COEXISTENCE OF CHRONIC COMPLICATIONS AMONG DIABETIC PATIENTS AT NIGIST ELENI MOHAMMED MEMORIAL HOSPITAL, HOSSANA, SOUTH ETHIOPIA

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A RESEARCH THESIS TO BE SUBMITTED TO JIMMA UNIVERSITY, COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCES, DEPARTMENT OF EPIDEMIOLOGY; IN PARTIAL FULFILLMENT FOR THE REQUIREMENTS OF DEGREE IN MASTERS OF PUBLIC HEALTH IN EPIDEMIOLOGY

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Abstract

Background: *Chronic complications reduce quality of life, increases diabetes related mortality and overburden the public health services. In addition, it affects working age diabetics and then contributes to poverty. This study assess the prevalence of chronic complications and its associated factors among diabetic patients*

Objective: *The aim of this study was to determine the prevalence of chronic complications and its associated factors among diabetic patients at Nigist Eleni Mohammed Memorial Hospital, Hossana, South Ethiopia.*

Method and materials: *A Hospital based cross sectional study was conducted from* October 7-November 5/2013*. A random sample of 266 diabetic patients was selected from the hospitals registry. Data were collected using structured questionnaire and patients chart review. Data was entered and analyzed using SPSS version 16.0. Descriptive statistics were used to describe the study variables. Bivariate and multivariable binary logistic regression methods were used to identify factors associated with chronic complications among diabetic patients. P-value < 0.05 with 95% CI was used to declare significant association.*

Result: *Out of 247 diabetic subjects, 114(46.2%) were found to have at least one chronic complication that included, hypertension 59 (23.9%), diabetes related eye disease 29 (11.7%), neuropathy 25 (10.1%) and nephropathy 16 (6.5%). Compared to age group 15-29 there was higher risk of chronic complications for those who were in age groups 45-64,* [AOR=2.50, (95% CI): (1.20, 5.22)] and ≥65 years, [AOR=7.18, (95% CI): (2.10, 24.87)]. *Duration of diabetes >10 years* [AOR=2.87, (95% CI): (1.20, 6.88)], *and not performing self-monitoring of blood glucose,* [AOR=15.22, (95% CI): (3.07, 75.48)] *were also strongly associated with chronic complications of diabetes mellitus.*

Conclusion and recommendation: *Considerable number of diabetic participants in this study area had at least one chronic complication. Attention should be given to older diabetic patients and longer diabetic duration. Diabetic education should focus on health benefit of self-monitoring of blood glucose.*

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Acronyms & Abbreviations

ADA: American Diabetes Association

DM: Diabetes Mellitus

WHO: World Health Organization

SCAS: Self Care Activities Scale

DKA: Diabetic ketoacidosis

HHS: Hyperglycemic Hyperosmolar state

CHD: Coronary Heart Disease

CVD: Cardiovascular Disease

PAD: Peripheral Arterial Disease

SSA: Sub Saharan Africa

BP: Blood Pressure

WC: Waist Circumference

BMI: Body Mass Index

HbA1c: Glycosylated Hemoglobin

HDL: High Density Lipoprotein

OGLA: Oral Glucose Lowering Agent

FBS: Fasting Blood Sugar

Chapter 1: Introduction

1.1 Background

The term diabetes mellitus (DM) describes a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbance of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both [1].

Although the prevalence of both type 1 and type 2 DM is increasing worldwide, the prevalence of type 2 DM is rising much more rapidly because of increasing obesity, changing pattern of diet and reduced activity levels as countries become more industrialized and aging population [2,3]. Type 2 diabetes accounts for over 90% of diabetes cases in Sub-Saharan Africa, whilst Type 1 diabetes, gestational diabetes, and variant forms such as atypical 'ketosis-prone' diabetes and malnutrition-related diabetes constitute the remainder [2].

Coexisting conditions are conditions that are caused by or are otherwise related to another condition are more common in people with diabetes than the general population [4]. The chronic complications of DM affect many organ systems and are responsible for the majority of morbidity and mortality associated with the disease [5].

The micro vascular complications of both type 1 and type 2 DM result from chronic hyperglycemia [5]. In Sub Saharan Africa proportions of patients with diabetic complications ranged from 7-63% for retinopathy, 27-66% for neuropathy, and 10-83% for micro albuminuria. The micro vascular complications of both type 1 and type 2 DM result from chronic hyperglycemia [5].

Study conducted at different hospitals in Ethiopia also showed that the proportion of diabetic patients with retinopathy ranged from 31.4% to 37.8 % [6, 7], peripheral neuropathy from 29.5% to 35.2% [6, 8] and impotence from 6.8% to 48.7 % [8, 9]. Diabetic foot ulcer, skin and/or subcutaneous tissue infection, dental problems and tuberculosis were documented in 4.5%, 10.0%, 10.0%, and 5.6% patients, respectively [8]. Infections were documented among 44% of diabetic patients at Tikur Anbessa Hospital [10].

Study conducted in south west Ethiopia documented high proportion of undiagnosed hypertension in diabetic follow up clinic [11]. However, hypertension is the most frequent coexistent disease among diabetic patients [12].

The goals of therapy for type 1 or type 2 DM are to eliminate symptoms related to hyperglycemia, reduce or eliminate the long-term micro vascular and macro vascular complications, and allow the patient to achieve normal lifestyle as possible. In order to reach these goals identifying a target level of glycemic control for each patient, providing the patient with the educational and pharmacologic resources necessary to reach this level and monitor/treat DM-related complications are vital [5]**.**

1.2 Statement of the problem

Globally, with increasing prevalence and interactions with other diseases, including the major communicable diseases, diabetes is becoming a pressing public health problem [2]. The worldwide prevalence of DM estimated to grow to 366 million to 440 million by 2030, with three-quarters of patients with diabetes living in low-income countries and the greatest relative increases will occur in the Middle Eastern Crescent, sub-Saharan Africa (SSA), and India [13].

In 2010, 12.1 million people were estimated to be living with diabetes in Africa, and this is projected to increase to 23.9 million by 2030 [14]. The incidence and prevalence of diabetes mellitus in general Ethiopian population are unknown. A population based study conducted near Gondar showed the overall prevalence of diabetes and impaired glucose tolerance is only 0.5%. However, the figure for those above 40 year was found to be 2.4% [15].

In sub-Saharan Africa non-communicable disease add to the epidemic of chronic diseases, with diabetes being the number two just after cardiovascular diseases [13]. Although, it is thought that chronic diseases are often a public health problem of developed world, 80% of chronic disease deaths occur in low-income countries [16]. Worldwide, 3.2 million deaths per year are attributable to diabetes, compared with 3.1 million deaths for AIDS [17]. In Ethiopia, diabetes mellitus is among the leading chronic diseases with marked contributions to the overall morbidity and mortality burden [18].

Chronic complications increase diabetic mortality. About 50-80 % of individuals with diabetes die of cardiovascular disease, cerebrovascular disease and kidney failure [19]. In Ethiopia majority of diabetic mortality attributed to chronic renal failure, chronic liver disease, cerebrovascular accident, cardiac disease and gangrene [20].

Permanent disability is the common outcome of diabetes. Diabetic eye disease, particularly retinopathy has become a major cause of blindness throughout the world and foot ulcer represents more than 85% of non-traumatic lower extremity amputation in diabetic patients [5].

Consequently, the total cost to manage chronic complications in diabetics far outweighs the cost of effective primary and secondary prevention and overburdened the public health services [21]. In addition, diabetes related chronic complications affect working-age people and then contribute to poverty [22]. In a country with lowest per capita income like Ethiopia, chronic complications pose even worse threat from economic standpoint.

Studies conducted in different countries have pointed out various factors including, type of diabetes mellitus [8], duration of diabetes [23], poorly controlled cases and dyslipidemia [22] associated with chronic complications of diabetes mellitus. Sociodemographic variables like age [24] and sex [25] and anthropometric measurements; overweight, obesity [23] and central obesity [26] are also factors that have identified for diabetic chronic complications.

The American Diabetes Association (ADA) publishes standards of medical care to prevent acute complication and to reduce the risk of chronic complications. This diabetic care strategy requires continuing medical care and ongoing self-management education and support. Besides, lifestyle modifications, pharmacological control of hyperglycemia, hypertension, and hyperlipidemia are important comprehensive treatment necessary to achieve successful health outcomes [27]. To prevent serious morbidity and mortality, diabetes treatment also requires dedication to self-care practice in multiple domains, including food choices, physical activity, proper medications intake and self-blood glucose monitoring [28, 29].

At Nigist Eleni Mohammed Memorial Hospital, chronic complication of diabetes and its associated factors are not studied. The hospital 2013 nine month report showed that DM is the six leading causes of admission and ten top cause of chronic disease morbidity [30]. Chronic complication of diabetes results in increased diabetes mortality, permanent disability and incur

heavy burden to health care system [20, 21]. A study conducted in Yekatit 12 hospital showed that chronic complications like renal failure, chronic liver disease, cerebrovascular accident and cardiac disease were responsible for 60.6% of diabetic death [20] and in Tikur anbesa and St. Paul's hospitals 28% of deaths among diabetic admission were attributed to cardiovascular disease [31].

Therefore, the aim of this study was to assess the prevalence of chronic complications and its associated factors among diabetic patients attending chronic care follow up clinic of Nigist Eleni Mohammed Memorial Hospital, Hossana, South Ethiopia.

CHAPTER 2: Literature review

The chronic complications of diabetes mellitus affect many organ systems and are responsible for the majority of morbidity and mortality associated with the disease. Chronic complications can be divided into vascular and nonvascular complications. The vascular complications of DM are further subdivided into micro vascular (retinopathy, neuropathy and nephropathy) and macro vascular complications (coronary heart disease, peripheral arterial disease, cerebrovascular disease). Nonvascular complications include problems such as gastroparesis, infections, and skin changes [5].

Studies are conducted in different countries to determine prevalence of diabetes related complication and its associated factors. The prevalence as well as associated factors of chronic diabetic complications is included in this literature review.

2.1 Prevalence of chronic diabetic complications

A study conducted in Jimma University Hospital, Ethiopia reported that 52.5% diabetic patients had one or more of the chronic complications. Visual disturbance, neuropathy, hypertension, nephropathy, skin infection, foot ulcer/ infection and impotence were the major reported chronic complications [8]. Another study from the same hospital assessed quality of care given to diabetic patients and showed 32.8 % suffered from diabetes related complication. Both studies have been reviewed patients chart for diabetes related complication [11].

A study conducted in, Douala General Hospital, Cameron showed 70% of the patients had at least one cardiovascular complication. Microangiopathy distribution was: retinopathy 23.6%, nephropathy 25% and neuropathy 40%. Within macroangiopathy prevalence was: 5% for stroke, 17.1% for limbs ischemic disease and 23.6% for coronary heart disease [22].

A cross sectional study conducted among type II diabetic patients in Benghazi, Libya reported 68.7% long term complications. The overall prevalence of coronary heart disease reported 14.9%, diabetic retinopathy 30.6%, peripheral neuropathy 47.1%, macro albuminuria 25.8%, peripheral arterial disease 15.2% and cataract 13.1%, 1.1% of patients had their legs amputated below knee and 0.7% of them were blind [24]. Chronic complications were assessed by clinical examination and the study population was only type II diabetic patients.

In Sub-Saharan Africa prevalence of retinopathy ranged from 7% in Kenya, to 63% in South Africa [2]. 30.6% diabetic retinopathy was reported from study conducted in Benghazi, Libya [24]. Studies conducted in Jimma University Hospital, South west Ethiopia documented that visual disturbance in 33.8% and retinopathy in 18.4% of Diabetic patients [8].

Neuropathy ranged from 27% in Cameroon to 66% in Sudan [2]**.**Evidences from south west Ethiopia reported neuropathy in 29.5% and evidence of sensory poly neuropathy in 90.3% of diabetics [8].

The prevalence of micro albuminuria ranged from 10% in Tanzania to 83% in Nigeria [2]. In Jimma Hospital nephropathy documented in 15.7% and proteinuria was reported for 45.7% patients and 17.0% had raised renal function test [8]. Another study in similar place showed only 29.5% of the patients had renal function test (RFT) done over the last 5 years among them 19.8% of them had impaired renal function. The rates of proteinuria, glycosuria, and ketonuria were 28.7, 63.4, and 9.3% respectively [8].

Cardiovascular diseases (CVD), comprising coronary heart (CHD) and cerebrovascular diseases, are currently the leading cause of death globally, accounting for 21.9 per cent of total deaths, and are projected to increase to 26.3 per cent by 2030. Cardiovascular disease is the major cause of morbidity and mortality for individuals with diabetes, and the largest contributor to the direct and indirect costs of diabetes [5].

In Libya CHD was present in 14.9% of DM patients [24]. Of the risk factors, diabetes, and its predominant form, type II diabetes mellitus, has a distinctive association with CHD. Those with diabetes have two- to four-fold higher risk of developing coronary disease than people without diabetes [32]

Study in Jimma University showed that 32.8% rheumatic heart disease was the diagnosis in the cardiac cases on follow-up followed by hypertensive heart disease and cardiomyopathy accounting for 24.2% and 20.2% of cases, respectively [33].

Hypertension and dyslipidemia are the common conditions coexisting with type 2 diabetes [2].In Jimma university Hospital 44.4% of patients had already been diagnosed to have hypertension before the study and the majority 89.0% of them were on pharmacologic treatments. The commonly used antihypertensive drugs were ACE inhibitors [11].

However, high rate of ignorance of hypertension were observed among Moroccan diabetic patients [12]. In Ethiopia also it was found that only 6.8% of patients already diagnosed to have hypertension had target BP level of <130/80 mmHg. In line with this among patients who have never been diagnosed to have hypertension, 41.0% had measurements higher than the target. Overall, 64.1% of the patients had BP higher than the target level at least over the last three visits. Despite having higher BP over the last three visits, only 21.8% of these patients had modification of their antihypertensive treatment [11].

Another study in similar place hypertension was present in 24.9% of the patients. Of those diabetic patients with hypertension 96.1% were type II diabetics [8]. Another study from Sidama Zone, southern Ethiopia showed the general prevalence of hypertension in the entire study population was 18.8%,with 26.1% in diabetics and 10.2 % in non-diabetics [26]. Systemic hypertension was present in 50% of diabetic patients in Nigeria with male and female rate of 55% and 43% respectively [34].

Among cardiac cases at Jimma university hospital hypertension contributed for a total of 30.9% of cardiac patients that included 24.2% hypertensive heart disease and 6.7% as one major risk factor for ischemic heart disease [33].

Several unusual infections such as malignant external otitis, rhinocerebral mucormycosis, emphysematous pyelonephritis, and emphysematous cholecystitis occur exclusively in diabetics. Foot infections are very important in diabetic patients [35]. Study conducted in Jimma Ethiopia revealed that 32.3% of diabetic patients had skin and subcutaneous tissue infection and 10.2% patients had dental problems [8].

High incidence (30 to 60 percent) of diabetes has been reported to have klebsiella infections, including bacteremia, liver abscess, endophthalmitis, and thyroid abscess. In addition other

infections that occur with increased frequency in patients with diabetes include mucocutaneous candida infections such as oropharyngeal candidiasis, candidal vulvovaginitis, and cutaneous candidiasis in the intertriginous areas of obese diabetic patients [36].

2.2 Factors associated with chronic complications

Sex

Study in Untied States show women had a higher prevalence of diagnosed diabetes than men and a greater relative hazard of death than non-diabetic women, leading to a higher population Attributable Risk for women (3.8% for all causes and 7.3% for CVD) versus men (3.3% for all causes and 3.8% for CVD). These data suggest that diabetes accounts for at least 3.6% of all deaths and 5.2% of CVD deaths in US adults [37].

Study conducted on long term complication showed that microvascular complications approximately similar in occurrence in both sexes and frequency of CHD significantly higher among females. Higher occurrence of PAD among male and that of PN among females was not significant and cataract significantly frequent among males in Libya [24].

Age

Secondary data analysis from Thai National Health Examination Survey III showed that factors associated with coexistence of diabetes and hypertension included; age ≥60 years, having education less than 6 years and abdominal obesity. More than 80% were unaware of having both conditions. Target for control of both glucose and blood pressure among those treated was achieved in only 6.2% [38]. Generally, hypertension in type 2 diabetic persons clusters with other CVD risk factors such as micro albuminuria, central obesity, insulin resistance, dyslipidemia, hyper coagulation, increased inflammation, and left ventricular hypertrophy. This clustering risk factor in diabetic patients ultimately results in the development of CVD, which is the major cause of premature mortality in patients with type 2 diabetes [39].

Duration of diabetes

Duration of diabetes were independent risk factors for long-term complications among type 2 diabetic patients [24]. The longer the duration of DM, the more frequent was the

occurrence of the complications. Large proportion of patients with diabetic retinopathy, skin and subcutaneous tissue infection had diabetes for 5 to 9 years in Ethiopia [8].

Evidence from Libya showed Patients with duration of diabetes of 7-14 and ≥14 years had nearly two fold and threefold increase in complications than patients with duration of <7 years. Subjects with ≥50 years of age had nearly double risk of complications than those with <50 years of age [24]. Type of DM significantly associated with all chronic complications with the exception of infection and foot ulcer; type II being more affected [8].

Self-care practices

Coupled with diet, increased physical activity, such as walking for 30 to 45 minutes three to five days a week, has been shown to improve lipid profiles, BP, and insulin resistance [40, 41]. Self-care activity in diabetic management includes medication self-care, dietary self-care; physical activity self-care and self-monitoring of blood glucose levels [27]. Diabetes educators help patients with diabetes acquire the knowledge and skills necessary to manage their disease on a daily basis. However, knowledge alone will not lead to improved clinical outcomes and the resulting long-term outcome of improved health behavior change is also necessary for clinical indicators to improve [28].

Self-care is highly challenging, since factors such as the patient's knowledge, physical skills and social and emotional factors, interact and affect the self-care behavior. Although, frank depression and other psychiatric problems can manifest commonly in patients with diabetes, often high levels of diabetes-specific distress, may account for many of the reported findings. Diabetes distress is defined as the patient concerns about the disease management, support, emotional burden, and the access to care [42]. In Ethiopia self-care practice is inadequate and majority of the patients are not controlling their blood glucose level [43]. This may increase the risk of coexistence of chronic diseases in diabetic patients.

Glycemic control

Improvement of glycemic control reduced non proliferative and proliferative retinopathy (47% reduction), micro albuminuria (39% reduction), clinical nephropathy (54% reduction), and neuropathy (60% reduction). Improved glycemic control also slowed the progression of early diabetic complications. However, there was no significant trend in reduction of macro vascular

events. Improved glycemic control did not conclusively reduce (nor worsen) cardiovascular mortality rate, but associated with improvement with lipoprotein risk profiles, such as reduced triglycerides and increased high density lipoprotein (HDL) [5].

In vitro gene expression analysis in human coronary endothelial cells revealed that resistin induced fatty acid binding protein, a key molecule of insulin resistance, diabetes, and atherosclerosis. These results suggest that hyper resistinemia would contribute to the pathogenesis of hypertension in patients with Type 2 DM, significantly linked to vascular complications and cardiovascular events [41].

It was also documented that insulin resistance and diabetes can precipitate hypertension by stimulating the sympathetic nervous system and the renin–angiotensin system, and promoting sodium retention [5].

Researchers from Ehime University Hospital in Japan conducted a study on patients with hypertension with T2 DM, hypertension without T2DM, and normotensive Type 2 DM. They found that serum resistin, an adipocyte and monocyte derived cytokine, was positively correlated with several components of the metabolic syndrome, including hypertension in Type 2 DM. Serum resistin level was higher in subjects with hypertension with T2DM, followed by subjects with normotensive T2DM and hypertension without T2DM, irrespective of antihypertensive treatment status respectively [41].

An assessment done on the health care system for diabetes in Addis Ababa, Ethiopia revealed that majority of DM patients 81% had no access for blood glucose monitoring at the same health institutions. Only 5% of diabetic patients were able to do self-blood glucose monitoring at home. Nearly 75% of the patients required admissions directly or indirectly due to uncontrolled diabetes [6]. None of diabetic patients had glycosylated hemoglobin (HbA1c) determination in Ethiopia [43].

Study conducted on quality of care at Jimma Hospital documented that Over 2/3rd of both types of diabetes groups had a mean fasting blood sugar (FBS) above the target level of 130 mg/dl

with mean and SD of 171.7 ± 63.6 mg/dl. Patients taking a single oral glucose lowering agent (OGLA) alone had a better glucose levels than those taking insulin alone or combination of OGLAs or insulin and OGLA. Patients taking lower doses of oral agents also had better blood sugar control than those taking higher doses. However, a similar trend did not occur for insulin. Among patients taking combination OGLA, over 90% of them had sub-optimal glycemic control [11].

Anthropometric and other factors

A study from Nigeria showed that the diabetic hypertensive subjects significantly had higher BMI while the hypertensive diabetics group had higher hip/waist ratio. The diabetic hypertensive group had higher waist circumference statistically significant only in women. Only use of table salt was independently associated with order of diagnosis of diabetes or hypertension [39].

It was reported that diabetic nephropathy is the commonest cause of hypertension in patients with type 1 diabetes. Patients with type 2 diabetes can develop renal disease, but hypertension commonly occurs without abnormal renal function and is often associated with central obesity [40].

Strict blood pressure control significantly reduced both macro and microvascular complications. In fact, the beneficial effects of blood pressure control were greater than the beneficial effects of glycemic control. Lowering blood pressure to moderate goals (144/82 mmHg) reduced the risk of DM related death, stroke, microvascular end- points, retinopathy, and heart failure (risk reductions between 32 and 56%) [5].

Chronic complications are more common among diabetic patients. With increasing prevalence of diabetes mellitus, chronic complications will be the coming challenge. Very limited studies conducted in Ethiopia showed that considerable numbers of diabetic patients are affected by diabetes related complications. Consequently it resulted in increased diabetes mortality, reduce quality of life, incur high cost to manage complications and overburden the public health services. Despite, almost all studies done in Ethiopia used retrospective data. Patients card contain limited sociodemographic characteristics. Self-care practice and anthropometric measurements has not been assessed in the previous studies.

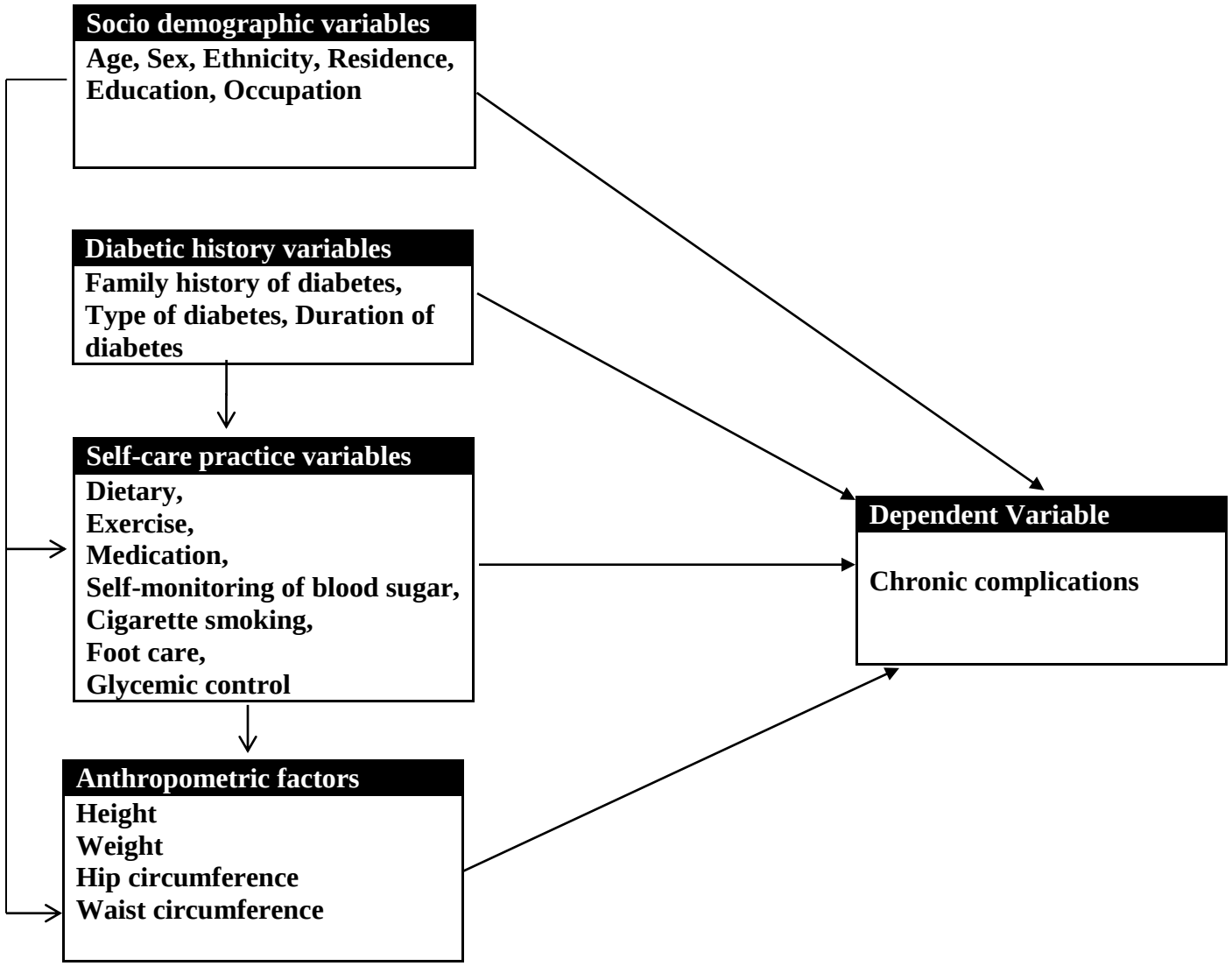

Figure 1: Conceptual framework on factors associated with chronic complication among diabetic patients. Developed from reviewed literatures.

2.3 Significance of the study

Chronic complications in diabetic patients impose tremendous burden on the patients, their family and on the health care system [2].

The findings of this study revealed prevalence of chronic complications and associated factors among diabetic patients. This provides valuable information for health care managers' on most frequent coexisting chronic complications which require consideration in co-management. Moreover, the knowledge derived from this study will be useful for health service and public health action to plan and develop evidence based intervention strategies to prevent chronic complications that occurred among diabetics and to improve quality of care that diabetic patients receive. The findings of this study will also serves as a baseline data for future studies.

Chapter 3: Objective of the study

3.1 General objective

- To assess chronic complication and associated factors among diabetic patients at chronic care follow up clinic of Nigist Eleni Mohammed Memorial Hospital, Hossana, South Ethiopia, 2013

3.2 Specific objectives

- To determine prevalence of chronic complications among diabetic patients

- To identify factors associated with chronic complications among diabetic patients

Chapter 4: Methods and materials

4.1 Study area and period

This study was conducted at the Nigist Eleni Mohamed Memorial Hospital chronic care follow up clinic which is located in Hossana Town, Hadiya Zone, SNNPR. The town is located 232 km South of the capital city Addis Ababa. The total area of the zone is 3542.66 sq. km and comprised ten woredas, one town administration, 305 rural and 24 urban kebeles with a total population of 1,506,733 [44].

In the town there are three health centers, one zonal hospital (Nigist Eleni Mohammed Memorial Hospital), six private clinics and twenty two pharmacies. The hospital provides services in outpatient, inpatient, emergency, maternal and child health, dental, psychiatry, eye, gynecology and obstetrics, general surgery and radiography. The Hospital serves for about 1,506,733 million populations. According to the hospital 2013 nine month report, DM is the six leading causes of admission and ten top cause of morbidity in the hospital and pneumonia, typhoid fever and other communicable diseases are the leading ten top causes of morbidity [30].

The chronic care follow up clinic provide services for 481 diabetic patients for five days a week (i.e. Monday to Friday). Congestive heart failure, hypertensive and asthmatic patients were treated in the same clinic with diabetic patients. On a monthly interval diabetic patients attend the chronic care clinic for regular follow up. Insulin is provided free of charge for insulin treated diabetic patients and the follow up service is provided by medical doctors. This study was conducted in one month duration from October 7-November 5/2013.

4.2 Study Design

A Hospital based cross sectional study design was conducted

4.3 Population

4.3.1 Source population

All DM patients attending chronic care clinic at Nigist Eleni Mohamed Memorial Hospital

4.3.2 Study population

DM patients attending chronic care clinic at Nigist Eleni Mohamed Memorial Hospital who fulfilled the inclusion criteria

4.3.3 Sampling unit

Diabetic patients attending chronic care clinic at Nigist Eleni Mohamed Memorial Hospital

4.3.4 Study unit

A patient attending diabetic chronic care clinic at Nigist Eleni Mohamed Memorial Hospital

4.4 Inclusion and exclusion criteria

4.4.1 Inclusion criteria

- A patient with 15 years of age or older

4.4.2 Exclusion criteria

- Patients with mental health problems
- Hearing impairments or any other serious health problems

4.5 Sample size and sampling technique

4.5.1 Sample size

A study conducted at Jimma University hospital indicated that proportion of chronic complication was found in 52.5% of diabetic patients [8]. Therefore, the sample size was calculated using single population proportion with finite population correction formula [45].

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

Where:

n: Sample size with finite population correction

N=Population size (N=481)

P= Estimated proportion of comorbidity among diabetic patients (0.525)

Zα/2= Critical value at 95% level of confidence (z=1.96)

d= Margin of error (5%),

The sample size was calculated to be 213 diabetic patients.

Considering 20% non-response rate the final sample size was calculated using the following formula [46].

$$nf = \frac{n}{1-L} = \frac{213}{1-0.20} \approx 266$$

Where, n_f =Final sample size

n= total number of subjects

L= non response rate

4.5.2 Sampling technique

This study employed simple random sampling technique to select each study participants. First a list of diabetic patients who attended chronic care follow up clinic of Nigist Eleni Mohammed Memorial Hospital was obtained from the hospital registration book. Then, all diabetic patients (i.e. 481) numbered list with identification number were prepared. Finally, 266 study participants were selected by computer generated random number using openepi statistical software.

4.6 Data collection instrument and procedures

4.6.1 Data collection instrument

Data was collected using structured questionnaire, weight, height, hip and waist circumference measurements and patient chart review. The questionnaire was developed after reviewing different relevant literatures of similar studies.

The questionnaires was prepared in English and translated into Amharic language and back translated into English to check its consistency. The Amharic versions was used for data collection after pretesting on 10% of the actual sample size in other similar settings to ensure that respondents understand the questions and to check the wording, logic and skip order of the questions in a sensible way to the respondents. Amendments were made accordingly after the pre-test.

The instrument comprises five parts, part I: Sociodemographic characteristics such as sex, age, ethnicity, marital status, educational status, place of residence and occupation. Part II: History of diabetes such as family history of diabetes, duration of diabetes and type of diabetes. Part III:

Diabetes self-care practice, which was measured using Summary Diabetes Self Care Activity (SDSCA) measure. The measurement tool was developed by Toobert and Glasgow; it has acceptable reliability and validity. The SDSCA consist of 11 items regarding diet, exercise, self-monitoring of blood glucose, medication, foot care and smoking. The scale included the diabetes self-care activities of the patients during the past 7 days [29]. Part IV: Anthropometric measurements like weight, height, waist circumference and hip circumference were also included in the instrument.

4.6.2 Data collection procedure

Data were collected from selected diabetic patients during the follow up visit to the clinic (i.e. Exit interview). Weight was measured two times with minimum clothing and no shoe using Seca electronic weighing scale in kilogram (kg) to the nearest 0.1 kg and average of the two measurements was used for analysis. Height was measured in a standing position in centimeter to the nearest 1 centimeter (cm).

Waist circumference was measured at a level midway between lower rib margin and iliac crest on a horizontal plane around the body [47]. Tape meter was used to measure both waist circumference and hip circumference.

Patient's chart was reviewed for chronic diabetic complications, fasting blood sugar and types of diabetes; and retrieved to a well prepared format.

4.6.3 Data collectors

Two data collectors, one supervisor and the principal investigator were participated throughout data collection. The data collectors were diploma nurses and the supervisor was a health officer. Both the data collectors and supervisor were trained by the principal investigator for one day about the objective of the research, data collection instrument, consent form, how to interview and about data collection procedure. During the training the trainer was demonstrated how to take anthropometric measurements and the trainee were re-demonstrated it on each other.

4.7 Study variables

Dependent variable

- ❖ Chronic complications

Independent Variables

Background variables

- ❖ Age
- ❖ Sex
- ❖ Residence
- ❖ Occupation
- ❖ Ethnicity
- ❖ Marital status
- ❖ Education

Diabetic history

- ❖ Family history of diabetes
- ❖ Type of diabetes
- ❖ Duration of diabetes

Self-care practice

- ❖ Diet
- ❖ Exercises
- ❖ Self-monitoring of blood sugar
- ❖ Medication
- ❖ Foot care

Glycemic control

- ❖ Fasting blood sugar

Anthropometric variables

- ❖ Height
- ❖ weight
- ❖ Waist circumference
- ❖ Hip circumference

4.8 Operational definitions and definition of terms

Chronic complication: A diabetic patient with at least one microvascular (i.e. Retinopathy, neuropathy and nephropathy), macro vascular (i.e. coronary heart disease, peripheral vascular disease and hypertension) or non-vascular (i.e. skin infection, foot ulcer and impotence) complication.

No chronic complication: A diabetic patient who had no any documented microvascular (i.e. Retinopathy, Neuropathy and Nephropathy), macro vascular (i.e. coronary heart disease, peripheral vascular disease and hypertension) or non-vascular complication (i.e. skin infection, foot ulcer and impotence).

Diet: A diabetic patient who reported an average of 4-7 days to dietary questions was classified as having adequate dietary practice and <4 day was classified as having inadequate dietary practice.

Exercise: A diabetic patient participate in at least 30 minutes of physical activity for 3 or more days per week or participate in a specific exercise session was considered as adequate exercise otherwise it was classified as inadequate exercise [28].

Self-Monitoring of Blood glucose: If a diabetic patient performed self-monitoring of blood glucose at his/her home during last seven days.

Medication intake: A diabetic patient taking all his recommended insulin injections or diabetes pills during last 7 days was classified as adequate medication intake otherwise inadequate.

Foot care: A diabetic patient who reported an average of 4-7 days to foot care questions was classified as having adequate foot care and <4 days was considered inadequate foot care.

Central obesity: A diabetic patient whose waist to hip circumference ratio ≥ 90 centimeter for male and ≥85 centimeter for female [47].

Controlled glycemia: A diabetic patient with fasting blood sugar measurement <126 mg/dl.

Uncontrolled glycemia: A diabetic patient with fasting blood sugar measurement ≥126 mg/dl.

Underweight: A diabetic patient with body mass index of <18.5 kg/m^2.

Overweight: A diabetic patient with body mass index of 25-29.9 kg/m^2.

Obese: A diabetic patient with body mass index of ≥30 kg/m^2.

Normal body mass index: A diabetic patient with body mass index of 18.5-24.9 kg/m^2.

4.9 Data processing and analysis

Each questionnaire was checked for completeness. Data was entered in to and analyzed using SPSS version 16 computer software. Descriptive statistics like frequency tables, graphs and descriptive summaries were used to describe the study variables.

Chi-square test was used to see the existence of association between dependent and each independent variable. Those variables which will have statistically significant relationship at p – value <0.25 were considered as candidate for multivariate analysis.

To control the effect of confounding variables and to identify factors associated with chronic complications, backward multiple binary logistic regression method was used. Finally all groups of explanatory variables were fitted to a single model and variables with p-value <0.05 were reported as factors associated with chronic complications among diabetic patients using both p-values and adjusted odds ratio (AOR) with 95% confidence interval (95% CI).

Self-care practice: The SDSCA measure consists of 11 items assessing the following aspects of the diabetes regimen: Diet, exercise, blood glucose testing, foot care and smoking. Each question measures diabetic self-care activities during last seven days on a continuous scale from 0 to 7 days.

The data analysis for diet was based on the answer to four questions. A diabetic patients was classifies as having adequate dietary practice if he reported an average of 4-7 days and classified as having inadequate dietary practice if he reported an average of <4 days to four dietary questions.

The data analysis for exercise was based on the answer to two questions. A diabetic patient was classified as having adequate exercise if he was participated in at least 3 days of physical activity for 30 minutes or participated in specific exercise session during last seven days.

Self-monitoring of blood glucose was measured based on two questions. Therefore, a diabetic patient who monitored blood glucose level was classified as yes and a diabetic patient who did not monitor his blood glucose level was classified as no.

The data analysis for foot care was based on the answer to two questions. A diabetic patient was classified as having adequate foot care if he reported an average of 4-7 days and classified as having inadequate foot care if he reported <4 days to two foot care questions.

Medication intake was coded as adequate if a diabetic patient was taking all the recommended medication during last seven days and coded inadequate if a patient did not satisfy this criteria.

The overall self-care practice was analyzed based on the responses to nine items of diet, exercise and foot care from SDSCA measures. The total score of these items were calculated out of 100 and overall self-care practice was classified as adequate if a diabetic patient scored ≥50 to nine items of diabetic self-care practice and inadequate if a diabetic patient scored <50.

4.10 Data quality control

The questionnaire was initially prepared in English and it was translated to Amharic for the purpose of data collection. Then the Amharic questionnaire was back translated to English to check for any inconsistency and distortion in the meaning of the words and/or concepts. Before data collection training was provided for data collectors and supervisor on the objective, process of data collection, how to interview and how to take anthropometric measurements.

Data was collected by trained data collectors and pretesting of the instrument was made before the commencement of the actual data collection. Based on the feedback obtained from the pre-test the questionnaire was reviewed and data collectors and supervisor were oriented based on the changes that were made.

The weight scale was checked against zero reading before and after weighing every diabetic participant. The data collectors were supervised on daily basis for completeness and consistency of the filled questionnaire. Finally, data was carefully entered into and thoroughly cleaned using SPSS version 16 software.

4.11 Ethical consideration

Before data collection, ethical clearance was obtained from ethical clearance committee of Jimma University, college of public health and medical science. A formal letter, written from Epidemiology department of Jimma University was submitted to Nigist Eleni Mohammed Memorial Hospital.

After discussion about the actual study or explaining the purpose of the study, verbal informed consent was obtained from each study participants. Participation was voluntary while the study participants right to refuse/withdraw from the study at any stage were respected. Identification of the study participants by name were avoided to assure confidentiality during data collection and analysis.

4.12 Dissemination of the finding

The result of the study will be will be presented to Jimma University, College of Public Health and Medicine and disseminated to Nigist Eleni Mohammed Memorial Hospital and other concerned governmental and nongovernmental organization.

Chapter 5: Result

Socio-demographic characteristics of patients

Out of 266 sampled subjects, 247 participated making the response rate 92.9%. The rest 19(7.1%) were excluded because 5 gave incomplete information and the rest 14 patient charts were lost and treated on new card.

Of all participants, 147 (59.5%) were male. Mean age (±SD) was 43.5 (±13.5) years ranging between 17 and 71 years. Majority of the participants 111(44.9%) were in the age range of 45-64 years. Majority 188 (76.1%) were Hadiya by ethnicity, 170 (70.9%) were married, 70 (28.3%) were illiterate. Urban residence accounted for 155 (62.8%) of the patients and 88 (35.6%) were employed (Table 1).

Table 1: Socio demographic characteristics of diabetic participants by chronic complication at Nigist Eleni Mohammed Memorial Hospital, Hossana, South Ethiopia, 2013

Characteristics	Chronic complication		Total N (%)	COR (95%CI)
	Yes N (%)	No N (%)		
Sex				
Male	67 (45.6)	80 (54.4)	147 (59.5)	1
Female	47 (47)	53 (53)	100 (40.5)	1.06 (0.64, 1.76)
Age				
15-29	17 (32.1)	36 (67.9)	53 (21.7)	1
30-44	11 (20.4)	43 (79.6)	54 (21.9)	0.54 (0.23, 1.30)
45-64	63 (56.8)	48 (43.2)	111 (44.9)	2.78 (1.40, 5.53) ‡
≥65	23 (79.3)	6 (20.7)	29 (11.7)	8.12 (2.79, 23.61) ‡
Ethnicity				
Hadiya	87 (46.3)	101(53.7)	188 (76.1)	1
Others*	27(45.8)	32 (54.2)	59 (23.9)	0.98 (0.55, 1.76)
Marital status				
Married	34 (47.2)	38 (52.8)	175 (70.9)	1
Not married**	80 (45.7)	95 (54.3)	72 (29.1)	0.94 (0.54, 1.63)
Educational status				
Illiterate	36 (51.4)	34 (48.6)	70 (28.3)	1
Elementary	27 (39.7)	41 (60.3)	68 (27.3)	0.62 (0.31, 1.22)
Secondary+***	51(46.8)	58 (53.2)	109 (44.1)	0.83 (0.46, 1.56)
Place of residence				
Urban	74 (47.7)	81 (52.3)	155 (62.8)	1
Rural	40 (43.5)	52 (56.5)	92 (37.2)	0.84 (0.50, 1.42)

Occupation				
Employed†	43 (48.9)	45 (51.1)	88 (35.6)	1
Housewife	23 (53.5)	20 (46.5)	43 (17.1)	0.83 (0.40, 1.73)
Student	18 (64.3)	10 (35.7)	28 (11.3)	0.53(0.22, 1.28)
Merchant	19 (65.5)	10 (34.5)	29 (11.7)	0.50(0.21, 1.20)
Farmer	24 (57.1)	18 (42.9)	42 (17)	0.72(0.34, 1.50)
Daily worker	6 (35.3)	11 (61.7)	17 (6.9)	1.75 (0.59, 5.15)

* Amhara, Guraghe, Kembata, Silte, Wolayta and/or Tigre

**Single and/or widowed

***7-12 grade, diploma and/or degree

†Governmental and/or non-governmental

‡p-value <0.05

Diabetic history

From the participants, 62 (25.1%) had family history of diabetes, 150 (60.7%) were diabetics for less than five year since known by diagnosis and 191 (77.3%) had type two diabetes (Table 2).

Table 2: Diabetic history characteristics of diabetic participants at Nigist Eleni Mohammed Memorial Hospital, Hossana, South Ethiopia, 2013

	Chronic complication			
Characteristics	Yes N (%)	No N (%)	Total N (%)	COR (95%CI)
Family history†				
Yes	30 (48.4)	32 (51.6)	62 (25.1)	1
No	103 (55.7)	82 (44.3)	185 (74.9)	1.34 (0.72, 2.48)
Duration of diabetes (In year)				
<5	52 (34.7)	98 (65.3)	150 (60.7)	1
5-10	32 (57.1)	24 (42.9)	56 (22.7)	2.51 (1.34, 4.70)*
>10	30 (73.2)	11 (26.8)	41 (16.6)	5.14 (2.38, 11.08)*
Type of diabetes				
Type I	19 (33.9)	37 (66.1)	56 (22.7)	1
Type I	95 (49.7)	96 (50.3)	191 (77.3)	1.93 (1.04, 3.59)*

†Family history of diabetes in first degree relatives
*p-value <0.05

Diabetic self-care practice

Two hundred and fourteen (86.6%) were found to have adequate dietary practice. Majority 199 (77.3%) of diabetic participants in this study were found to have inadequate exercise. Only 17(6.9%) were performed self-monitoring of blood glucose. Two hundred and twenty seven (91.9%) of the participants were found to have adequate medication intake. Cigarette smoking accounted for 6 (2.4%) of diabetic participants (Table 3).

Table 3: Self-care practice characteristics of diabetic participants at Nigist Eleni Mohammed Memorial Hospital, Hossana, South Ethiopia, 2013

Characteristics	Chronic complication		Total N (%)	COR (95%CI)
	Yes N (%)	No N (%)		
Diet				
Adequate	113 (52.8)	101(47.2)	214 (86.6)	1
Inadequate	20 (60.6)	13 (39.4)	33 (14.4)	1.38 (0.65, 2.91)
Exercise				
Adequate	38 (67.9)	18 (32.1)	56 (22.7)	1
Inadequate	95 (49.7)	96 (50.3)	191 (77.3)	0.27 (0.24, 0.92)*
SMBG				
Yes	2 (11.8)	15 (88.2)	17 (6.9)	1
No	112 (48.7)	118 (51.3)	230 (93.1)	7.12 (1.59, 31.84)*
Medication				
Adequate	122 (53.7)	105 (46.3)	227(91.9)	1
Inadequate	11(55.0)	9 (45.0)	20 (8.1)	1.05 (0.42, 2.64)
Foot care				
Adequate	6 (60)	4 (40)	10 (4)	1
Inadequate	127 (53.6)	110 (46.4)	237 (96)	0.77 (0.21, 2.79)
Smoking				
Yes	3 (50)	3(50)	6 (2.4)	1
No	111 (46.1)	130 (53.9)	241 (97.6)	0.85 (0.17, 4.32)

*P-value <0.05

Blood glucose and anthropometric measurements

Of the participants, 159 (64.4%) were found to have uncontrolled glycemic level. Normal waist to hip ratio account 81(32.8%) and the rest were centrally obese. Of all diabetic participants 121 (49%) had normal body mass index and the rest 20 (8.1%), 94 (38.1%) and 12 (4.8%) were underweight, overweight and obese respectively (Table 4).

Table 4: Blood glucose and anthropometric measurements of diabetic participants at Nigist Eleni Mohammed Memorial Hospital, Hossana, South Ethiopia, 2013

	Chronic complication			
Measurement	Yes N (%)	No N (%)	Total N (%)	COR (95%CI)
Fasting blood sugar				
Controlled†	39 (44.3)	49(55.7)	88 (35.6)	1
Uncontrolled‡	75 (47.2)	84 (52.8)	159 (64.4)	1.12 (0.67, 1.89)
Waist to hip ratio				
Normal	32 (39.5)	49 (60.5)	81 (32.8)	1
Central obesity	82 (49.4)	84 (50.6)	166 (67.2)	1.49 (0.87, 2.56)
Body mass index				
Underweight	11 (55)	9 (45)	20 (8.1)	1.74 (0.67, 4.49)
Normal	50 (41.3)	71 (58.7)	121(49.0)	1
Overweight	45 (47.9)	49 (52.1)	94 (38.1)	1.30 (0.76, 2.24)
Obese	8 (66.7)	4 (33.3)	12 (4.8)	2.84 (0.81, 9.95)

†Fasting blood sugar <126mg/dl

‡Fasting blood sugar ≥126mg/dl

Prevalence of chronic complications

Of the total 247 diabetic participants, more than half 133 (53.8%) had no documented chronic complications and 114 (46.2%) had at least one chronic complications.

Regarding the type of complications, prevalence of diabetic eye disease, neuropathy and nephropathy were 29 (11.7%), 25 (10.1%) and 16 (6.5%) respectively. Out of the total participants 59 (23.9%) had hypertension. Impotence was documented in 3 (1.2%) of diabetic patients. One (0.4%) of the participants had Foot ulcer (Fig 2).

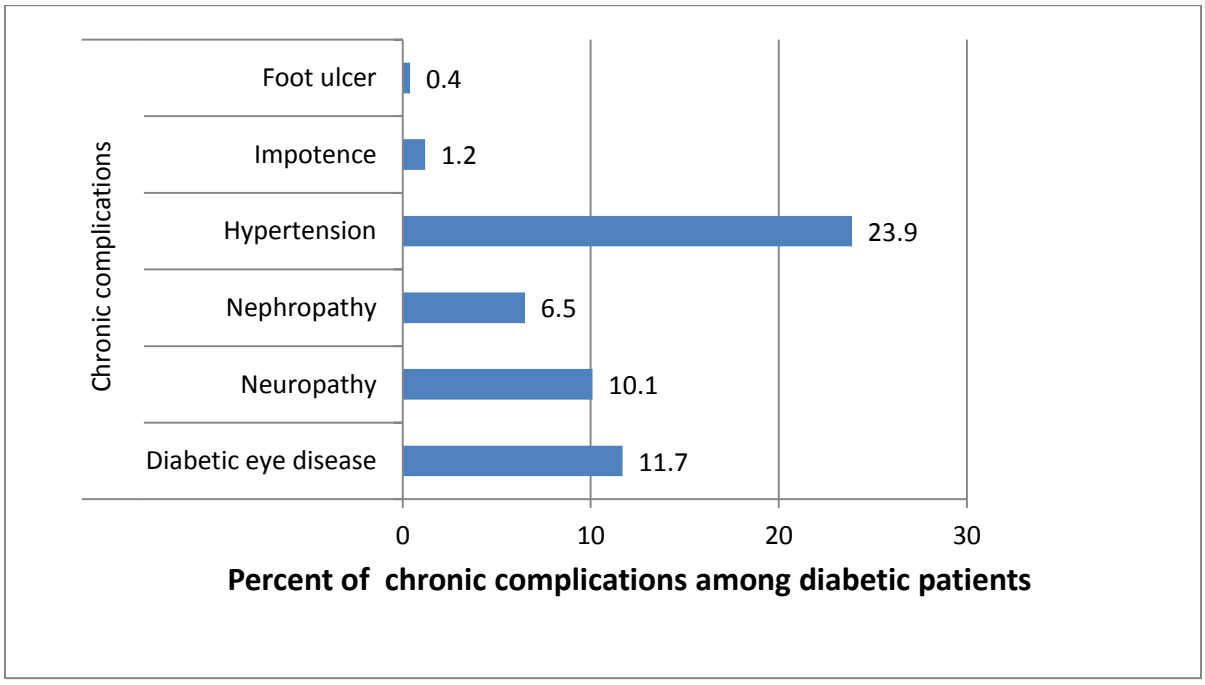

Fig 2: Prevalence of chronic complications by type among diabetic patients at Nigist Eleni Mohammed Memorial Hospital, Hossana, South Ethiopia, 2013

Factors associated with chronic complications

In bivariate analysis age, duration of diabetes, type of diabetes, exercise and self-monitoring of blood sugar were found to have association with chronic complications among diabetics.

On the other hand, of the factors entered in-to multivariable logistic regression model only patient's age, duration of diabetes and self-monitoring of blood glucose showed significant association with chronic complications among diabetic patients.

Diabetic patients between age 45-64 were 2.50 times more likely [AOR=2.50, 95% CI: (1.20, 5.20)] to have chronic complications than age 15-29. Diabetic patients with age ≥65 years were 7.18 times more likely [AOR=7.18, 95% CI: (2.10, 24.87)] to have chronic complications than those between age 15-29. Diabetics with >10 year duration of diabetes were 2.87 times more likely to have chronic complications [AOR=2.87, 95% CI: (1.20, 6.88)] than those < 5 years duration of diabetes. Additionally, Diabetic patients who did not monitored their blood sugar level were 15.22 times more likely [AOR=15.22, 95% CI: (3.07, 75.48)] having chronic complications than those who monitored their blood sugar level (Table 5).

Table 5: Multivariable logistic regression analysis result of chronic complications among diabetic patients at Nigist Eleni Mohammed Memorial Hospital, Hossana, South Ethiopia, 2013

Factors	Chronic complications		AOR (95%CI)
	Yes N (%)	No N (%)	
Age			
15-29	17 (32.1)	36 (67.9)	1
30-44	11 (20.4)	43 (79.6)	0.56 (0.23, 1.39)
45-64	63 (56.8)	48 (43.2)	2.50 (1.20, 5.22)*
≥65	23 (79.3)	6 (20.7)	7.18 (2.10, 24.87)*
Duration of DM (Year)			
<5	52 (34.7)	98 (65.3)	1
5-10	32 (57.1)	24 (42.9)	1.94(0.94, 4.0)
>10	30 (73.2)	11 (26.8)	2.87 (1.20, 6.88)*
Exercise			
Adequate	18 (31.6)	39 (68.40)	1
Inadequate	96 (50.5)	94 (49.5)	1.83(0.91, 3.69)
SMBG			
Yes	2 (11.8)	15 (88.2)	1
No	112 (48.7)	118 (51.3)	15.22 (3.07, 75.48)*

*P-value <0.05

Chapter 6: Discussions

Various studies provide evidence for increasing mortality of diabetes patients in sub-Saharan countries [2]. The chronic complications of DM affect many organ systems and are responsible for the majority of morbidity and mortality associated with the disease [5]. Consequently, chronic complications in diabetic patients impose tremendous burden on the patients, their family and on the health care system [2]. In this study, prevalence and factors associated with chronic complications among diabetic patients were identified. Studying chronic complication of DM and acting upon, therefore, would help in reduction of diabetes mortality as well as its burden.

Chronic complication

This study demonstrated that the overall prevalence of chronic complications among diabetic patients was 114 (46.2%). The finding of this study is lower than a study done in Jimma University Hospital, Ethiopia, which reported 52.5% prevalence [8]. Another study in south India showed 61% of diabetic patients were associated with chronic complications [42]. The prevalence of chronic complications obtained in this study was higher than other studies conducted in Ethiopia 37.45% [48], Netherland 20.9% [49] and USA 19.7% [50]. The possible explanation for this discrepancy might be associated with better quality of care, difference in sample size and/or study area.

Coexistence of diabetes mellitus and hypertension were seen in many studies [38-41]. Previous studies conducted in Hawassa and Jimma University Hospitals, revealed that hypertension was found to be an associated morbidity in 24.9% and 21.3% of diabetic patients respectively [8, 26]. Similarly, 23.9% of diabetic patients in this study were found to be hypertensive. But various findings are reported on coexistence of hypertension and diabetes mellitus in Ethiopia. In Addis Ababa 34.1 % was reported [6]. Higher proportion, 64.1% and 46.5% was reported in studies conducted in Jimma University hospital [11, 51].

Microvascular complication of diabetes includes retinopathy, neuropathy and nephropathy [5]. This study showed the prevalence of diabetic eye disease, neuropathy and nephropathy were

11.7%, 10.1% and 6.5% respectively. The microvascular complications obtained in this study were less as compared to a study done in Jimma, which was 33.8% for diabetic eye disease, 29.5% for neuropathy and 15.7% for nephropathy [8]. The lower prevalence in this study could be due to the difference in duration of diabetes. Majority of the participants had <5 year duration of diabetes in the current study.

The prevalence of diabetic eye disease 11.7% was also lower than other studies done in Minilik II hospital, Ethiopia 31.4% [48], Libya 30.6% [24], and Cameroon 33.8% [22]. However, in Africa prevalence of retinopathy ranged from 7% in Kenya, to 63% in South Africa [2]. This might be due to difference in study area and/or methodology. Regarding peripheral neuropathy 10.1% and nephropathy 6.5%, similar finding was obtained as compared to a study done at yekatit 12 hospital, Ethiopia, in which 9.4% and 5.6% of diabetic patients had peripheral neuropathy and nephropathy respectively [20]. The prevalence of neuropathy 10.1% indicated in this study is also similar with a study conducted at Tikur anbesa and St. Paul's hospitals which reported the prevalence of neuropathy as 12.4% [31].

Studies conducted among type II diabetic patients showed various finding regarding chronic complications of diabetic mellitus. The finding of this study revealed that the prevalence of chronic complications among type II diabetic patients was 49.9%, which is similar with a study done in Addis Ababa 49.1% [52]. But, lower than other studies conducted in Libya and china, reported 68.7% and 52% chronic complications [24, 23]. This might be due to difference in methodology.

Factors associated with chronic complication

In this study the highest prevalence of chronic complications were seen in age groups of 45-64 and ≥65 years and statistically significant associations were demonstrated. Diabetic patients between ages 45-64 and ≥65 years were 2.50 and 7.18 times more likely to have chronic complications than age 15-29 respectively [AOR=2.50, 95% CI: (1.20, 5.22)], [AOR=7.18, 95% CI: (2.10, 24.87)]. This finding is congruent with studies done in china, Libya and camerone [23, 24, 22], in which chronic complications was associated with increasing age.

A retrospective study conducted at Jimma university hospital in 2010 revealed that duration of diabetes significantly associated with chronic complication [8]. Similarly this study showed, diabetic patient with >10 year duration since the time of diabetes diagnosis were 2.87 times more likely to develop chronic complications [AOR=2.87, 95% CI: (1.20, 6.88)] than those < 5 years duration of diabetes. A study from china also reported the prevalence of chronic complication positively associated with the duration of diabetes [23].

The current study revealed that diabetic patients who did not perform self-blood glucose monitoring at home were 15.22 times more likely to have chronic complication [AOR=15.22, 95% CI: (3.07, 75.48)] than those monitored their blood glucose at home. A retrospective cohort study conducted in Germany has shown similar finding, in which diabetic patients in non-SMBG subgroup were associated with increased long term diabetes-related morbidity and this association remained in a subgroup of patients who were not receiving insulin therapy [53]. SMBG may be associated with healthier life style and better disease management. Monitoring of glycemic status, as performed by patients and health care providers, is considered a cornerstone of diabetes care. Results of monitoring are used to assess the efficacy of therapy and to guide adjustments in medical nutrition therapy (MNT), exercise, and medications to achieve the best possible blood glucose control which is essential to prevent diabetic complication [54].

Limitation of the study

Because the study design was cross-sectional, the direction of causal relationship between self-care practice and chronic complications can't always be determined. Since the present study was hospital based the findings are valid only for patients managed by the hospital rather than the general diabetic population. Chronic complications, type of diabetes and fasting blood sugar data's were collected retrospectively and incompleteness of patent charts was one of the short coming of this study. Due to small sample size wide confidence interval was observed for some variables. Some measurements may not be accurate due to subjective response and recall bias. Lead time bias was also the other limitation of this study.

Chapter 7: Conclusions and recommendations

Conclusion

Overall, about 46.2% of diabetic patients had chronic diseases. Hypertension, diabetes related eye disease, neuropathy and nephropathy were the major chronic complications among diabetic patients.

Age between 45-64 and ≥65 years, > 10 year duration of diabetes, not performing self-monitoring of blood glucose were strongly associated with chronic complications among diabetic patients in this study.

Recommendation

The following recommendations are forwarded based on the findings of our study:

To the hospital and Hadiya zone health department:

- Strengthening early diagnosis and improving case management to prevent and minimize the occurrence of chronic complications.
- Prevention and management of chronic diseases in diabetic patients should primary target age groups of 45-64 and ≥ 65 years and those with >10 year duration of diabetes. Screening may delay the onset of chronic complication of DM.
- Diabetes education should include health benefit of self-monitoring of blood glucose.

To ministry of health and other concerned bodies:

- Making self-monitoring of blood glucose equipment readily accessible and affordable for all diabetic patients.
- Improving diabetes education strategy on self-monitoring of blood glucose.

To researchers:

- Further longitudinal study on the relationship of self-monitoring of blood glucose and chronic complications and incorporating other variables which were not included in this study.

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Annexes

Annex 1. Questionnaire: English version

JIMMA UNIVERSITY

COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCES

Informed consent for study on self-care practice and coexistence of other diseases among diabetic patients at Nigist Eleni Mohammed Memorial Hospital, Hossana, Southern Ethiopia, 2013

Informed Consent number_____

Dear Sir/madam;

This questionnaire is prepared to assess coexistence of other diseases and associated factors among diabetic patients at Nigist Eleni Mohammed Memorial Hospital, Hossana, South Ethiopia.

Thus, this interview is prepared for this purpose to get appropriate information. The information that I will obtain using this interview will be used only for research purpose and also I need to assure you that confidentiality is my main quality. The study has no risk to you and your family members except mild time consuming. Therefore I politely request your cooperation to participate in this interview. You do have the right not to respond at all or to withdraw in the meantime, but your input has great value for the success of my objective.

Thank you for your cooperation!!!

Do you agree to participate in this study? Yes, ------continue No-------, thank you!

Name of the data collector_____ Sign_____ Date----------

Part I: Sociodemographic characteristics			
S.No	Questions	Response	code
101	Sex of the respondent	0. Male 1. Female	
102	What is your age? **Enter age in years**		
103	What is your ethnicity?	0. Hadiya 1. Kembata 2. Amhara 3. Silte 4. Guraghe 5. Others (Specify) _____	
104	What is your marital status?	0. Single 1. Married 2. Divorced 3. Widowed	
105	What is your educational level?	0. Illiterate (cannot read and write) 1. Read and write without formal education 2. Primary (grade 1-6) 3. Junior (7&8) 4. Secondary (9-12) 5. Tertiary	
106	Where is your place of residence? Is it urban or rural?	0. Urban 1. Rural	
107	What is your main occupation?	0. Employed (GO/NGO) 1. House wife 2. Student 3. Self-employee/merchant 4. Daily worker 5. Others (specify)_____	

Part II- Diabetic history questions			
201	How long have you had diabetes **[enter in years]**	_____Years	
202	Is there other family member with diabetes mellitus?	0. Yes 1. No	
203	Have you had diabetes education before?	0. Yes 1. No	
204	Have you ever been hospitalized because of diabetes?	0. Yes 1. No	
205	Do you have another disease in addition to diabetes	0. Yes 1. No	
206	**If yes to q205,** when did you diagnosed for this disease	0. Before the diagnosis of diabetes 1. After the diagnosis of diabetes	
207	How often do you see your doctor for your diabetes?	0. Ones in a week 1. Once in a month 2. Other specify_____	
208	What type of diabetes do you have?	0. Type I 1. Type II 2. I don't know	
209	Do you use table salt in your food?	0. Yes 1. No	
210	Do you drink alcohol?	0. Yes 1. No	
211	**If yes to q210,** what type of alcohol do you drink?	0. Tella 1. Tej 2. Beer 3. Other specify _____	
212	How often do you drink?	0. Daily 1. Weekly 2. Monthly 3. Other specify_____	
213	How much average amount of this alcohol do you drink?	_____ml	

Part III: Self-care practice questions

The questions below ask you about your diabetes self-care activities during the past seven days. If you were sick during the past seven days, please think back to the past seven days that you were not sick.

3.1. Diet		
301	How many of the last SEVEN DAYS have you followed a healthful eating plan?	0 1 2 3 4 5 6 7
302	On average over the past month how many days per week have you followed a healthful eating plan	0 1 2 3 4 5 6 7
303	How many of the last SEVEN DAYS did you eat fruits and vegetables?	0 1 2 3 4 5 6 7
304	How many of the last SEVEN DAYS did you eat high fat foods such as red meat or full fat dairy products?	0 1 2 3 4 5 6 7
3.2. Exercise		
305	On how many of last seven days did you participate in at least 30 minutes of physical activity?	0 1 2 3 4 5 6 7
306	On how many of last seven days did you participate in a specific exercise session (such as swimming, walking and biking) other than what you do around the house or as part of your work?	0 1 2 3 4 5 6 7
3.3. Blood sugar testing		
307	On how many of the last SEVEN DAYS did you test your blood sugar?	0 1 2 3 4 5 6 7
308	On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider?	0 1 2 3 4 5 6 7
3.4. Foot care		
309	On how many of the last SEVEN DAYS did you inspect the inside of your shoes?	0 1 2 3 4 5 6 7
310	On how many of the last SEVEN DAYS did you wash your feet?	0 1 2 3 4 5 6 7

311	On how many of the last SEVEN DAYS did you soak your feet?	0 1 2 3 4 5 6 7
312	On how many of the last SEVEN DAYS did you dry between your toes after washing?	0 1 2 3 4 5 6 7
3.5. Medication		
313	What type of diabetes medication do you take?	0. Insulin injection 1. Diabetic pills
314	If the answer is insulin injection for q217, on how many of the last SEVEN DAYS, did you take your recommended insulin injection?	0 1 2 3 4 5 6 7
315	If the answer is diabetic pills for q217, on how many of the last SEVEN DAYS, did you take your recommended diabetic pills?	0 1 2 3 4 5 6 7
3.6. Smoking		
316	Have you smoked a cigarette—even one puff—during the past SEVEN DAYS?	0. Yes 1. No
317	If yes to q220, how many cigarettes did you smoke on an average day?	_____ cigarettes

Part IV. Anthropometric measurement

401. Height (/cm) _____

402. Weight (/kg) _____

403. Waist circumference (/cm) _____

404. Hip circumference (/cm) _____

Part V. Chronic complications, type of diabetes and fasting blood sugar (To be extracted from the patient chart) **Patients card number_____**

S.No	Chronic complications	Category
501	Microvascular complication	**0.** No 1. Retinopathy 2. Neuropathy 3. Nephropathy Other specify_____
502	Macrovascular complication	0.No 1.Coronary heart disease (CHD) 2. Peripheral arterial disease (PAD) 3. Cerebrovascular disease Other specify_____
503	Non vascular complication	0. No 1. Skin infection 2. Foot ulcer 3. Impotence Others specify_____
504	Type of diabetes	0.Type I 1.Type II
505	Three consecutive fasting blood sugar measurements	_____mg/dl _____mg/dl _____mg/dl

Annex II: Amharic version of the questionnaire

ጅማ ዩኒቨርሲቲ ህክምናና ህብረተሰብ ጤና ሳይንስ ኮሌጅ

የኤፒዲሞሎጂ ትምህርት ክፍል

በስኳር ህሙማን ላይ በጣምራ የሚከሰቱ ሌሎች በሽታዎች ዙሪያ በንግስት እሌኒ መሃመድ መታሰቢያ ሆስፒታል ለሚካሄደው ጥናትና ምርምር የተዘጋጀ የስምምነት መጠየቂያ ቅፅ።

የጥናቱ ተካፋይ መለያ ቁጥር _____

ጤና ይስጥልኝ!

ስሜ_____ ይባላል። ከጅማ ዩኒቨርሲቲ ጥናት ቡድን ጋር እየሰራሁ እገኛለሁ።

የዚህ ጥናት ዋና አላማ ከስኳር ህመም ጋር በጣምራ የሚከሰቱ ሌሎች በሽታዎች በስኳር ህሙማን ላይ ያለውን ስርጭትና ተያያዝ ምክንያቶችን ለማወቅ ነዉ። ይህም ቃለ መጠይቅ ለዚህ ዓላማ የሚውል ተገቢ መረጃ ለማግኘት የተዘጋጀ ሲሆን የጥናቱ ውጤት በተጨባጭ መረጃ ላይ የተመሰረተ የመከላከል ስልት ለመንደፍና ለመዘርጋት ይጠቅማል። በመሆኑም በዚህ ቃለ መጠይቅ ዉስጥ ያሉትን ጥያቄዎች እንዲመልሱልንና የክብደት የቁመት የወገብና የጭንዎን ስፋት መጠን እንዲሁም የደም ግፊትዎን እንለካ ዘንድ እንዲፈቅዱልን በአክብሮት እንጠይቃለን።የእርስዎ መልካም ፈቃድና ተሳትፎ ይህንን ችግር ለማወቅና ለመለየት በጣም ጠቃሚ ነው። የእርስዎ ስም በዚህ ጥናት ላይ አይፃፍም፤ የሰጡንም መረጃ በስምዎ ይፋ አይደረግም። ተሳትፎዎት በፈቃደኝነት ላይ የተመሰረተ ሲሆን በፈለጉት ሰዓት ከጥናቱ ማቋረጥ ወይም የማይፈልጉትን ጥያቄ ያለመመለስ መብት አለዎት።

ስለዚህ የርሶን ፈቃድ ማግኘት እንችላለን?

1 አዎ 2 አይደለም

ስለትብብርዎ እናመሰግናለን!!!

የጠያቂው ስም_____ ፊርማ_____

ክፍል አንድ-ማህበራዊና ስነ ህዝባዊ ጥያቄዎች			
ጥ.ቁ	ጥያቄ	መልስ	ኮድ
101	የጥናቱ ተካፋይ ጾታ	0. ወንድ 1. ሴት	
102	እድሜዎ ስንት ነው?		
103	ብሄረሰብዎ ምንድን ነው?	0. ሃዲያ 1. ከምባታ 2. አማራ 3. ስልጤ 4. ጉራጌ 5. ሌላ ካለ እዚህ ይፃፉ _____	
104	የጋብቻ ሁኔታ ምንድን ነው?	0. ያላገባ 1. ያገባ 2. የተፋታ 3. ባል/ሚስት የሞተበት	
105	የትምህርት ደረጃዎ ስንት ነው?	0. ያልተማረ (ማንበብና መፃፍ የማይችል) 1. ማንበብና መፃፍ የሚችል ከመደበኛ ትምህርት ውጪ 2. የመጀመርያ ደረጃ (ከ 1-6) 3. መለስተኛ (7 እና 8) 4. ሁለተኛ ደረጃ (ከ9-12) 5. ከ12ኛ ክፍል በላይ	
106	የሚኖሩበት አካባቢ የት ነዉ?	0. ከተማ 1. ገጠር	
107	ዋና ስራዎ ምንድን ነው?	0. የመንግስት ወይም የግል ድርጅት ተቀጣሪ 1. የቤት እመቤት 2. ተማሪ 3. ነጋዴ 4. የቀን ሰራተኛ 5. ሌላ ካለ እዚህ ይፃፉ) _____	
ክፍል ሁለት- የስኳር ህመም ታሪክ ሁኔታ ጥያቄዎች			
201	በስኳር ህመም ከተያዙ ምን ያህል ጊዜዎት ነው?	_____ዓመት	
202	የስኳር ህመም ያለበት የቤተሰብዎ አባል አለ?	0. አለ 1. የለም	

203	ከዚህ በፊት ስለ ስኳር ትምህርት ተምረው ያውቃሉ?	0. አዎ 1. አይደለም	
204	በስኳር ህመም ምክንያት ሆስፒታል ተኝተው ያውቃሉ?	0. አዎ 1. አይደለም	
205	ከስኳር ህመም በተጨማሪ ሌላ በሽታ አለብዎት?	0. አለብኝ 1. የለብኝም	
206	**ለጥያቄ ቁጥር 205 መልሱ አዎ ከሆነ** ተጨማሪ ሌላ በሽታ እንዳለብዎ ያወቁት መቼ ነው?	0. በስኳር ህመም ከመያዝዎ በፊት 1. በስኳር ህመም ከመያዝዎ በኋላ	
207	ለስኳር ህመምዎ ምን ያህል ጊዜ ጤና ተቋማትን ይጎበኛሉ?	0. በሳምንት አንዴ 1. በወር አንዴ 2. ሌላ ካለ እዚህ ይፃፉ_____	
208	የትኛዉ አይነት የስኳር ህመም ነው ያለብዎ?	0. አይነት I 1. አይነት II 2. አላዉቅም	
209	በሚመገቡት ምግብ ዉስጥ ጨው ይጠቀማሉ?	0. አዎ 1. አይደለም	
210	አልኮል ይጠጣሉ?	0. አዎ 1. አይደለም	
211	**ለጥያቄ ቁጥር 210 መልሱ አዎ ከሆነ** ምን አይነት አልኮል ነው የሚጠጡት?	0. ጠላ 1. ጠጅ 2. ቢራ 3. ሌላ (እዚህ ይፃፉ) _____	
212	በምን ያህል ጊዜ ይጠጣሉ?	0. በየቀኑ 1. በሳምንት 2. በወር 3. ሌላ ካለ እዚህ ይፃፉ _____	
213	በአማካይ ምን ያህል መጠን አልኮል ይጠጣሉ?	_____ሚ.ሊ	

ክፍል ሶስት- የስኳር ህመማን ለራሳቸው የሚያደርጉት እንክብካቤ			
3.1. አመጋገብ			
301	ባለፉት ሰባት ቀናት ዉስጥ ለምን ያህል ቀን የአመጋገብ እቅድዎን ተገበሩት?	0 1 2 3 4 5 6 7	
302	ባለፈው ወር በነበሩት ሳምንታት በአማካይ ለምን ያህል ቀን የአመጋገብ እቅድዎን ተገበሩት?	0 1 2 3 4 5 6 7	
303	ባለፉት ሰባት ቀናት ዉስጥ ለምን ያህል ቀን ፍራፍሬና ቅጠላ ቅጠል ምግቦችን ተመግበዋል?	0 1 2 3 4 5 6 7	
304	ባለፉት ሰባት ቀናት ዉስጥ ለምን ያህል ቀን ቀይ ስጋ ወይም የወተት ተቃፅዖዎችን ተመገቡ?	0 1 2 3 4 5 6 7	
3.2. የአካል ብቃት አንቅስቃሴ			
305	ባለፉት ሰባት ቀናት ዉስጥ ለምን ያህል ቀን አካላዊ አንቅስቃሴ አድርገዋል (የእግር ጉዞን ምሮ)	0 1 2 3 4 5 6 7	
306	ከመደበና ስራዎ ውጪ ባለፉት ሰባት ቀናት ዉስጥ ለምን ያህል ቀን ውሃ ዋና ወይም ብስክሌት ነዱ	0 1 2 3 4 5 6 7	
3.2. የራስን የደም የስኳር መጠን መለካት			
307		0. አዎ 1. አይደለም	
307	**ለጥያቄ ቁጥር 310 መልሱ አዎ ከሆነ** ባለፉት ሰባት ቀናት ዉስጥ ለምን ያህል ቀን የደምዎን ስኳር መጠን ለክተዋል?	0 1 2 3 4 5 6 7	
308	ባለፉት ሰባት ቀናት ዉስጥ ለምን ያህል ቀናት የጤና ባለሙያ ባዘዘሎት መሰረት የደምዎን የስኳር መጠን ለክተዋል?	0 1 2 3 4 5 6 7	
3.3. የእግር እንክብካቤ			
309	ባለፉት **ሰባት ቀናት** ዉስጥ ለምን ያህል ቀናት የውስጠኛውን የጫማዎን ክፍል ተመልክተዋል?	0 1 2 3 4 5 6 7	
310	ባለፉት **ሰባት ቀናት** ዉስጥ ለምን ያህል ቀናት እግርዎን ታጠቡ?	0 1 2 3 4 5 6 7	
311	ባለፉት **ሰባት ቀናት** ዉስጥ ለምን ያህል ቀናት እግርዎን ውሃ ውስጥ ዘፈዘፉ?	0 1 2 3 4 5 6 7	
312	ባለፉት **ሰባት ቀናት** ዉስጥ ለምን ያህል ቀናት እግርዎን ከታጠቡ በሃላ ጣቶችዎን አድርቀዋል?	0 1 2 3 4 5 6 7	

3.4. የስኳር መድሃኒት አወሳሰድ			
313	ምን አይነት የስኳር መድሃኒት ይወስዳሉ?	0. ኢንሱሊን 1. እንክብል	
314	**ለጥያቄ ቁጥር 317 መልሱ ኢንሱሊን ከሆነ** ባለፉት **ሰባት ቀናት** ዉስጥ ለምን ያህል ቀናት የታዘዘሎትን ኢንሱሊን መርፌ ተወግተዋል?	0 1 2 3 4 5 6 7	
315	**ለጥያቄ ቁጥር 317 መልሱ እንክብል ከሆነ** ባለፉት **ሰባት ቀናት** ዉስጥ ለምን ያህል ቀናት የታዘዘሎትን የስኳር መድሃኒት እንክብል ወስደዋል?	0 1 2 3 4 5 6 7	
3.5. ሲጋራ ማጨስ			
316	ባለፉት **ሰባት ቀናት** ዉስጥ ሲጋራ አጭሰው ያውቃሉ?	0. አዎ 1. አጭሼ አላውቅም	
317	**ለጥያቄ ቁጥር 320 መልሱ አዎ ከሆነ** ባለፉት ሰባት ቀናት ውስጥ በአማካይ በቀን ምን ያህል ሲጋራ አጭሰዋል?	_____ ሲጋራ	

Part IV. Anthropometric measurement

401. Height (/cm) _____

402. Weight (/kg) _____

403. Waist circumference (/cm) _____

404. Hip circumference (/cm) _____

Part V. Chronic complications, type of diabetes and fasting blood sugar (To be extracted from the patient chart) Patients card number_____

S.No	Chronic complications	Category
501	Microvascular complication	**1.** No 1. Retinopathy 2. Neuropathy 3. Nephropathy Other specify_____
502	Macrovascular complication	0.No 1.Coronary heart disease (CHD) 2. Peripheral arterial disease (PAD) 3. Cerebrovascular disease Other specify_____
503	Non vascular complication	0. No 1. Skin infection 2. Foot ulcer 3. Impotence Others specify_____
504	Type of diabetes	0.Type I 1.Type II
505	Three consecutive fasting blood sugar measurements	_____mg/dl _____mg/dl _____mg/dl