthly income, side effect and complexity of regimens and forgetting of patients.

Recommendations: It is better if data collection time is increased from two weeks to four weeks in order to have enough data for better outcome (to Jimma university research committee).

Since there were no another studies that addresses the adherence to DM treatment done in the hospital it is better to use this finding as a bases (to Shashemene referral hospital).

To improve patient providers' relationship as those who have good patient providers' relationship are more adherent than those do not (to Shashemene referral hospital professionals).

It is recommended that to increase level of education of the population as it has great impact on outcome of the treatment (to the government).

Key words: Adherence, Self-Care Practices, Medication, Shashemene hospital, Diabetes.

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Acronyms and Abbreviations

ADA   American Diabetes Association

BGL   Blood Glucose Level

DM   Diabetes mellitus

HbA1c   Glycosylated hemoglobin

HCP   Health Care Provider

IDF   International Diabetes Association

JU   Jimma University

OHAs   Oral Hypoglycemic Agents

OHG   Oral Hypoglycemia

SPSSv20   Statistical Package for Social Sciences Version 20

SRH   Shashemene Referral Hospital

WHO   World Health Organization

Operational/standard definition

Health literacy: the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.

Adherence: the extent to which a person's behavior, taking medication, following diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider [5].

Adhered to medication: Taking all medication as counseled by health-care providers.

Adhered to self-care: following the recommended diet management practices at least 3-4 times a week.

Complexity of regimen: a drug regimen was considered complex if patient was taking >/= 2 drugs with daily dosing of twice or more each [35].

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1 Introduction

1.1 Background

Diabetes mellitus (DM) is a metabolic disorder resulting from a defect in insulin secretion, insulin action, or both. Insulin deficiency in turn leads to chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism. DM as a non-communicable disease has significant public health importance and its prevalence is rapidly rising all over the globe at alarming rate. It is now regarded as a global epidemic and more than 230million people worldwide are living with diabetes. This number is expected to rise to a staggering 350 million (6.3% of the world population) within 20 years [1].

In United States, more than 13.8 million Americans have diabetes and Type 2diabetes accounts for 90% to 95% of the diagnosed cases with 800,000 new cases reported each year[1]. In Australia, chronic diseases like diabetes now contribute to over 70% of the disease burden, and this is expected to increase to 80% by2020. China with its large population of 1.3 billion has 30million diabetic adults, while India has 35.5 million [2].

In Africa, the traditional rural communities still have low prevalence of 1-2% (except in specific high risk groups) while1-13% or more adults in urban communities have diabetes. Nigeria has 7% of its population as diabetic [3, 4]. In view of the rate at which diabetes is now increasing, especially in developing countries, and with its long and short term complications, there is urgent need for diabetic patients to adhere and maintain the American Diabetic Association's Clinical Practice recommendations of tight plasma glucose control of 80 – 120 mg/dl for fasting glucose measurement, eat as recommended, perform other self-care activities, and go for checkup necessary [5].

Though national data regarding the prevalence of diabetes in Ethiopia are non-existing, diabetes care were estimated to about 800,000 by the year 2000 and projection for the number of people with diabetes (within 20-79 age group) show that some 2.6 million people are expected to have diabetes in Ethiopia by the year 2025[6]. Based on the IDF Atlas 5th edition, 2012 report, number of cases of diabetes in Ethiopia is estimated to be about 1.4 million in 2011. The number may outstrip beyond this as access to care, as a major problem in Ethiopia, may contribute to

poor prognosis for people with diabetes [7]. Patient has to travel long to nearest medical center in order to get medical care and medication. In addition, high cost of medication and overall medical cost remains a very serious problem [8].

Adherence to chronic disease treatment have evidenced that patients often discontinue their medication or even do not take them at all because they consider them ineffective or experience untoward side effects. Non –adherence to medication is one of the major factors of treatment failure in chronic disease treatment. Different definition of adherence have been proposed but it is generally defined as not less than 80% use of prescribed drugs and other procedure, as well as compliance with doses, times, and treatment duration. It represents the final steps of a proposed rational drug use [9, 10]. Regimen adherence problems are common in individuals with diabetes, making glycemic control difficult to attain. If diabetic management goals are to be achieved, all factors and circumstances that predispose or contribute to patients' non-adherence to regimen should be part of the health caregivers' concern. This underscores the need to investigate the obstacles to non-adherence to diabetes dietary regimen. Many factors can affect treatments adherence and there is no consensus on which has greatest impact. First, it should be considered whether patients have access to medications. Ruling out the possibility no access, patient's adherence to drug therapy can be divided into four groups of factors. Patient related, patient - provider relationship, the therapeutic regimen, and disease itself [9].

Diabetes is one of the chronic illnesses for which self-management plays a central role in care. To optimize their health, individuals with diabetes may be advised regarding diet and exercise, frequent medical examinations, annual specialized examinations of their eyes and feet, and, for many, prescribed multiple oral or injected medications every day. Until there is a cure for diabetes, these behaviors must be sustained for a lifetime [11]. Patients with diabetes need nutrition recommendations that are supported by scientific evidence and that can be easily understood and translated into everyday life. To achieve positive outcomes, a coordinated team effort that provides continued education and support is essential [12].

Self-care implies that the patient actively monitors and responds to changing environmental and biological conditions by making adaptive adjustments in the different aspects of diabetes mellitus treatment in order to maintain adequate metabolic control and reduce the probability of

complications [13]. Self-care behaviors involved in achieving adequate metabolic control and avoiding long term complications are: home glucose monitoring (i.e. in blood or urine); adjustment food intake, especially of carbohydrates, to meet daily needs and match available insulin; administration of medication (insulin or oral hypoglycemic agent): regular physical activity, regular medical visits, and others behaviors that may vary depending on the type of diabetes [14].

1.2 Statement of the Problem

Diabetes mellitus is approaching epidemic proportions worldwide [15]. In the United States alone; an estimated 24 million people have diabetes [18] with a projected prevalence of 48 million by 2050 [17]. It is the seventh leading cause of death in the United States and likely to be underreported as a cause of death [18, 19]; and the leading cause of lower extremity amputation, end-stage renal disease, and blindness among person aged 18-65 years [20].

Prevalence of DM was previously thought to be rare or undocumented in Africa, but over the past few decades it has emerged as an important non-communicable disease in sub- Saharan Africa. Mortality attributable to diabetes in sub- Saharan Africa is estimated, in 2010, at 6% of total mortality, an increase from 2.2-2.5% in 2000. The absolute and relative mortality rates are highest in 20-39 year age group (i.e. the most economically productive population) [10].

Diabetes also imposes significant economic burdens with medical expenditures attributable to hospitalizations, medications, outpatient visits, and treatment of chronic complications [21]. People with diabetes, on average, have medical costs that are 2.3 times higher than people without the disease [21].

Inadequate adherence to prescribed medication is a major problem in diabetes mellitus and is usually responsible for therapeutic failure. Non-adherence in chronic diseases has been described as taking less than 80% of the prescribed treatment [22]. Previous studies have found adherence to diabetes treatment generally to be sub-optimal ranging from 23 to 77% [22 – 25]. In addition, these studies have generated varied results of the factors associated with non-adherence to diabetes treatment. Most of the studies, however, were carried out in developed countries, leaving a gap in knowledge about the prevalence and factors that may be associated with adherence to diabetic treatment in Nigeria, a developing country. Non-adherence to prescribed drugs schedule has been and continues to be a major problem the world over. Studies on this subject show that adherence is about 50% for medications in chronic diseases and much lower for lifestyle prescriptions [15, 16].

Diabetes is considered to be one of the most psychologically and behaviorally demanding of the chronic diseases [17]. It requires frequent self-monitoring of blood glucose, dietary

modifications, exercise, and administration of medication on schedule [17-20]. In view of the need to prevent or delay the development of diabetes complications, the researchers reasoned that if diabetic patients would be empowered to manage their illness better, they need to be helped to identify and manage factors that contribute to non-adherence to dietary regimen as compliance is a crucial component of chronic illness, self-management. The obstacles associated with adherence in resource limited settings should be determined so as to lower the impact of a disease that is on the increase on the health systems, which are already overburdened with communicable diseases.

Self-care implies that patient actively monitors and responds to changing environmental and biological condition by making adaptive environmental adjustment in the different aspects of diabetes treatment in order to maintain adequate metabolic control and reduce the probability of compliance [10].

1.3 Literature Review

Diabetes mellitus is highly prevalent affecting approximately 150 million people worldwide [26], and this number is expected to rise to 300 million in the year 2025 [27]. The International Diabetes Federation (IDF) estimates the total number of diabetic subjects to be around 40.9 million in India and this is further set to rise to 69.9 million by the year 2025 [28].

Diabetes mellitus affects nearly 24 million Americans, making diabetes one of the most common chronic diseases in USA. A current empirical research suggests that the number of individuals diagnosed with diabetes (per year) to be doubled by year 2034 [29]. According to the American Diabetes Association (ADA), the management of diabetes can be costly, generating both large direct ($116 billion) and indirect ($68 billion) medical costs [32]. Diabetic patient spend an average of $10,000 per year compared with $2,700 for non-diabetic patients; most of these costs are associated with hospitalization due to chronic diabetes related complications [30].

Adherence to treatment for type 1 and 2 diabetes mellitus includes tasks such as medication-taking, daily insulin injection, self-monitoring of glucose level (daily or several times per day), complex dietary restriction, frequent eye examinations, and daily exercise routines [31,32]. On an average, 25% of patients are non –adherent to treatment. For patients with chronic disease (e.g. diabetes), rates of non-adherence are 50% or more [10]. Additionally among children and adolescents, 50-70% is non-adherent to medications directives [11].

The compliance rate to the anti-diabetic drugs was found to be 57.7% (271/470), while 42.3% (199/470) were non-compliant. It was also observed that only 36.4% (171/470) and 27.0% (127/470) of the study participants had followed the prescribed diet plan and the exercise schedule respectively in the preceding week. Fifty-nine percent (279/470) of the participants had either adequate or some knowledge about the complications of diabetes, while nearly 41% (191/470) had no knowledge about these. A systematic review on the compliance to medication among diabetic patients, showed that the average compliance to the oral hypoglycemic agents ranged from 36%-93% [33]. In a study from Saudi Arabia, the overall prevalence of the therapeutic compliance of the participants was found to be 32.1% [34].

Twenty eight percent of diabetic patient from an urban primary care clinic of New York City [35], 28.9% in Uganda [37], 59% in Nigeria [38], and 21.7% in southern Brazil and 39% in Egypt [36] were reported to be non-adherent to their anti-diabetic therapy. A study in Egypt showed that there was a statistically significant difference between 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 [36]. However, the spectrum of non-adherence and its associated factors in Ethiopia setup have not been investigated before, Previous studies conducted at the diabetic clinic of Jimma University specialized Hospital, demonstrated that 47% of patient had poor glycemic control and many patients developed diabetes related complication [39].

Study done in Bangladesh showed that around 37% did not adhere to BG monitoring. Non-adherence to diet was 44.8%, to foot care 43.2% and to exercise 33.2%. About 37.2% were non-adherent to smoking after receiving advice. Non-adherence to OHA was 20% while 6.6% non-adhered to insulin. About 50.4% patients had problem in mobility, 28.2% in self-care, 47.6% in usual activities, 72.8% in pain/discomfort and 73.6% in anxiety/depression [40].

1.4 Significance of the study

Several studies suggest that a large proportion of people with diabetes have difficulty managing their medication regimens (oral hypoglycemic agents [OHAs] and insulin) as well as other aspects of self-management as a result of low level of adherence. Identifying the factors affecting adherence to DM treatment will give insights into the reasons behind high defaulter and subsequently low treatment success rates. The result of the study may contribute to increase the awareness of patients and health care providers on the issue of adherence. This study may help to develop strategies for improvement of adherence to anti-diabetic medication and self-care practice. Identifying factors in adherence will lead to finding more efficient and effective ways of enhancing patients' adherence. It will also help healthcare providers compare their perceived factors related to patients' live experiences thus enhancing patient/provider communication and better therapeutic relationship that aids adherence.

2 Objectives

2.1 General objective

➤ To assess level of adherence of diabetic patient to medication and self-care practice and factors associated with non-adherence at Shashemene referral hospital southern Ethiopia.

2.2 Specific objectives

➤ To assess level of adherence of diabetic patients to medication at Shashemene referral hospital.

➤ To assess level of adherence of diabetic patients to self-care practice at Shashemene referral hospital.

➤ To identify associated factors for non-adherence at Shashemene referral hospital.

3. Method and participants

3.1 Study area and study period

The study was conducted in Shashemene referral hospital which is found in Shashemene town, west Arsi zone, Oromia region, south east Ethiopia. Shashemene town is located 250km to the south of, Addis Ababa, the capital city of Ethiopia.

The Hospital has several departments to deliver diversified health care activities through a number of different care providing units. Among the units diabetes follow up clinic is the one which provides anti-diabetic treatment and counseling. The study was conducted from January24 to Februarys7, 2014.

3.2 study design

A cross-sectional study was conducted by interviewing the consecutive patients seeking follow up using structured questionnaire and by reviewing case charts using checklist to assess the level of adherence to anti-diabetic treatment and self-care practice among DM patients, who were following their treatment in Shashemene referral hospital.

3.3 populations

3.3.1 Source population

Source populations for the adherence study were all DM patients (866) who were on anti-diabetic treatment during the study period at Shashemene referral Hospital.

3.3.2 Study participants

The study participants was all DM patients who were on anti-diabetic for at least one month in the specified study period and met the inclusion criteria(280 patients).

3.3.3 Inclusion criteria

Patients that have been on anti-diabetic drugs for more than one month, age above 18 years, who have no communication problem, who have no mental problems and volunteer to participate in the study were included in the drug adherence of the study.

3.3.4 Exclusion criteria

Elders above 80 years, those with obvious psychiatric problems and prisoner patients were not included in the study of treatment adherence.

3.4 Study Variables

Dependent variables

➢ Adherence or non-adherence to drug regimen and self-care

Independent variables

➢ Duration of the treatment
➢ Adverse effect of the drugs
➢ Consultation time
➢ Follow up
➢ Age
➢ Sex
➢ Marital status,
➢ Educational level ,
➢ Occupation,
➢ Income

3.5 Sample size determination

The required sample size for study was calculated by using the simple population proportion formula .Sample size was determined to estimate level of adherence to anti-diabetic treatment and self-management with reasonable degree of accuracy (i.e. margin of error was taken as 5% with 95% confidence) assuming 50% for the level of adherence of the patient to anti- diabetic treatment.

Based on the above assumption, the following formula was used to estimate the required sample size

$$n = \frac{(Z\alpha/2)^2 P (1-P)}{d^2}$$

Where:

n = the required minimum sample size,

Z= the critical value from standard Normal distribution considering 95% confidence in the estimate of the prevalence of adherence,

P=the expected proportion of adherence to anti-diabetic treatment and self-care of study participants and

d=assumed margin of error in the prevalence of adherence to anti-diabetic treatment and self-care.

The resulting sample size was; $n = \dfrac{(Z\alpha/2)^2 P\,(1\text{-}P)}{d^2} = \dfrac{(1.96)^2\,(0.5)\,(0.5)}{0.05^2} = 384$

Since number of total population (N) was < 10,000 sample size was adjusted by the following formula: $n_f = n/[1 + (n/\,N)]$

Then $nf = 384/\,[1+ (384/866)] = 266$

Then the final adjusted sample size for non- respondent

$$n_f = 266 + 5\% \text{ non-respondent rate}$$

$$n_f = 266 + 14 = 280$$

3.6 Method of data collection

Structured questionnaire was used to collect information on the level of adherence to anti-diabetic treatment and self-care practice in Shashemene referral hospital.

3.7 Data collection technique

3.7.1 Data Collection Instrument

A pretested questionnaire was used to collect data. Necessary correction was made on the clarity of language of format.

3.7.2 Data Collection

Data was collected by using pretested data collection format.

3.8 Data Quality Assurance

To assure the quality of the data the following measure was taken. Properly designed structured questionnaire was used. Every day the collected data was reviewed and checked for completeness and consistency of response.

3.9 Data processing and analysis

Data analysis was carried out using the statistical package for social sciences (SPSS v20) to assess level of adherence. Descriptive analysis was used to describe the percentages and number distributions of the respondents by socio-demographic characteristics, the percentage and number distributions of variables in the study.

3.10 Ethical Consideration

Ethical approval was obtained from Jimma University, College of Public Health and Medical Science, school of pharmacy. Letters of permission was presented to Shashemene referral hospital. Permission was obtained from Shashemene referral hospital and verbal consent of the patients was sought before administering questionnaires. Name of the patient was omitted from the questionnaire in order to keep confidentiality.

3.11 Plan for dissemination of findings

The finding of this study will be disseminated to the college of public health and medical science (JU) department of pharmacy and Shashemene referral hospital.

3.12 Strengths and Limitations of the study

The Strengths of the study were High response rate and since there is no similar study conducted in the area, it can contribute a lot as baseline information for future studies. Limitations were Social desirability bias, Limitation of related literatures to compare and discuss some of the findings and because the study designs were cross-sectional method, the direction of causal relationship between variables can't always be determined.

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4. Result

4.1 Socio-demographic Characteristics

A total of 280 diabetic patients comprising 154 (55%) male and 126 (45%) females were included in this study. majority of the participants were in the age range of 31-60 years (67.5%) and married 217 (77.5%). The monthly income of 154(55%) 0f the patients were below 500 Ethiopian birr (table.1). the patients' disease and medication related information revealed that most of the patients, 126 (43.9%) were on the diabetic treatment for 1-5 years while 63 (22.0%), 98 (34.1%) were on the diabetic treatment for less than one year and greater than five years respectively.

Table 1: Socio-demographic characteristics of diabetic patients at diabetic clinic of SRH, January 24-Feb.7/2014 (n=280).

Socio-demographic Characteristics	Frequency	Percent (%)
Sex of respondent		
Male	154	55
Female	126	45
Age of respondent		
18-30	42	15
31-60	175	62.5
>60	63	22.5
Marital status		
Single	28	10
Married	217	77.5
Divorced	21	7.5
Widowed	14	5
Religion of respondent		
Orthodox	65	23.2
Catholic	14	5
Protestant	77	27.5
Muslim	96	34.3
Others	28	10
Ethnicity		
Oromo	147	52.5
Amara	57	20.4
Tigre	29	10.4
Gurage	16	5.7
Others	31	11.1

Educational Level

Illiterate	77	27.5
Primary	77	27.5
Secondary	42	15
College/University	84	30

Occupation Of Respondent

Government Employed	33	11.8
Private Employed	27	9.6
Unemployed	42	15
Student	21	7.5
Farmer	73	26.1
Merchant	49	17.5
Housewife	28	10
Others	7	2.5

Monthly Income

<500	154	55
500-2000	77	27.5
>2000	49	17.5

Chewing Of Chat

Yes	42	15
No	238	85

Smoking Of Cigarette

Yes	7	2.5
No	273	97.5

Drinking Of Alcohol

Yes	42	15
No	238	85
Total	280	100

Distance From Clinic

<6	91	32.5
6-24	119	42.5
>24	70	25

Residence

urban	189	67.5
Rural	91	32.5

4.2 Medication and healthcare providers related factors

A majority, 133 (47.5%) of the participants were served with monthly doses and 249 (89.9%) had good patient provider relationship. Sixty five (23.20%) participants missed their medication in one month prior to study period. Most of them (42.5%) were on DM treatment for 1-5 years.

Table 2: Distribution of patient, medication and health care providers, related factors among DM patient in diabetic clinic of SRH, January 24-Feb.7/2014.(n=280).

characteristic	Frequency	Percent (%)
Patient Provider Relation Ship		
Good	249	88.9
Moderate	28	10
Weak	3	1.1
Dose Served On Each Visit		
Monthly Dose	133	47.5
2 Months Dose	98	35
3 Months Dose	49	17.5
Frequency Of Counseling		
On The First Visit	175	62.5
On Each Visit	91	32.5
Once A While	14	5
Duration On DM		
<1	63	22.5
1-5	119	42.5
>5	98	35
Missing Of Medicine In The Last 4weeks?		
Yes	65	23.20
No	215	76.80
Forgetting To Take		
Yes	35	12.5
No	245	87.5
Feel Side Effect		
Yes	21	7.5
No	259	92.5
When Feel Better		
Yes	14	5
No	266	95
Complexity Of Drugs		
Yes	29	10.4
No	251	89.6
Type Of Diabetic Medication		
One OHA	89	31.8
Combined Hypoglycemic	150	53.6
Insulin Containing Combination	41	14.6

4.3 Self-care practices

The majority, 210 (75%) 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 70 (25%) study participants were Adhered which means follow the recommended diet management practices at least 3-4 times a week. Variables like education level, monthly income and marital status were showed statistically significant association with adherence to diet management practices.

Table 3: Level of self-care of diabetic patients at diabetic clinic of SRH, January 24-Feb.7/2014, (n=280).

Self-care practices	Frequency	Percent (%)
Self-glucose monitoring		
yes	70	25
no	210	75
Diet and meal planning		
yes	70	25
No	210	75
Blood pressure control		
Yes	203	72.5
No	77	27.5
Sign and symptom of low and high blood sugar		
Yes	224	80
No	56	20
Routine eye and foot examination		
Yes	203	72.5
No	77	27.5

Among the patients who felt side effect the majority 10(46.62%) were due to gastro intestinal side effects like constipation, and diarrhea while 6(28.58%) and (23.80%) were due to headache and hypoglycemia respectively (Fig 1).
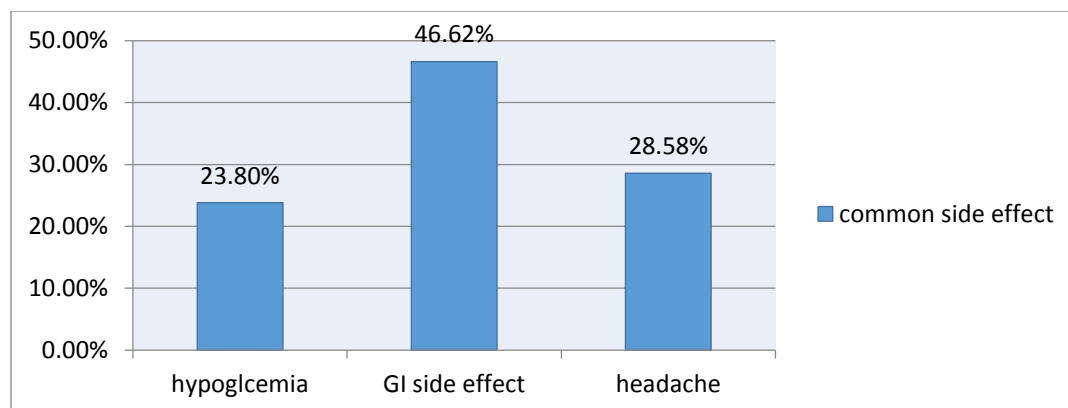
Figure 1: Common side effect of medication among diabetic patients at diabetic clinic of SRH, January 24-Feb.7/2014 (n=280).

4.4 Non-adherence and associated factors

As it can be observed from the computed chi-square, p-value .000 indicates that there is an association between monthly income, age of respondents and duration on DM and missing of taking medication in the last four weeks during the study period since the p-values of the computed chi-square test statistics is less than 5% significant level.

Table 4: Factors associated with non-adherence among diabetic patient at diabetic clinic of SRH, January 24-Feb.7/2014(n=280).

Factors	Adherence		
	Adhered	Non-adhered	**P value**
Monthly income	215	65	.000
Age of respondents	215	65	.000
Duration on DM	215	65	.000
Forgetting to take	24	11	0.219
Feel side effect	11	10	.006
Complexity of drugs	16	12	.030
Frequency of counseling	214	66	.000
Dose served on each visit	215	65	.014

5. Discussion

 The main goal of diabetes management is to improve the quality of life of the patients so that they can possibly have normal life. Successful management depends upon the extent to which a person's adherence of keeping appointments, monitoring his/her glycemic status, taking medication and making lifestyle changes.

A self-reported, 4-item Morisky medication adherence scale was used to assess medication non-adherence. This was done by requiring patients to answer the questions on the basis of their adherence behavior of last one month during the study period. The patients' remembering of medication taking behavior was low as the time between each visit was longer. Most people with diabetes in low and middle income countries are middle aged (31-60) not elderly (60+) which is contrary to popular opinion that diabetes is a disease of the elderly [28].

Despite its standard method for assessing long term glycemic control in diabetes, glycosylated hemoglobin (HbA1c) was found that none of the patients had their HbA1c value determined and unavailable on the patient medical record. Thus why, fasting blood glucose was used to assess level of glycemic control. Although, they might have roles on an impact of non-adherence, factors like habit of chat chewing, alcohol drinking, smoking, and patient provider relationship, were excluded from analysis because these variables did not fulfill the chi-square assumption.

Medication non-adherence is considerable problem in the management of patients with chronic diseases such as diabetes. A different studies report shows that the prevalence of treatment non-adherence for chronic illness such as diabetes generally ranges from 20 to 60% [31]. Among diabetes patients investigated, 23.20% were non-adherent associated with, failure to remember (forgetting), side effects and complexity of the regimen. The extent of non-adherence (23.20%) found in this study was lower as compared to other studies reported [37, 38, 39]. But, it was higher as compared with other study reported [31].

Higher rate of side effect were reported by Yusuff (hypoglycemia in 60.3%) and was the most common factor for non-adherence. The discrepancy could be attributed to differences in matrices to assess medication non-adherence and/or difference in health care setting and socio-economic

status in reported perceived reasons for non-adherence. The most common side effects of medication reported in this study were GI (46.62%), headache (28.58%) and hypoglycemia (25.80%). Another study also reported side effect GI (13.9%), hypoglycemic symptom (13.1%) [39].

A total of 210 (75%) of this sample did not have self-blood glucose monitoring equipment, 210 (75%) did not have diet and meal plan for controlling their diabetic and preventing complication. and these were associated with level of education, monthly income patient provider relationship of the participants. Routine eye and foot examination is another important part of managing diabetes because it improves the occurrence of complications. One-thirds of the patients in the study were non-adhered in routinely examining their eyes and foot in spite of its importance.

The findings of this study demonstrated that strong influence of lower educational level and low income on poor medication adherence as evidenced by ignorance and lack of relevant knowledge or skills required to maintain quality diabetes care and control. This in support of recent study that showed that most in Nigeria have little or formal education and are poor with little understanding of the nature of their understanding [34]. Diabetes education whose goal is to help patients better understand the importance of many aspects of diabetes care such as the importance of ongoing monitoring of blood glucose regular measurement of HbA1c values maintaining of healthy weight diets plan, eye and comprehensive foot examination should be ongoing process [29].

Education and income have been identified as major socioeconomic determinants of health. Low income (p=.000) and low educational level (p=.001) have been associated with higher rates of non-adherence. This result is similar with another study which is Respondents with high level of were about five more likely to be engaged in diet management practices when compared with their counter parts [P=0.001] and respondents with high monthly income were showed four times more adhered when compared to their counterpart (P=0.001) in adults of all ages [30]. This is due to similar life standards of the populations. Consequently, poor economic base and illiteracy can result in poor outcome of diabetes due to poor accessibility to healthcare services and self-care of diabetes.

Having a higher income therefore means having access to goods and services of greater monetary value with concomitant health benefits such as consumption of more expensive foods (organic foods, lean meats, poultry, fruits and vegetables) which may lead to reduced intake of saturated fats. Similarly, more affluent individuals may enjoy regular physical exercises as consequence of member of fitness clubs [35].

This study demonstrates that patients on complex (P=030) and multiple medications were non-adherent as compared to patients on one medication. Result from other studies indicated that patients on complex drug regimen were associated with lower adherence rate ($p < 0.05$) [35]. There were significant linear trends of poorer adherence with each increase in the daily number of tablet taken (p=0.001) and in co-medication (p=0.001) [9].

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6 Conclusion

Despite the important role of adherence to medication and 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 adherence to prescribed medication and self-care among people with diabetes which is below optimal.

However, self-monitoring of blood glucose and diet management practices are said to be the cornerstone of self-care practices and glycemic control, it was more problematic.

Factors like side effect and complexity of regimen, failure to remember and socio-demographic factors such as educational level, monthly income and age of respondents as well as healthcare providers' related factors like frequency of counseling, dose patient served on each visits were significantly associated with non-adherence to medication and self-care practices.

Generally adherence to prescribed medication and self-care practice was suboptimal among diabetic patients in diabetic clinic of Shashemene referral hospital.

7 Recommendation

Since there were no another studies that addresses the adherence to DM treatment done in the hospital it is better to use this finding as a bases (to Shashemene referral hospital).

To improve patient providers' relationship as those who have good patient providers' relationship are more adherent than those do not (to Shashemene referral hospital professionals).

It is better to work on increasing level of education and monthly income of population as it has high impact on outcome of the treatment (to the government).

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Annex data collection format

Identification number: _____

Questionnaire for the assessment of adherence of diabetic patients to medication and self-management and associated factors in Shashemene referral hospital southern Ethiopia

Please answer the following questions on the space provided.

NO	Questions	Coding categories
01	Sex of respondent	0= Male 1=female
02	Age (year)	_____
03	Marital status	0= Unmarried, 1= Married 2= Divorced, 3= Widowed
04	Religion	0= Orthodox 1= Catholic 2= Protestant 3= Muslim 4= Others------------------
05	Education level	0= Illiterate 1=primary (1-8) 2= secondary(9-12) 3= diploma and above
06	What is your Occupation?	0= Government employed 1= Private employed 2= Unemployed 3= Student 4= pastoralist 5= Merchant 6=Daily labor 7= housewife 8= if others specify-------------
07	Income	0=<500 1=500-2000 2=>2000
08	ethnicity	0= Oromo 1= Amara 2=Tigre 3=Gurage 4=others

09	residence	0=urban 1=rural
10	Duration on DM	0= <1 1= 1-5 2= >5
11	Chewing of chat	0. yes 1. 1.No
12	Smoking of cigarette	0=yes 1=no
13	Drinking of alcohol	0=yes 1=no
14	frequency of counseling	0=on the first visit 1=on each visit 2=once a while 3=Never counseled
15	patient provider relation ship	0=good 1=moderate 2=weak
16	dose served on each visit	0=monthly dose 1=2 months dose 2=3months dose 3=others
17	Distance from clinic	_____
18	Were there any days when you did not take your medicine in the last 4weeks?	0=yes 1=no
19	How often do you have difficulty remembering to take all your medication?	0= never/rarely 1=Once in awhile 2=some times 3=usually 4=all the time
20	Have you ever stopped to taking your medicine without telling your doctor because you felt worse when you took it?	0=yes 1=no

21	Is there any day when you did not take your medication when you feel your DM is under control?	0=yes 1=no
22	Do you ever feel hassled about sticking to your anti-diabetic treatment plan?	0=yes 1=no
23	type of diabetic medication	0= OHA 1=insulin 2=both
24	Self-glucose monitoring	0=yes 1=no
25	Do you follow Diet and meal plan to control your DM?	0=yes 1=no
26	Do you follow strategies for controlling your blood pressure?	0=yes 1=no
27	Sign and symptom of low and high blood glucose	0=yes 1=no
28	Routine eye and foot examination	0=yes 1=no
29	Common side effects	0=hypoglycemia 1=GI 2=headache 3=water retention 4=depression 5=others