PROPORTION OF CHRONIC DIABETIC COMPLICATIONS AND ASSOCIATED FACTORS AMONG ADULT TYPE 2 DIABETIC PATIENTS IN DILL CHORA REFERRAL HOSPITAL, DIRE DEWA, ESTEREN ETHIOPIA

MPH THESIS

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I hereby certify that I have read and evaluate this Thesis "Proportion of chronic diabetic complications and its associated factors among adult type 2 diabetic patients in Dill chora Referral Hospital, Dire Dewa, Esteren Ethiopia Public health Facility based Cross-sectional study" Prepared under my guidance by Anteneh Berihe. I recommend that it be submitted as fulfilling the thesis requirement.

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As a member of the board of examiners of the MPH thesis open defence examination, I certify that I have read and evaluated the thesis prepared by Anteneh Berihe and examined the candidate. I recommend that the thesis be accepted as fulfilling the thesis requirements for degree of master of public health in epidemiology.

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ACRONYMS AND ABBREVIATIONS

AOR	Adjusted Odds Ratio
BMI	Body Mass Index
CI	Confidence Interval
COR	Crude Odds Ratio
CVD	Cardiovascular Disease
DM	Diabetes Mellitus
DPN	Diabetic Peripheral Neuropathy
ESRD	End Stage Renal Disease
FBG	Fasting Blood Glucose
IDF	International Diabetic Federation
LEA	Lower Extremity Amputation
LR	Logistic Regression
NCD	Non Communicable Disease
OR	Odds Ratio
PVD	Peripheral Vascular Disease
T2DM	Type 2 Diabetes Mellitus
WHO	World Health Organization

Abstract

Background: Diabetes is a serious, chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Type 2 diabetes results from the body's ineffective use of insulin. Chronic diabetic complications are recognized as an important cause of premature death and disability. However, there is a paucity of information about type 2 diabetic complication and associated factors in Dire Dewa Ethiopia.

Objective: To assess proportion of chronic diabetic complication and associated factors among type 2 adult diabetic patients at Dill Chora Referral hospital, Dire Dewa, Ethiopia

Method: Facility based cross sectional study design was conducted on a sample of 403 type 2 diabetic patients attending in diabetic clinic of Dill Chora referral hospital. Systematic sampling technique was used to select the study subjects. Structured questionnaires and check lists were used to collect data. Data analysis was carried out using Statistical package for social science version 20. Using multivariable logistic regression analysis, odds ratio with 95% confidence interval was estimated to identify factors associated with chronic diabetic complications. Finally, statistical significance had been declared at p-value ≤ 0.05.

Result: Out 403 respondents 55.8% were females. Mean $\pm$ (SD) duration of diabetes were 8.1 $\pm$ (4.72). Among all, 314(77.9%) of participant their Fasting Blood Glucose level was >130mg/dl. The proportion of chronic diabetic complications was 76.2%, 95%CI (72% – 80.4%). Multivariable logistic regression analysis found that females (AOR=3.76, P≤0.001), age ≥65years (AOR=3.17, P=0.008), Fasting Blood Glucose level >130mg/dl (AOR=4.17, P≤0.001), history of hypertension (AOR=4.83, P≤0.001), duration of diabetes >10years (AOR=5.26, P≤0.001) and Body Mass Index >30kg/m^2 (AOR=9.34, P≤0.001) were significantly associated with chronic diabetic complication.

Conclusion: The proportion of chronic diabetic complications among 403 participants was 76.2%, 95%CI (72% – 80.4%). Gender (female), age of patients, Fasting Blood Glucose level, history of hypertension, duration of diabetes and Body Mass Index level were significantly associated with chronic diabetic complications.

Recommendation: Give special attention to patients with long duration of diabetes, high body mass index, uncontrolled fasting blood glucose level, hypertensive and elderly patients.

Keywords: Type 2 diabetes mellitus, chronic diabetic complications

1. INTRODUCTION

1.1. Background

Diabetes is a serious, chronic disease that occurs either when the pancreas does not produce enough insulin (a hormone that regulates blood sugar, or glucose), or when the body cannot effectively use the insulin it produces (WHO 2016). Type 2 diabetes mellitus is characterized by impaired insulin secretion, insulin resistance, excessive hepatic glucose production, and abnormal fat metabolism (Longo, Kasper et al. 2012).

Diabetes can affect many different organ systems in the body and, over time, can lead to serious complications. Complications from diabetes can be classified as microvascular or macrovascular. Microvascular complications include nervous system damage (neuropathy), renal system damage (nephropathy) and eye damage (retinopathy). Macrovascular complications include cardiovascular disease, stroke, and peripheral vascular disease. Peripheral vascular disease may lead to bruises or injuries that do not heal, gangrene, and, ultimately amputation (Deshpande, Harris-Hayes et al. 2008).

According to Center for Disease prevention and Control (CDC) in 2003–2006, after adjusting for population age differences, cardiovascular disease death rates were about 1.7 times higher among adults aged 18 years or older with diagnosed diabetes than among adults without diagnosed diabetes. In 2010, hospitalization rates for heart attack were 1.8 times higher among adults aged 20 years or older with diagnosed diabetes than among adults without diagnosed diabetes. In 2005–2008, of adults with diabetes aged 40 years or older, 4.2 million people had diabetic retinopathy. In 2011 diabetes was listed as the primary cause of kidney failure in 44% of all new cases about 49,677 people of all ages began treatment for kidney failure due to diabetes a total of 228,924 people of all ages with kidney failure due to diabetes were living on chronic dialysis or with a kidney transplant. In 2010, about 73,000 non-traumatic lower-limb amputations were performed in adults aged 20 years or older with diagnosed diabetes. About 60% of non-traumatic lower-limb amputations among people aged 20 years or older occur in people with diagnosed diabetes (CDC 2014).

The risk of type 2 diabetes is determined by interplay of genetic and metabolic factors. Ethnicity, family history of diabetes, and previous gestational diabetes combine with older age, overweight

and obesity, unhealthy diet, physical inactivity and smoking to increase risk (WHO 2016). Across all of the diabetes-related complications described above, the 3 most significant risk factors are hyperglycemia, high blood pressure, and hypercholesterolemia (Deshpande, Harris-Hayes et al. 2008).

1.2. Statement of the problem

Diabetes is recognized as an important cause of premature death and disability. It is one of four priority Non-Communicable Disease (NCDs) targeted by world leaders in the 2011 Political Declaration on the Prevention and Control of NCDs (WHO 2016).

Globally, an estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980. The global prevalence (age-standardized) of diabetes has nearly doubled since 1980, rising from 4.7% to 8.5% in the adult population. This reflects an increase in associated risk factors such as being overweight or obese. Over the past decade, diabetes prevalence has risen faster in low- and middle-income countries than in high-income countries (WHO 2016). The region of sub-Saharan Africa contains 33 of the 50 poorest countries in the world and will experience the greatest risk in the prevalence of diabetes over the next 20 years. Based on demographic changes by 2030, the number of people older than 64 years with diabetes will be more than 82 million in developing countries and more than 48 million in developed countries. Almost one million people die because of diabetes each year with two-thirds in developing countries (Buowari 2013).

The total burden of deaths from high blood glucose in 2012 has been estimated to amount to 3.7 million. This number includes 1.5 million diabetes deaths, and an additional 2.2 million deaths from cardiovascular diseases, chronic kidney disease, and tuberculosis related to higher-than-optimal blood glucose. Forty-three percent of these 3.7 million deaths occur before the age of 70 years (WHO 2016).

There is general agreement about the distribution of causes of death in type2 diabetes, two thirds of people with diabetes die of heart disease and stroke. The risk for cardiovascular disease mortality is 2 to 4 times higher in people with diabetes than in people who do not have diabetes (Deshpande, Harris-Hayes et al. 2008).

Cardiovascular disease causes up to 65% of all deaths in people with diabetes. Ischemic heart disease and stroke account for the greatest proportion of morbidity associated with diabetes.

Diabetic retinopathy is the most common microvascular complication among people with diabetes and results in more than 10,000 new cases of blindness per year. In addition, retinopathy is associated with prolonged hyperglycemia, it is slow to develop, and there is some evidence that it can begin to develop as early as 7 years before clinical diagnosis of type2 diabetes. Diabetic Peripheral Neuropathy (DPN) is a common complication estimated to affect 30% to 50% of individuals with diabetes. Diabetic peripheral neuropathy leads to a number of impairments and functional limitations. Individuals with DPN are at high risk for foot ulceration and subsequent lower-extremity amputation. Non traumatic lower Extremity Amputations (LEAs) are a devastating complication of diabetes. As many as 15% of people with diabetes will have such amputations during their lifetime. People with diabetes are 10 to 20 times more likely to have LEAs than those without diabetes. People 65 years of age and older account for about 55% of patients with diabetes who had non traumatic LEAs (Deshpande, Harris-Hayes et al. 2008).

Currently developing countries including Ethiopia faced a double burden of both communicable and NCD. According to International Diabetic Federation (IDF) Ethiopia is one of the four countries in Africa with highly populated diabetic patients (IDF 2017).

To the level of knowledge of the investigator, there is a paucity of information concerning the proportion of chronic diabetic complications and associated factors among type 2 diabetic patients in Dire Dewa Ethiopia. Therefore the findings of this study will address this gap.

1.3. Significant of the study

The result of this study, which concentrates on the proportion of chronic diabetic complications and its associated factors among type 2 diabetic patients, can be used for prevention /control strategy and for planning preventive public health interventions to reduce the associated factors, thereby reduce the chronic diabetic complications. The population in the study area in a general and those who was participated in the study in particular will be beneficiary of this research. The result of this study can be used to assist in the planning of effective control program in the study area especially will benefit as source of data for Dill chora Hospital, Dire Dewa Administration Health Bureau, Non-Governmental Organizations and other stakeholders operating in the administration for their program draft and implementation. In addition the study will provide a baseline data for further study to be carried out in the area.

1.4. Objective

1.4.1. General objective

- To assess proportion of chronic diabetic complication and its associated factors among adult type 2 diabetic patients at Dill Chora Referral hospital, Dire Dewa, Ethiopia

1.4.2. Specific objectives

1. To assess proportion of chronic diabetic complication among adult type 2 diabetic patients.
2. To identify factors associated with chronic diabetic complications among adult type 2 diabetic patients.

2. LITERATURE REVIEW

2.1. Proportion of chronic diabetic complications

Diabetes, if not well controlled, may cause blindness, kidney failure, lower limb amputation and several other long-term consequences that impact significantly on quality of life (WHO 2016).

Globally in 2010 diabetic retinopathy caused 1.9% of moderate to severe visual impairment. Studies suggest that the prevalence of any retinopathy in persons with diabetes is 35% (WHO 2016). Pooled data from 54 countries show that at least 80% of cases of end-stage renal disease (ESRD) are caused by diabetes, hypertension or a combination of the two. The proportion of ESRD attributable to diabetes alone ranges from 12–55% (WHO 2016). Adults with diabetes historically have a two or three times higher rate of cardiovascular disease (CVD) than adults without diabetes (WHO 2016).

Cross-sectional hospital-based study carried out in 4 major Chinese cities among 1,524 type 2 diabetic outpatients found that 52.0% (792) of diabetic patients suffered from at least one diagnosed chronic complication. The most common complications were 30.1% of cardiovascular complications, 17.8% of neuropathy, 10.7% of nephropathy and 14.8% of ocular lesions (Liu, Fu et al. 2010).

Another cross sectional study conducted in Kathmandu district, Nepal, indicated that 43.1% had one or more of the microvascular complications (31.9% of retinopathy, 18.1% of nephropathy and 22.2% of neuropathy) (Rimal and Panza 2013).

Study conducted in a secondary health center in Niger Delta, Nigeria, 2016 found that 65% (130) of diabetic patients had at least one chronic diabetic complication with the prevalence of 58% of nephropathy, 14% of neuropathy and 9% of retinopathy (Chukwuani, Digban et al. 2016).

A cross-sectional study among 952 type 2 diabetic patients in Benghazi, Libya, 2011, found that 68.7% (654) of type 2 diabetic patients had at least one chronic diabetic complication. Coronary

heart disease was present in 14.9%, retinopathy in 30.6%, peripheral neuropathy in 47.1%, peripheral arterial disease in 15.2% and cataract in 13.1% (Roaeid and Kadiki 2011).

A systematic review of research papers published from 1970 to 2013 on Diabetes mellitus and associated diseases in Ethiopia, 2013, found that the prevalence of diabetes associated complications and admissions has increased from 7.1% in 2005 to 34.1% in 2009. Chronic complications of Diabetes Mellitus (DM) including retinopathy, neuropathy, and foot diseases are mostly seen in Type 2 Diabetes Mellitus (T2DM) patients. Reports in 2009 indicated that the prevalence of eye disease were as high as above 33%. In addition, other DM associated complications including neuropathy and renal diseases prevalence rate in recent years has reached up to 29.5 % and 32% respectively (Mistire 2013).

Cross-sectional study conducted among 216 diabetic patients in the diabetic clinic of Dessie Referral Hospital, Dessie, Ethiopia, 2013 found that the overall prevalence of chronic diabetic complications were 59.7% (129) of which 105 (48.6%) were from type II diabetic patients. Hypertension 39 (43.3%), visual disturbance 26 (28.9%), and neuropathy 13 (14.4%) were the three most common chronic complications in the diabetic clinic (Asrat Agalu Abejew, Abebe et al. 2015).

A cross sectional study at Jimma University specialized hospital, 2008, found that among the 305 patients in the study, 52.5% had one or more chronic diabetic complications, the major ones were 29.5% of neuropathy, 15.7% of nephropathy and 33.8% of visual disturbance (Dawit Worku, Leja Hamza et al. 2010).

Hospital based cross sectional study conducted at Nigist Eleni Mohammed memorial hospital, Hossanna, Ethiopia, 2014 found that among 247 diabetic participants 46.2% (114) of them had at least one chronic complication. Regarding the type of complications, proportion of diabetic eye disease, neuropathy and nephropathy were 11.7%, 10.1% and 6.5% respectively (Tesfaye, Tessema et al. 2014).

Another cross sectional study conducted in Felege Hiwot Referral Hospital (FHRH), Baherdar, Ethiopia, 2017, a total of 344 type 2 diabetic patients were involved in the study and more than half (53.5%) of the participants had at least one chronic diabetic complication (Lebeta, Argaw et al. 2017).

2.2. Factors associated with diabetic complications

2.2.1. Socio demographic factors

A prospective study conducted among 1077 type 2 diabetes mellitus in Malaysia, 2008, found that the major risk factor for the development of diabetic complications were gender (Female vs Male, p=0.014) (Abougalambou, Hassali et al. 2011). Other study conducted to the Diabetic Association of Pakistan (DAP) Pakistan, 2004, also found that gender (female) was significantly associated with chronic diabetic complications (Shera, Jawad et al. 2004). A cross sectional survey conducted in Saudi Arabia, 2014 found that the overall prevalence of chronic complications among female subjects was significantly higher than males (p=0.038) (Khan, Lateef et al. 2014).

Retrospective study conducted in Nigeria, 2013, found that age of diabetic patients was significantly associated with chronic complications ($p \leq 0.001$) (Jasper, Opara et al. 2014). Other study conducted in Benghazi, Libya, 2011, also found that age of patients were independent risk factors for long-term complications, subjects with ≥50 years of age had nearly double risk of complications than those with <50 years of age (Roaeid and Kadiki 2011). A cross sectional study based on record review of 305 diabetic patients at Jimma university specialized hospital, Ethiopia, 2008, also found that the occurrence of chronic complications (hypertension, visual disturbance, nephropathy and neuropathy) increased with increasing age of the patient (P= 0.000) (Dawit Worku, Leja Hamza et al. 2010).

Another cross sectional study conducted at Nigist Eleni Mohammed memorial hospital, Hossanna, Ethiopia, 2014 found that age of patient were significantly associated with chronic complications, patients age 45 - 64 years were 2.5 times more likely to have the complications than age between 15-29 years (95%CI 1.2-5.2) (Tesfaye, Tessema et al. 2014).

A 1:1 unmatched case-control study among 136 diabetic patients in Zimbabwe, from July 2010 to June 2011, found that unmarried (p=0.001) and widowed (p=0.013) woman were significantly associated with chronic complications than married woman. Having attained at most primary education (p=0.005) and urbanized residence (p=0.01) were also associated with the chronic complications. Health education (p=0.001) and having a treatment supporter (p=0.001) were protective factors against the chronic complications (Ponesai, Anderson et al. 2011).

2.2.2. Clinical Factors

Another cross-sectional hospital-based study carried out in 4 major Chinese cities, 2007, found that after adjusting age of participants, the overall prevalence of chronic complications were significantly increased with diabetic duration ($p < 0.001$). And of the 1511 subjects completing HbA1c tests, their average level of HbA1c were significantly associated with chronic diabetic complications ($p=0.015$) (Liu, Fu et al. 2010).

Cross sectional study conducted in Nepal,2013, indicated that family history of diabetes ($p=0.005$), history of hypertension ($p=0.024$), above normal waist circumference ($p=0.093$) and duration of Diabetic mellitus (>10 years vs <5years, $p\leq0.001$) was significantly associated with micro vascular complications (Rimal and Panza 2013).

The Medicare Current Beneficiary Survey (MCBS), among 14,657 study subjects, from 1991-2010, found that elevated BMI was associated with progressively higher risk for all chronic diabetic complications. Women with $30 \leq BMI \leq 39.9$ kg/m^2 were significantly at increased risk of cardiovascular (HR=2.04), cerebrovascular (HR=1.7), renal (HR=1.86), ocular (HR=2.02) and lower extremity (HR=2.06) complications relative to women with $18.5 \leq BMI < 25$ kg/m^2. Men with $30 \leq BMI <39.9$ kg/m^2 were also significantly at increased risk of cardiovascular (HR=1.91), cerebrovascular (HR=1.47), renal (HR=2.13), ocular (HR=2.17, p=) and lower extremity (HR=2.13) complications relative to men with $18.5 \leq BMI < 25$ kg/m^2 (Gray, Picone et al. 2015).

Study conducted to the outpatient clinic of the Diabetic Association of Pakistan (DAP) Pakistan, 2004, found that participants with longer duration of diabetes (>15years) were significantly associated with all microvascular complications (neuropathy ($p=0.001$), nephropathy ($p=0.05$) and retinopathy ($p=0.05$)) than subjects <5years of diabetic duration. BMI level were also significantly associated with neuropathy ($p=0.004$) and macrovascular complications (AOR=2.1, 95% CI 1.2-3.5). Participants their HbA1c level (>7%) was significantly associated with neuropathy ($p=0.002$) and nephropathy (AOR=2.1, 95% CI 1.3-3.9). Hypertensive diabetic participants were also significantly associated with nephropathy (AOR=4.1, 95% CI 2.2- 7.7) and retinopathy ($p=0.005$). Study subjects with diabetes >15years were 3 times more likely develops macrovascular complications than those <5years of diabetic duration (AOR=3.0 (95% CI (1.5-6.0)) (Shera, Jawad et al. 2004).

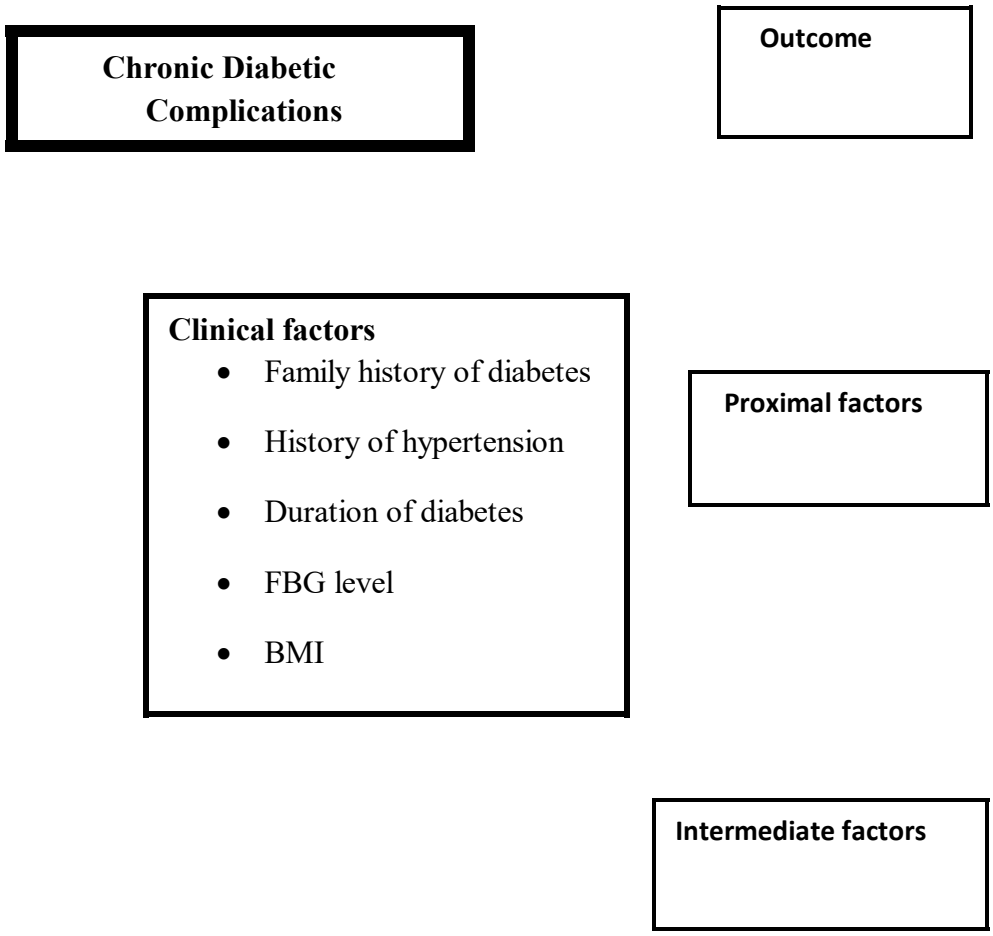
A cross-sectional study among 952 type 2 diabetic patients in Benghazi, Libya, 2011, found that duration of diabetes were independent risk factors for long-term complications, patients with duration of diabetes ≥14 years had nearly threefold increase in chronic complications than patients with <7 years of diabetic duration (p=0.01) (Roaeid and Kadiki 2011). Another cross sectional study conducted at Nigist Eleni Mohammed memorial hospital, Hossanna, Ethiopia, 2014 found that duration of diabetes were significantly associated with chronic complications, those patients >10years of diabetes duration were 2.87 times more likely to have chronic diabetic complications than <5years of diabetes duration (95%CI 1.2-6.8) (Tesfaye, Tessema et al. 2014).

A 1:1 unmatched case-control study among 136 diabetic patients in Zimbabwe, 2011, found that patients who were on insulin were 3.83 times more likely to develop chronic complications than those who were on either dietary control or on oral tablets (p<0.001). Diabetic patients who also suffered from hypertension had a 4.1 fold risk of developing diabetic complications as compared to patients who did not have hypertension (p=0.001) (Ponesai, Anderson et al. 2011).

2.2.3. Behavioral Factors

A 1:1 unmatched case-control study among 136 diabetic patients in Zimbabwe, from July 2010 to June 2011, found that independent risk for the development of diabetic complications were eating sugar containing diet (COR=3.9, 95%CI (1.86-8.1), smoking (COR=2.19, 95%CI (1.2-5.3) and missed treatment doses (COR=6.63, 95%CI (3.08-14.29) (Ponesai, Anderson et al. 2011).

2.3. Conceptual framework



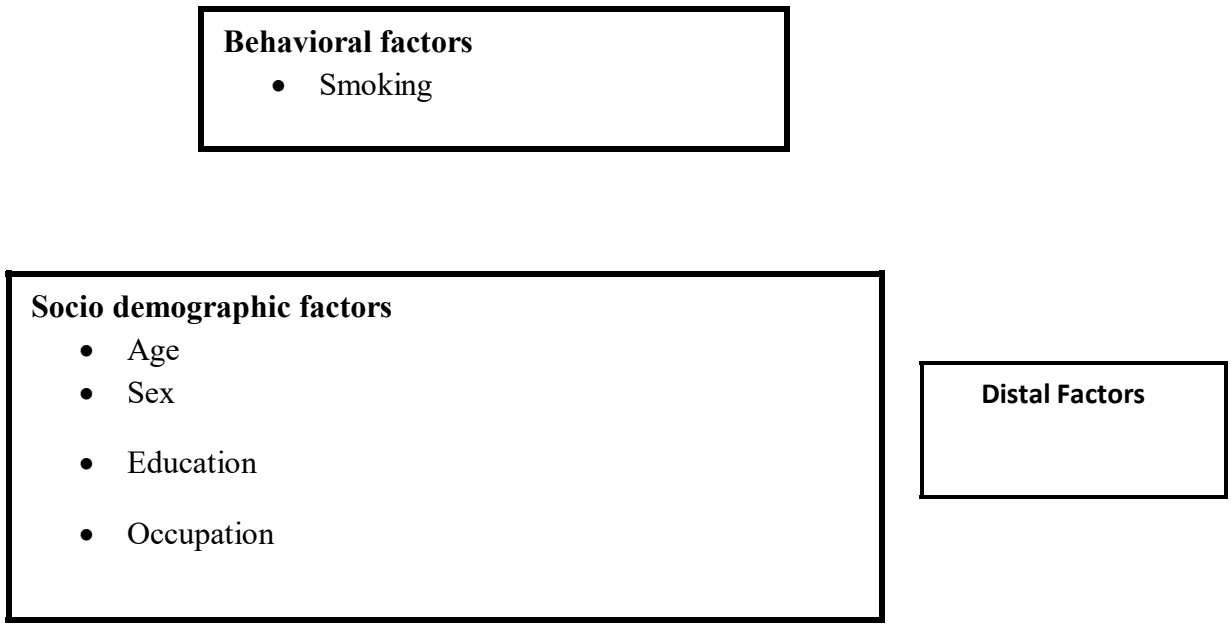


Figure 1: Schematic representation of Conceptual frame work (prepared by the investigator by reviewing different literatures)

3. METHOD AND MATERIALS

3.1. Study area and period

The study was conducted in Dire Dawa city, which is located in eastern part of Ethiopia about 555 kilometers away from the capital city Addis Ababa, 55 kilometers north of Harar town and 311 kilometers west of Djibouti. According to 2007 census, the town has a total population of 342,827 out of which, 50.2% were males and the remaining 49.8% were females.

The study was conducted from March 1 2017 to May 31 2017 in Dil Chora Referral Hospital, Dire Dawa Ethiopia. This Hospital was established in 1952 and it serves as referral and a teaching center for different Governmental and Private Colleges.

Dill Chora Referral Hospital is the largest referral hospital with specialized service for diabetic patient in Dire Dewa city. The endocrinology unit has two clinics visit three days per week for patients with type 2 diabetes and average number of patients attending the clinic in one month was estimated to be 576.

3.2. Study design

The study design was facility based cross sectional study design.

3.3. Source population

All adult type 2 diabetes patients who have follow up at diabetic clinic of Dil Chora hospital.

3.4. Study population

The study population was all adult Type 2 diabetes patients attending diabetic clinic of Dil Chora hospital during data collection period.

3.5. Inclusion criteria

- Patients who were diagnosed to have type 2 diabetes.
- Having follow up at the diabetic clinic.
- $\geq$ 18 years old

3.6. Exclusion criteria

- Patients who are severely ill.

3.7. Sample size determination

The required sample size was estimated using the proportion of type 2 diabetics with chronic diabetic complications 52.5% which was reported from study conducted in Jimma University specialized hospital among type 2 diabetic patients (Dawit Worku, Leja Hamza et al. 2010). The level of significance (α) equals to 0.05 and marginal error of 5%.

$$N = \frac{(Z\ \alpha/2)^2 \times pq}{d^2}$$

Where

n= the desirable sample size

Z (α/2) =the critical value at 95% level of significance (1.96)

p=proportion of patients with chronic diabetic complications

d=precision of measurement (acceptable marginal error)

p=0.52

d=0.05

$n = \frac{(1.96)^2 \times (0.52) \times (0.48)}{(0.05)^2} = 384$

After adding 10% non response rate sample size will be 422.

To calculate sample size for the second specific objective, factors associated with chronic diabetic complication important factors was reviewed. Duration of diabetes, gender and age of patients was common factors associated with chronic diabetic complications. Sample size was determined by using Epi info verision 3.8.4 with, precision = 5%, two sided confidence level =95%, Power = 80% (Table1).

Table 1: Sample size determination for the second specific objective

Factors	Reference	Ratio of unexposed to exposed	Outcome in unexposed group	OR	Sample size for group1	Sample size for group2	Total sample size after adding 10%NR
Duration of diabetes (exposed=>10yr, unexposed=<10yr)	(Abougalambou , Hassali et al. 2011)	0.87	11.4%	2.3	189	189	416
Age of patients (exposed=45-64yr, unexposed=15-29yr)	(Tesfaye, Tessema et al. 2014)	0.48	32.1%	2.5	100	200	220
Smoking status (exposed=smoker	(Ponesai, Anderson et al.	4.23	46.36%	2.19	186	187	411

unexposed=nonsmoker	2011)						

From the above calculated sample sizes, the largest sample size which is 422 was used in the study.

3.8. Sampling procedures

Systematic sampling technique was used to select the study subjects. The study hospital was selected purposively. Dill Chora Referral Hospital is the largest referral hospital with specialized service for diabetic patient in Dire Dewa city. The endocrinology unit has two clinics visit three days per week for patients with type 2 diabetes and average number of patients attending the clinic in one month was estimated to be 576. Using this estimated number sampling fraction was determined (K=2). The first eligible study subject was selected randomly. Then every other eligible patient visiting the clinic during the data collection period was interviewed using structured data collection questionnaire until desired sample size is achieved.

3.9. Data collection method

3.9.1. Data collection instruments

The data collection tools was first prepared in English and translated to Amharic, oromifa and Somali finally back translated to English by different person to ensure validity of translation.

Data collection tools are: (prepared by the principal investigator)

Part 1: Structured questionnaires contain information on socio demographic and clinical characteristics of participants.

Part 2: Check lists to review patient's medical record to obtain their last three fasting blood glucose and medical status.

3.9.2. Data collectors

Data collection took place by 2 male and 4 female who are BSC nurses and supervised by two health officers. A two-days training regarding objective of the study, data collection tools and interview methods was give by the principal investigator.

3.9.3. Procedure of data collection

Data was collected through face to face interview by using structured questionnaire which is prepared by the principal investigator. The structured questionnaire contains information

regarding the socio demographic, socio economic and clinical history of participants. After patients completed the interview finally their respective medical record was reviewed using a check list to obtain their last three fasting blood glucose and medical status of participants. Diagnosis of the participant's diabetic complication was documented on their medical records which were conducted by their respective physicians of Dill Chora Referral Hospital.

3.10. Study variables

3.10.1. Dependent variable

The dependent (main outcome variable) in this study was chronic diabetic complications.

3.10.2. Independent variables

Independent variables were:-

Socio demographic variables:

- Age
- Sex
- Educational status
- Occupation
- Income
- Marital status

Clinical variables

- Family history of DM
- History of hypertension
- Duration of diabetes
- BMI
- FBG

Behavioral variables

- Smoking

3.11. Operational definitions

Angina:- is discomfort in the chest that occurs when the blood supply to the myocardium is compromised (Chisholm-Burns, Wells et al. 2007).

Body Mass Index (BMI):- a person's weight in kilograms divided by the square of the person's height in meters (kg/m^2) and classified as BMI below 18.5 as underweight, 18.5 – 24.9 as normal weight, 25 – 29.9 as pre-obesity, 30 – 34.9 as obesity class I, 35 – 39.9 obesity class II, above 40 obesity class III (WHO 2018).

Cerebrovascular disease (CVD) or stroke:- can be either ischemic stroke (is the abrupt development of a focal neurologic deficit that occurs due to inadequate blood supply to an area of the brain) or hemorrhagic stroke (is a result of bleeding into the brain and other spaces within the central nervous system) (Chisholm-Burns, Wells et al. 2007).

Chronic complications of diabetes: - can be divided into vascular and nonvascular complications.

Diabetes mellitus (DM):- refers to a group of common metabolic disorders that share the phenotype of hyperglycemia, those factors contributing to hyperglycemia include reduced insulin secretion, decreased glucose utilization, and increased glucose production (Longo, Kasper et al. 2012).

Diabetic nephropathy:- is a chronic microvascular complication initially manifested by proteinuria; subsequently, as kidney function declines, urea and creatinine accumulate in the blood (Mcphee and Papadakis 2009).

Diabetic neuropathy:- is a consequence of metabolic disturbances in the neurons and characterized by paresthesia and pain in the lower extremities; decreased sensation to monofilament testing; decreased ankle and knee jerks; and decreased nerve conduction velocity (Koda-Kimbele, Young et al. 2009).

Diabetic retinopathy:- is a sight-threatening chronic microvascular complication, characterized by gradually progressive alterations in the retinal microvasculature, leading to areas of retinal non-perfusion, increased vascular permeability and pathologic intraocular proliferation of retinal vessels which can result in severe and permanent vision loss (Kronenberg, Melmed et al. 2007).

Fasting Plasma Glucose concentration:- is commonly used to assess glycemic control in the fasting state (normal FPG 70–120 mg/dL) (Koda-Kimbele, Young et al. 2009).

Gestational diabetes:- any carbohydrate intolerance with onset or first recognition during pregnancy (Koda-Kimbele, Young et al. 2009).

Glycosylated hemoglobin A (H_{bA1c}):- measures the percentage of hemoglobin A that has been irreversibly glycosylated (when glucose interacts with hemoglobin in red blood cells) at the

N-terminal amino group of the β-chain. The American Diabetic Association (ADA) goal of H_{bA1c} for persons with DM is less than 7% (Koda-Kimbele, Young et al. 2009).

Heart failure (HF):- is the inadequate ability of the heart to pump enough blood to meet the blood flow and metabolic demands of the body (Chisholm-Burns, Wells et al. 2007).

Ischemic heart disease (IHD):- also called coronary heart disease (CHD) or coronary artery disease is a decreased supply of oxygenated blood to the heart muscle due to the narrowing of one or more of the major coronary arteries that supply blood to the heart, most commonly by atherosclerotic plaques (Chisholm-Burns, Wells et al. 2007).

Microalbuminuria:- Sensitive radioimmunoassay methods of detecting small amounts of urinary albumin have permitted detection of microgram concentrations. In the early morning spot urine, a ratio of albumin (mcg/L) to creatinine (mg/L) of 30–300 mcg/mg creatinine suggests abnormal microalbuminuria (Mcphee and Papadakis 2009).

The vascular complications of DM are further subdivided into microvascular (retinopathy, neuropathy & nephropathy) and macrovascular complications [coronary heart disease (CHD), peripheral arterial disease (PAD), cerebrovascular disease] (Longo, Kasper et al. 2012).

Type 1 DM:- is the result of interactions of genetic, environmental, and immunologic factors that ultimately lead to the destruction of the pancreatic beta cells and insulin deficiency (Longo, Kasper et al. 2012).

Type 2 DM:- is a heterogeneous group of disorders characterized by variable degrees of insulin resistance, impaired insulin secretion, and increased glucose production (Longo, Kasper et al. 2012).

3.12. Data quality assurance

To ensure the quality of data, training was given for data collectors on the objective of the study, contents of the questionnaires, contents of patients medical record check list and how to maintain confidentiality and privacy of the study subjects. In order to check the functionality of data extraction forms, a pre-test was carried out on 10% of the sample at Sabiyan primary hospital, Dire Dawa, Ethiopia. Necessary modification was done based on the result of pre-test. The collected data were checked for completeness and accuracy and corrected on daily basis before

leaving the facilities. Prior to data entry data was coded and edited properly and then enter into a computer using Epi.data by two different data clerks.

3.13. Data processing and analysis

After collection of data, data analysis was carried out using Statistical package for social science (SPSS version 20). Continuous variables were summarized with mean and categorical variables as percentages. Odds ratio along with 95% confidence interval were calculated to measure the strength of association between dependent and independent variables. **Multicollinearity test was carried out to see the correlation between independent variables using linear regression then by checking their Variance Inflation Factor (VIF) correlation test and the value of Standard error. Hosmer Lemshow and Omnibus test were done to test for model fit.** Variable which had value less than 5 in their cell where excluded from bivariable analysis. To ascertain the association; variables were significant when P-value of <0.20 in the bivariable analysis were used to construct a multivariable model. Finally, multivariable logistic regression analysis was done to control possible confounders and to determine significantly associated factors with chronic diabetic complications. For multivariable analysis statistical significance was considered with two sides' p -value ≤0.05.

3.14. Ethical consideration

Ethical clearance was obtained from Haramaya University, college of health and medical sciences, Institutional Health Research Ethics Review Committee (IHRERC). Information sheet was prepared and read to all eligible participants of the study. All participants was informed the purpose of the study and their participation is on voluntary basis. Written and signed informed consent was received from all participants. The risk of being participating in this study was very minimal, only taking few minutes from their time. The findings from this research may reveal important information for Dill Chora Referral Hospital and for the local health planners and action made by them will directly benefit the participants. Confidentiality of the information and privacy of the participants was secured during data collection.

3.15. Dissemination of the result

The result of this study will be presented to Haramaya University, college of health and medical sciences, as partial fulfillment of the requirement of master degree in public health. Further more the result will be shared with Endocrinology unit of Dill Chora Hospital and also the manuscript of the research will be prepared and submitted to appropriate journals for possible publication.

4. RESULT

4.1. Socio demographic Characteristics of the study participants

Among the expected 422 participants a total of 403 respondents with response rate of 95.5% were participated in the study. Out 403 respondents, 225(55.8%) and 178(44.2%) were females

and males respectively. The mean ± (SD) ages of respondents were 58.67± (13.04) years. Majority of the respondent 189(46.9%) were Amhara and 146(36.2%) of them were Oromo by their ethnicity. Out of total, 233(57.8%) respondents were married. Majority 239(59.3%) of the respondents were Orthodox Christian by religion. One hundred and eighty two (45.2%) were illiterate and 33(8.2%) were completed grade 12th and above. One hundred one (25.1%) were un- employed and 139(34.5%) were retired. One hundred eighty nine (46.9%) of the respondent earn below 510 birr per month (Table 2).

Table 2: Socio demographic characteristics of study participants (type 2 diabetic patients, n=403) at Dill Chora referral hospital, Dire Dawa, Ethiopia, 2017.

Variable/characteristics	Frequency (%)
Sex	
Male	178(44.2)
Female	225(55.8)
Age	
18 – 40yrs	105(26)
41 – 64yrs	161(40)
≥65yrs	137(34)
Ethnicity	
Oromo	146(36.2)
Somali	22(5.5)
Amhara	189(46.9)
Gurage	27(6.7)
Tigrai	11(2.7)
Others	8(2)
Religion	
Muslim	124(30.8)
Orthodox	239(59.3)
Protestant	37(9.2)
Catholic	3(0.7)
Educational status	

Illiterate	182(45.2)
1-6	85(21.1)
7-12	103(25.6)
>12	33(8.2)
Marital Status	
Never married	7(1.7)
Married	233(57.8)
Widowed	99(24.6)
Divorced	64(15.9)
Occupation	
Unemployed	101(25.1)
Govt/Private employee	61(15.1)
Self-employee	102(25.3)
Retired	139(34.5)
Monthly income	
<510 birr	189(46.9)
510 - 1023 birr	171(42.4)
>1023 birr	43(10.7)

4.2. Clinical and Behavioral Characteristics

Family history of diabetes in the first degree relatives among the respondents were 98 (24.3%). One hundred seventy (42.2%) of participants were hypertensive. Majority of the participant 319(79.2%) were never smoke cigarette and 65(16.1%) were Ex-smoker. Mean duration of diabetes were 8.1±4.72 and 137 (34%) of the respondent were ≤ 5 years of diabetic duration and 121(30%) of the respondent had >10 years of diabetic duration. Average of the last three consecutive Fasting Blood Glucose (FBG) level of the respondent shows that, 89(22.1%) of them had b/n 70&130mg/dl and the remaining 314(77.9%) of the participant had FBG level >130mg/dl. Majority of the respondent 169(41.9%) had BMI b/n 18.5 – 24.9Kg/m^2 and 78(19.4%) of the respondents had ≥30Kg/m^2 (Table 3).

Table 3: Clinical and behavioral characteristics of study participants (n=403) at Dill Chora referral hospital, Dire Dawa, Ethiopia, 2017.

Variable/characteristics	Frequency (%)
Family DM history	
No	305(75.7)
Yes	98(24.3)
Hypertension	
No	233(57.8)
Yes	170(42.2)
Duration of diabetes	
≤5 years	137(34)
6-10 years	145(36)
>10years	121(30)
FBG	
70-130mg/dl	89(22.1)
>130mg/dl	314(77.9)
BMI	
18.5 – 24.9kg/m^2	169(41.9)
25 - 29.9kg/m^2	156(38.7)
≥30kg/m^2	78(19.4)
Smoking status	
Never smoke	319(79.2)
Smoker	19(4.7)
Ex-smoker	65(16.1)

4.3. Proportion of Chronic Diabetic Complication

The proportion of chronic diabetic complications among 403 participants in Dill Chora Referral Hospital was 76.2%, 95%CI (72% – 80.4%) (307 suffered from at least one diagnosed chronic diabetic complication). The most common microvascular complications were Neuropathy 38.2%

(154) then Nephropathy 35.7% (144) and Retinopathy 32.3% (130). And macrovascular complications were 23.8% (96) of Cardiovascular and 7.9% (32) of Cerberovascular complications. With regard to the proportion of chronic diabetic complications, 150 (37.2%) of the participants had only one complication, while there were 95 (23.6%), 32 (7.9%) and 30 (7.4%) of the participants had 2, 3 and 4 plus complications respectively.

4.4. Factors associated with chronic diabetic complications

4.4.1. Bivariable LR analysis of chronic diabetic complications

The proportion of chronic diabetic complications in the study area was under the influence of various variables. Bivariable logistic regression analysis found that, sex (female) (COR=2.12, 95%CI (1.33 – 3.38), P=0.002), family history of diabetes mellitus (COR=1.67, 95%CI (0.93 – 2.98), P=0.086) and hypertension (COR=5.03, 95%CI (2.81 – 9.00), P≤0.001) were associated with chronic diabetic complications. Additionally variables such as, patients age (≥65yrs vs 18 – 40yrs, COR=3.95, 95%CI (2.04 – 7.63), P≤0.001), BMI level (≥30kg/m^2 vs 18.5 – 24.9kg/m^2, COR=2.73, 95%CI (1.36 – 5.45), P=0.005), duration of diabetes mellitus (>10yrs vs ≤5yrs, COR=4.54, 95%CI (2.42 – 8.49), P≤0.001) and FBG level (>130mg/dl vs 70 – 130mg/dl, COR=6.49, 95%CI (2.26 – 6.25), P≤0.001) were also associated with chronic diabetic complications on bivariable logistic regression analysis (Table 4).

Table 4: Result of bivariable LR analysis for factors associated with Chronic diabetic complications among type 2 diabetic patients (n=403) in Dill chora referral hospital, Dire Dawa, Ethiopia, 2017

Variable	Chronic diabetic complication			
	Yes	No		
	No(%)	No(%)	COR (95%CI)	P-value
Sex				
Male	122(68.5)	56(31.5)	1	
Female	185(82.2)	40(17.8)	2.12(1.33 – 3.38)	0.002
Age				
18 - 40yrs	69(65.7)	36(34.3)	1	
41 – 64yrs	117(72.7)	44(27.3)	1.39(0.82 – 2.36)	0.227
≥65yrs	121(88.3)	16(11.7)	3.95(2.04 – 7.63)	0.000
Educational status				
Illiterate	136(74.7)	46(25.3)	1.69(0.77 – 3.7)	0.190
1 – 6	70(82.4)	15(17.6)	2.67(1.08 – 6.57)	0.033
7 – 12	80(77.7)	23(22.3	1.99(0.85 – 4.64)	0.112
>12	21(63.6)	12(36.4)	1	
Occupation				
Unemployed	79(78.2)	22(21.8)	1	
Gov/priv employ	46(75.4)	15(24.6)	1.16(0.63 – 2.14)	0.628
Self employed	77(75.7)	25(24.5)	0.99(0.49 – 1.99)	0.984
Retired	105(75.5)	34(24.5)	0.99(0.55 – 1.81)	0.993
Monthly income				
<510	148(78.3)	41(21.1)	1.56(0.75 – 3.27)	0.234
510 – 1023	129(75.4)	42(24.6)	1.33(0.64 – 2.78)	0.448
>1023	30(69.8)	13(30.2)	1	
Family DM history				

Yes	81(82.7)	17(17.3)	1.67(0.93 – 2.98)	0.086
No	226(74.1)	79(25.9)	1	
Cigarette smoking				
Never smoke	244(76.5)	75(23.5)	1	
Smoker	13(68.4)	6(31.6)	0.67(0.24 – 1.81)	0.426
Ex-smoker	50(76.9)	15(23.1)	1.03(0.54 – 1.93)	0.940
Duration of diabetes				
≤5yrs	81(59.1)	56(40.9)	1	
6 – 10yrs	121(83.4)	24(16.6)	3.49(2.0 – 6.07)	0.000
>10yrs	105(86.8)	16(13.2)	4.54(2.42 – 8.49)	0.000
BMI				
18.5 – 24.9kg/m^2	113(66.9)	56(33.1)	1	
25 – 29.9Kg/m^2	128(82.1)	28(17.9)	2.26(1.35 – 3.81)	0.002
≥30Kg/m^2	66(84.6)	12(15.4)	2.73(1.36 – 5.45)	0.005
Hypertension				
Yes	154(90.6)	16(9.4)	5.03(2.81 – 9.0)	0.000
No	153(65.7)	80(34.3)	1	
FBG				
70–130mg/dl	41(53.9)	48(46.1)	1	
>130mg/dl	266(84.7)	48(15.3)	6.49(3.86 – 10.89)	0.000

*significant at P<0.05

4.4.2. Multivariable LR analysis of chronic diabetic complications

Multivariable logistic regression analysis found that females were 3.76 times more likely develops chronic diabetic complications than male (AOR=3.76, 95%CI (1.84 – 7.66), P≤0.001). Patients' age ≥65yrs were 3.17 times more likely develops chronic diabetic complications than patients' age between 18 – 40yrs (AOR=3.17, 95%CI (1.35 – 7.48), P=0.008). FBG level (>130mg/dl vs 70 – 130mg/dl, AOR=4.17, 95%CI (2.13 – 8.09), P≤0.001) and hypertension (AOR=4.83, 95%CI

(2.34 – 9.96), P≤0.001) were also significantly associated with chronic diabetic complications. Patients' duration of diabetes between 6 – 10yrs were 7.79 times (AOR=7.79, 95%CI (3.34 – 17.19), P≤0.001) and those >10yrs of diabetic duration were 5.26 times (AOR=5.26, 95%CI (2.29 – 12.08), P≤0.001) more likely develops chronic diabetic complications than patients ≤5yrs of diabetes. BMI level of patients were also significantly associated with chronic diabetic complications (≥30Kg/m^2 vs 18.5 – 24.9kg/m^2, AOR=9.34, 95%CI (3.6 – 24.26), P≤0.001) and (25 – 29.9kg/m^2 vs 18.5 – 24.9kg/m^2, AOR=3.73, 95%CI (1.81 – 7.7), P≤0.001) (Table 5).

Table 5: Result of multivariable LR analysis for factors associated with Chronic diabetic complications among type 2 diabetic patients (n=403) in Dill chora referral hospital, Dire Dawa, Ethiopia, 2017

Variable	Chronic diabetic comp				
	Yes	No			
	No(%)	No(%)	COR (95%CI)	AOR (95%CI)	P-value
Sex					
Male	122(68.5)	56(31.5)	1	1	
Female	185(82.2)	40(17.8)	2.12(1.33 – 3.38)	3.76(1.84 – 7.66)	0.000
Age					
18 - 40yrs	69(65.7)	36(34.3)	1	1	
41 – 64yrs	117(72.7)	44(27.3)	1.39(0.82 – 2.36)	0.72(0.34 – 1.5)	0.378
≥65yrs	121(88.3)	16(11.7)	3.95(2.04 – 7.63)	3.17(1.35 – 7.48)	0.008
Educational status					
Illiterate	136(74.7)	46(25.3)	1.69(0.77 – 3.7)	1.24(0.47 – 3.29)	0.667
1 – 6	70(82.4)	15(17.6)	2.67(1.08 – 6.57)	3.11(0.91 – 9.49)	0.056
7 – 12	80(77.7)	23(22.3	1.99(0.85 – 4.64)	1.87(0.67 – 5.24)	0.230
>12	21(63.6)	12(36.4)	1	1	
Family DM history					
Yes	81(82.7)	17(17.3)	1.67(0.93 – 2.98)	2.37(0.94 – 4.97)	0.062
No	226(74.1)	79(25.9)	1	1	

Duration of diabetes					
≤5yrs	81(59.1)	56(40.9)	1	1	
6 – 10yrs	121(83.4)	24(16.6)	3.49(2.0 – 6.07)	7.79(3.54 – 17.19)	0.000
>10yrs	105(86.8)	16(13.2)	4.54(2.42 – 8.49)	5.26(2.29 – 12.08)	0.000
BMI					
18.5 – 24.9kg/m^2	113(66.9)	56(33.1)	1	1	
25 – 29.9Kg/m^2	128(82.1)	28(17.9)	2.26(1.35 – 3.81)	3.73(1.81 – 7.7)	0.000
≥30Kg/m^2	66(84.6)	12(15.4)	2.73(1.36 – 5.45)	9.34(3.6 – 24.26)	0.000
Hypertension					
Yes	154(90.6)	16(9.4)	5.03(2.81 – 9.0)	4.83(2.34 – 9.96)	0.000
No	153(65.7)	80(34.3)	1	1	
FBG					
70–130mg/dl	41(53.9)	48(46.1)	1	1	
>130mg/dl	266(84.7)	48(15.3)	6.49(3.86 – 10.89)	4.17(2.15 – 8.09)	0.000

5. Discussion

5.1. Proportion of chronic diabetic complications

The finding of this study shows that the proportion of chronic diabetic complications in Dill Chora Referral Hospital was 76.2%, 95%CI (72% – 80.4%). This result was almost similar with study conducted in Dessie, Ethiopia 70.5% (Asrat Agalu Abejew, Abebe et al. 2015), 74% in Sri Lanka (Arambawela, Somasundaram et al. 2018), 72.7% in Saudi Arabia (Khan, Lateef et al. 2014), 65% in Nigeria (Chukwuani, Digban et al. 2016) and 68.7% in Libya (Roaeid and Kadiki 2011). However the result of our study were higher than study conducted in China 52% (Liu, Fu et al. 2010), 52.7% in Nigeria (Jasper, Opara et al. 2014), 52.5% in Jimma, Ethiopia (Dawit Worku, Leja Hamza et al. 2010), 53.5% in Baherdar, Ethiopia (Lebeta, Argaw et al. 2017) and 46.2 in Hossana, South Ethiopia (Tesfaye, Tessema et al. 2014). The possible justification for this variance of proportion of chronic diabetic complication in our study might be due to difference in methodology and socio-demographic characteristics of the study area.

5.2. Factors associated with chronic diabetic complications

The study found that the overall proportion of chronic diabetic complications among female subjects (3.7 times) were significantly higher than male. Similarly studies conducted in China (Liu, Fu et al. 2010) and Saudi Arabia (Khan, Lateef et al. 2014) also found that females were significantly associated with chronic diabetic complications. This might be due to difference in Sex

hormones, USA (Xu, Wells et al. 2008) and difference in Sex specific gene polymorphism, Pakistan (Mansoor, Bilal et al. 2010).

Result of this study shows that age of patients were strongly associated with proportion of chronic diabetic complications, Patients age ≥65years were 3 times more likely develops chronic diabetic complications than patients' age between 18 – 40years. The result was supported by studies conducted in Dessie, Ethiopia (Asrat Agalu Abejew, Abebe et al. 2015), in Jimma, Ethiopia (Dawit Worku, Leja Hamza et al. 2010) and Libya (Roaeid and Kadiki 2011). As age increased, blood vessels become less flexible, making it harder for blood to move through them easily. Fatty deposits called plaques also collect along artery walls and slow the blood flow from the heart. In elderly patients, these things along with poor nutrition and exercise habits can increase risk of heart disease. Aging affects ocular structures in various ways and it leads to ocular tissue dysfunction and disease. Because of their function, retinal cells are exposed to a large amount of light throughout their lifetime, making them vulnerable to light-induced damage. Aging causes loss of retinal neurons and other non-neural cells, such as retinal pigment epithelium (RPE) cells. Aging is also associated with accumulation of both intracellular (lipofuscin, deposits in the RPE) and extracellular deposits, which leads to thickening of the acellular lamina between the RPE and the underlying choriocapillaris. The biologic price of aging includes progressive structural and functional deterioration of the kidney. With aging, many subjects exhibit progressive decreases in Glomerular Filtration Rate (GFR) and Renal Blood Flow (RBF). The fall in GFR is due to reductions in the glomerular capillary plasma flow rate, and the glomerular capillary ultrafiltration coefficient. Aging also leads to loss of renal mass, changes in the activity of the renin-angiotensin and nitric oxide systems. These changes may predispose the older kidney to acute as well as progressive chronic kidney disease (Weinstein and Anderson 2010).

In this study the proportion of chronic diabetic complications was significantly associated with the degree of hyperglycemia, patients their average FBG level >130mg/dl were 4 times more likely develops chronic diabetic complications than patients having FBG level between 70-130mg/dl. In line with study conducted in China (Liu, Fu et al. 2010) and Nigeria (Chukwuani, Digban et al. 2016). The Diabetes Control and Complications Trial (DCCT) demonstrated that improvement of glycemic control reduced nonproliferative and proliferative retinopathy by 47%, microalbuminuria

by 39%, nephropathy by 54% and neuropathy by 60%. Improved glycemic control also slowed the progression of early diabetic complications (Nathan 2014).

Result of the study found that hypertensive patients were 4.8 times more likely develops chronic diabetic complications than those normotensive ones. One of the major findings of the United Kingdom Prospective Diabetes Study (UKPDS) was strict blood pressure control significantly reduced both macro- and microvascular complications. Lowering blood pressure to moderate goals (144/82 mmHg) reduced the risk of DM-related death, stroke and heart failure (risk reductions between 32 and 56%) (King, Peacock et al. 2009).

The brain is a major target of the deleterious effects of hypertension and is responsible for a large portion of the related mortality and morbidity (Dahlof 2007). (Dahlof 2007)Hypertension is the number one risk factor for stroke and is a leading cause of cognitive decline and dementia (Dahlof 2007). Hypertension causes rupture of berry aneurysms of the circle of Willis leading to bleeding into the subarachnoid space (hemorrhagic stroke) (Chui 2007). There is a linear relationship between blood pressure and stroke mortality, in patients with treated hypertension a 1 mmHg increase in systolic blood pressure increases stroke deaths by 2% (Palmer, Bulpitt et al. 1992).

Hypertension is also one of the leading causes of chronic kidney disease due to the deleterious effects that increased blood pressure has on kidney vasculature. Long- term, uncontrolled, high blood pressure leads to high intraglomerular pressure, impairing glomerular filtration. Damage to the glomeruli lead to an increase in protein filtration, resulting in abnormally increased amounts of protein in the urine (microalbuminuria or proteinuria) (Buffet and Ricchetti 2012).

The result of the study found that duration of diabetes were significantly associated with chronic diabetic complications, patients with diabetes for more than 10years were 5.2 times more likely develops chronic diabetic complications than patients ≤5years of diabetes. Similarly Study conducted in Baherdar, Ethiopia (Lebeta, Argaw et al. 2017), in Libya (Roaeid and Kadiki 2011) and in Hossana, South Ethiopia (Tesfaye, Tessema et al. 2014) also found duration of diabetes were significantly associated with chronic diabetic complications. The study result was in line with the UKPDS report, stated that the incidence of microalbuminuria was 2%/year & the 10year prevalence after diagnosis was 25% (Adler, Stevens et al. 2003).

The study also found that BMI level of patients was significantly associated with chronic diabetic complications. When the percentage of fat increases in our body weight, there is an increase in

cardiac output. The increased cardiac output in obese patients is to meet the metabolic demand of the adipose tissue and is achieved mainly through an increase in stroke volume. The left ventricular chamber dilates to accommodate the increased venous return and, in turn, develops an eccentric type of hypertrophy to keep the wall stress normal. The left atrium also enlarges in obese individuals and is initially caused by the increased blood volume and venous return. Various tissues of heart, like the sinus node, atrioventricular node, right bundle branch, and the myocardium are replaced by fat cells which causes cardiomyopathy (adipositas cordis). These factors primarily caused by obesity play a role in causing heart failure. Similarly study conducted in Pakistan also found BMI were significantly associated with macrovascular complications (Shera, Jawad et al. 2004).

Overweight negatively affects the musculoskeletal system disorders. Study conducted in Tokyo, Japan speculated that obesity could be related to neuropathic pain that is distinct from the musculoskeletal nociceptive pain condition and conducted this preliminary study to test this hypothesis, the result showed that overweight patients with neuropathic pain complained of more severe pain than those with normal-weight patients, in spite of comparable analgesic dosages (i.e., on a proportional body-weight basis). In addition, the overweight patients seemed to experience more serious paroxysmal pain, and their neuropathic negative symptoms (i.e., paresthesia/dysesthesia) might tend to be aggravated (Hozumi, Sumitani et al. 2015). Similarly study conducted in Pakistan also shows BMI was significantly associated with neuropathy (Shera, Jawad et al. 2004).

Limitation of the study

Since the study uses cross sectional study design it couldn't show cause and effect relationship between the independent and dependent variables. Recall bias is one of the limitations of the study; this was tried to minimize by probing the respondents about the event. Lack of some details on exposures such as alcohol consumption, and physical exercise are another limitation.

6. Conclusion and Recommendations

6.1. Conclusion

The proportion of chronic diabetic complications in Dill Chora Referral Hospital was 76.2%, 95%CI (72% – 80.4%). From the total study subjects, 307 of them suffered from at least one diagnosed chronic diabetic complication (38.2% of neuropathy, 35.7% of nephropathy, 32.3% of retinopathy, 23.8% of cardiovascular and 7.9% of cerebrovascular complications).

Among socio demographic factors gender (female) and age of patients were significantly associated with chronic diabetic complications. Clinical factors which significantly associated with chronic diabetic complications were Fasting Blood Glucose level, history of hypertension, duration of diabetes and BMI level.

6.2. Recommendations

The following are recommendations based on the study result.

- The regional health bureau should
    - Work in collaboration with the community and concerned partners jointly to conduct measures to prevent chronic diabetic complications.

- The health institutions should
    - Give special attention to patients with long duration of diabetes, high BMI, uncontrolled FBG level, hypertensive and elderly patients.
    - Screen high risk type 2 diabetes for chronic diabetic complication and highlight importance of early diagnosis and detection of chronic diabetic complications so that appropriate treatment initiated at the earliest time.
    - Give routine health education and cost effective preventive interventions to reduce the proportions of chronic diabetic complications.
- For researchers
    - Further prospective studies should be conducted to asses' determinants over period of time, to generate more and deep information and strengthen the result of this study.
- Patients should
    - Control their BMI level with the range of 18 – 24.9kg/m2.
    - Control their FBG level in the range of 70 – 130mg/dl.
    - Take appropriate measures to prevent from hypertension and if they have they should control their blood pressure by taking appropriate medication with good behavioral characteristics.
    - Regularly screen for all chronic diabetic complications to reduce the future burden of chronic diabetic complications

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Annex I Information sheet

Participant information sheet and informed voluntary consent form

My name is _____ I am working as a data collector for the study being conducted in this community by Anteneh Berihe who is studying for his/her Master's degree at Haramaya University, the College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and being selected as the study participant.

The study/project title:

Proportion of chronic diabetic complications and its associated factors among adult type 2 diabetes patients in Dil Chora Referral Hospital, Dire Dewa, Eastern Ethiopia.

Purpose/aim of the study:

The finding of this study will be used to know the proportion of chronic diabetic complication among type 2 diabetic patients. Identifying factors associated with chronic diabetic complication will be used to assist in the planning of effective control program in the study area. Moreover, the

aim of this study is to write a thesis as a partial requirement for the fulfillment of a Master's Program in Public Health for the principal investigator.

Procedure and duration:

I will be interviewing you using a questionnaire to provide me with pertinent data that is helpful for the study. There are 12 questions to answer where I will fill the questionnaire by interviewing you. The interview will take about 20 minutes, so I kindly request you to spare me this time for the interview.

Risks and benefits:

The risk of being participating in this study is very minimal, but only taking few minutes from your time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for the local health planners.

Confidentiality:

The information you will provide us will be confidential. There will be no information that will identify you in particular. The findings of the study will be general for the study community and will not reflect anything particular of individual persons or housing. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

Rights:

Participation for this study is fully voluntary. You have the right to declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the study at any time and this will not label you for any loss of benefits which you otherwise are entitled. You do not have to answer any question that you do not want to answer.

Contact address:

If there are any questions or enquires any time about the study or the procedures, please contact:

Anteneh Berihe

Phone number = +251913178143

Email address = antenehb2005@gmail.com

Institutional Health Research Ethics Review Committee (IHRERC)

Office phone = 0254660708

P.O. Box = 235, Harar

Declaration of informed voluntary consent:

I have read/ was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to answer any question that I do not want. Therefore, I declare my voluntary consent to participate in this study with my initial (signature).

Name and signature of participant: _____

Name and Signature of Data Collector: _____

Annex II Consent form

Information sheet and Informed voluntary consent form for head of Dill Chora Referral Hospital

My name is _____I am working as a data collector for the study being conducted in this community by Anteneh Berihe who is studying for his/her Master's degree at Haramaya University, the College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and your institution being selected as the study setting.

The study/project title:

Proportion of chronic diabetic complications and its associated factors among adult type 2 diabetes patients in Dill Chora Referral Hospital, Dire Dewa, Eastern Ethiopia.

Purpose/aim of the study:

The finding of this study will be used to know the severity of chronic diabetic complication among type 2 diabetic patients. Identifying factors associated with chronic diabetic complication will be used to assist in the planning of effective control program in the study area. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of a Master's Program in Public Health for the principal investigator

Procedure and duration:

I will be interviewing type 2 diabetic patients using a questionnaire to provide me with pertinent data that is helpful for the study. There are 12 questions to answer where I will fill the questionnaire by interviewing them. The interview will take about 20 minutes.

Risks and benefits:

The risk of participating in this study is very minimal, but only taking few minutes from participants time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for the local health planners.

Confidentiality:

The information that we will be provided will be kept confidential. There will be no information that will identify the participants in particular. The findings of the study will be general for the study community and will not reflect anything particular of individual persons. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

Rights:

Participation for this study is fully voluntary. The participants have the right to declare to participate or not in this study. If they decide to participate, they have the right to withdraw from the study at any time and this will not label them for any loss of benefits which they otherwise are entitled. They do not have to answer any question that they do not want to answer.

Contact address:

If there are any questions or enquires any time about the study or the procedures, please contact:

Anteneh Berihe

Phone number = +251913178143

Email address = antenehb2005@gmail.com

Institutional Health Research Ethics Review Committee (IHRERC)

Office phone = 0254660708

P.O. Box = 235, Harar

Declaration of informed voluntary consent:

I have read the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that participants have the right to withdraw from the study at any time or not to answer any question that they do not want. I am also informed that the Hospital has the right to stop this study from being conducted in the Hospital if any misdeeds and unethical procedures are observed during the data collection process in the Hospital's premises. Therefore, I declare my voluntary consent on behalf of Dil Chora Referral hospital management to allow this study to be conducted in the Hospital with my initials (signature).

Name and Signature of Head of the Hospital: _____

Name and Signature of Data Collector:_____

Annex III English version of questionnaire

Haramaya University College Of Medicine And Health Science

Public Health Department

PROPORTION OF DIABETIC COMPLICATIONS AND ITS ASSOCIATED FACTORS AMONG ADULT TYPE 2 DIABETIC PATIENTS IN DILL CHORA REFERRAL HOSPITAL, DIRE DEWA, ESTEREN ETHIOPIA

PART-I. A Questionnaire on Socio demographic characteristics

1. Sex

1. Male 2. Female

2. Age _____years

3. Ethnicity

1. Oromo 2. Somali 3. Amhara

4. Gurage 5. Tigrai 6. Other (specify) _____

4. Religion

1. Muslim 2. Orthodox 3. Protestant

4. Catholic 5. Traditional 6. Other (specify)_____

5. What is your highest educational level?

1. Illiterate
2. Grade 1 – 6
3. Grade 7 – 12
4. >12 Grade

6. What is your marital status now?

1. Never married
2. Married
3. Widowed
4. Divorced
5. Separated
6. Others (specify) _____

7. What is your occupation?

1. Unemployed
2. Government/private employee
3. Self employed
4. Retired

8. How much money do you earn in monthly basis?

_____Ethiopian birr

9. How many years back were you diagnosed by health professional to have diabetes?

_____years

10. Did you have family history of diabetes?

1. Yes
2. No

11. Did you have Hypertension?

    1. Yes
    2. No

12. Do you smoke cigarettes?

    1. Never smoke
    2. Yes
    3. Ex-cigarettes smoker

Part 2: Check list to review patient's medical records

Check list to review patient's medical records

1	Last three fasting blood sugar	Value
	1	_____mg/dl
	2	_____mg/dl
	3	_____mg/dl
2	Weight	_____Kg

3	Height	_____meter
4	BMI (Body Mass Index)	_____Kg/m2
To assess chronic diabetic complications		
	Macrovascular complications	If yes=1, No=0
	1) Cardiovascular complications	
	2) Cerberovascular complications	
	Microvascular complications	
	1. Neuropathy	
	2. Nephropathy	
	3. Retinopathy	

Annex IV Amharic Translation

[illegible]

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Amharic version of questionnaire

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Annex V Somali Translation

xaashida macluumaadka Xubin iyo foomka oggolaanshaha la wargeliyey iskaa wax u qabso

Magacaygu waa_____ Waxaan shaqeynayo sidii ururiyaha xogta waxbarasho ah loo sameeyay in bulshada this by Anteneh Berihe oo la baranaya degree isaga / iyada Master ee

Jaamacadda Haramaya, ee College of Sciences Caafimaadka iyo Caafimaadka. Anigu waxaan u roonaan codsan inaad i amaahi aad fiiro gaar ah u aad u sharax ku saabsan waxbarashada iyo la xushay sida qaybgale daraasadda.

waxbarasho / horyaalka Mashruuca

Baahsanaanta dhibaatooyin diabetic chronic iyo arrimo la xiriira ka mid ah dadka qaba macaanka nooca 2aad ee Isbitaalka Dil Chora Referral, Dire Dewa, Eastern Itoobiya.

Ujeeddo / Ujeedada daraasadda

Maxsuulka daraasaddan waxaa loo isticmaali doonaa in la ogaado noqodo of dhibaatooyin diabetic chronic ka mid ah nooca 2aad ee sonkorowga bukaanka. Aqoonsiga arrimo la xiriira dhibaatooyin diabetic chronic waxaa loo isticmaali doonaa si ay u caawiyaan qorsheynta barnaamijka ay gacanta ku ool ah ee aagga daraasadda. Oo weliba, ujeedadu daraasaddan waa in ay qoraan sha a sida shuruud qayb loogu talagalay fulinta Barnaamijka Master ah ee Caafimaadka Dadweynaha baaraha maamulaha.

Habka iyo duration

Waxaan la wareysanaya doonaa iyadoo la isticmaalayo su'aalaha ah inay i siiyaan macluumaadka muhiimka ah waa waxtar u leh baadhitaanka. Waxaa jira 16 su'aalaha si ay uga jawaabaan halkaas waxaan ka buuxin doonaa su'aalaha by wareysanaya. Wareysiga qaadan doontaa ilaa 20 daqiiqo, sidaas darteed waxaan si naxariis leh aad codsato in ay iigu tudh waqtigan wareysiga.

Halista iyo faa'iidooyinka

Khatarta ah in ka qayb daraasaddan waa mid aad u yar, laakiin kaliya qaadato dhowr daqiiqo ka waqtigaaga. Ma jiri doonto wax lacag toos ah ka qayb daraasaddan. Laakiin natiijooyinka ka soo baxay cilmi muujin kartaa macluumaad muhiim ah oo ku roona caafimaadka deegaanka.

Qarsoodiga

Macluumaadka aad bixiso noo noqon doonaa mid qarsoodi ah. Waxaa jiri doona macluumaad ku jirin in aad aqoonsado doonaa gaar ahaan. Natiijooyinka daraasaddan waxay noqon doontaa guud ee bulshada waxbarashada iyo aad uma xusuusan doono wax gaar ah oo qof shaqsi ah ama guryaha. su'aalaha waxaa lagu suntan doonaa in laga saaro magacyada muujinaya. tixraaca No lagu sameyn doonaa in warbixino afka ah ama qoraal ah oo ka qaybgalayaasha in ay cilmi-link yaabaa.

Xuquuqda

Ka qayb qaadashada daraasaddan waa si buuxda iskaa wax u qabso. Waxaad xaq u leedahay inaad u sheegi in ay ka qayb ama aan daraasaddan. Haddii aad go'aansato in aad ka qayb, waxaad xaq u leedahay in ay ka baxaan ka daraasada waqti kasta iyo this aadan calaamadee doonaa khasaaraha ka mid ah faa'iidooyinka oo aad haddii kale waxay xaq u leeyihiin. Ma aha in aad ka jawaabto su'aal kasta oo aadan rabin in aad ka jawaabto.

cinwaanka Contact

Haddii ay jiraan wax su'aalo ah ama wax waqti kasta oo ku saabsan daraasadda ama nidaamka, fadlan la xiriir.

Anteneh Berihe

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Cinwaanka emailka: antenehb2005@gmail.com

Institutional Health Research Ethics Review Committee (IHRERC)

phone number xafiiska: 0254660708

P.O. Box: 235, Harar

Baaqa ogolaanshaha iskaa wax xog:

Waan akhriyey / ahaa ayaa hortayda loogu akhriyey warqada ka qaybgale macluumaadka si. Waxaan si cad u fahamsan ujeedada cilmi baarista, nidaamka, khataraha iyo faa'iidooyinka, arrimaha sirta, xuquuqda ka qayb iyo cinwaanka xiriirka ee wax su'aalo ah. Waxaan la siiyey fursad ay su'aalo wax ayaa laga yaabaa in cadda weydii. Waxaan ku wargeliyay in aan xaq u leeyahay inuu ka daraasada waqti kasta ama in aanad ka jawaabin su'aasha kasta oo aanan rabin leeyihiin. Sidaa darteed, waxaan sheegayaa oggolaanshahayga ikhtiyaari ah in ay ka qayb daraasaddan la saxeexa.

Magaca iyo saxeexa ee ka qaybgale: _____

Magaca iyo Saxeexa Data ururinta: _____

Lifaaqa version Soomaali ah su'aalaha

Haramaya University College Of Medicine Oo Science Caafimaadka Waaxda Caafimaadka Dadweynaha

Baahsanaanta CILLADAHA sokorow XAALADAHA la xiriira ururaan NOOCA 2 dadka sokorta qaba IN Dil Chora GUDBIN ISBITAALKA, DEWA Dire, ESTEREN ETHIOPIA

Su'aalaha A on sifooyinka dadka Bulsheedka

1) galmada

1) lab 2) dhedig

2) da'da_____ sano

3) Asalka

1) Oromo 4) Gurage

2) Somali 5) Tigira

3) Amhara 6) Ku kale (cayim) _____

4) Diinta

1) Muslim 2) Orthodox 3) Protestant

4) Catholic 5) Traditional 6) Ku kale (cayim) _____

5) Haddii ay haa tahay, waayo, su'aal tiro 5, waa maxay heerka ugu sareeya ee dugsi ee aad ka qayb sanadihii dhammaysay?

1)

2) 1 -6

3) 7 – 12

4) >12

6) Waa maxay xaaladdaada guur hadda?

1) Marna guursaday 5) Kala

2) guursaday 6) Ku kale (cayim) _____

3) sygu

4) furayna

7) Shuqulkiinnu waa maxay?

1) Shaqo la'aan

2) Dowladda / shaqaale gaar ah

3) Is shaqeeya

4) Ku kale (cayim) _____

8) Lacag intee le'eg ayaad u helaan in sal bil kasta?

_____ birr Itoobiya

9) Imisa sano ayaa aad cudurka by xirfadle caafimaad in aad qabto cudurka macaanka?

_____ sano

10) Ma waxay leeyihiin taariikh qoys ee cudurka macaanka?

1) haa 2) Maya

11) Ma waxaad leedahay dhiig-karka?

1) haa 2) Maya

12) Ha aad sigaar cabtid sigaarka?

1) Marna sigaar

2) haa

3) sigaarka caba ilaa xad

Annex VI Oromiffa Translation

Buchaa odeffanno Hayama odeffano kan durabu'ota dhibitif

Harka fune akkan jirtan maqaan koo _____ jedhama qo'amoon kan gagefama Yunversiti Haromayatati kolleji sayinsi medikaaliti fayyaati barnota is kan barataa jiru dha. Amma wa'ee qo'annotifi qo'anno irrati hirmaana akkan godlm odde fannolle balinaan akkan ibsuf corraan akka naaf kenaman kabajadhaan isin gaafadha.

Mata dure qo'annoo

Waa'e dhukbsattoata sukora sadarka 2ffaa irrati dhukubota walfana toraniti sababota babali'nsa isaenii wajji wal qabatte hospital Dill chora kessatti qo'annoo gagessudha.

Kayyoelle qo'annoo

Bu'aan qo'anno kanaa babali'nsa ykn tatala'insa dhukubota dhukubsatota sukora sadarka 2ffaa dhukubota isaan tena turan barafi. Akasuna fille qabachun maxannoo fulfulainsa dhukbota sababa sukaratin walafana namati dhufan belkam hospitalich kerorota dhukuba kena ittisuf bafetef is gargaara.

Haala ademsa fi torinsaa

Odeefanoo qo'anoo dhaef barbachisa ta'e arkachudhaf hala gafiilitin Isini gafadha ykn sin gafedha. Gafachun gafi 16 ot kussa kan qabun yoo ta'e haalaan gatif debisiulajji godhn kessati nin gutadha. Gafifi deebin daqiqa 20 kanfudhatu yoo tuhu daqiqalee kenena nawi uajji, akka dabersitaniin ykn dabarsitun kabajan Isin gafea dha.

Fayedaa fi Midhaalee

Qo'anna kana kessaati Hirmachun midhaan isaa heddun xiqaadha. Yero qabedura/qabdanira daqiqaa murasa qofa fudhetaa. Qo,anna kena kessati hirmachun kissenin kalati dhaan kefaliti hin qabu, garu bu'aan qo'anno kana karoora fayyaa biyyaatif odeyfano bu'a qabu ta'u nidanda'a.

Iciiti eguu

Odefanoon isin/ati nuf kenitan Iccitin isa kan egamedha. Odayfanoon isin/ati irra adda tune takka hin jira. Bu'aan/odefanum qo'anoo kana haullasa irate kan gagefama yoo ta'e dhun faadhaan malumaa nama kan ibsamiti addemsa gati kessati magalaan hirmatota akka hin amnef meqa iccititin fayyadaman ykn qaba. Hirmatota qo'anna wajji kan walqabsisn barrefamanis ta'e warabidhan isan kan ibsa hin jira.

Mirgota

Qo'anno kessati hirmachun gutama gutati fedhina isani irrati kan huda'edha. Qo'anno kessati hirmachi fis tahe hirmachadhan mirga gutu qabdan/qabda. Qo'anno kesssati hirmaachuf erga murtesite boda sa'a barbadeti adda mura nidandessa. Kena rawatef ykn rawatanif mauman kee kan durani isinira/sira hiutuqimu. Gati debisu hin berbanef namni isn direqesisuhinjiru.

Tesson

Wa’e qo’annos ta’e ademsa qo’anno kessati gaafii yoo qabaatan tesso maan gaditin na kachu ni don dessan.

Antenah Barhee
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Imai imeeli: antenehb2005@gmail.com
IHRERC: 0254660708
Lakk.posta: 235 Harar

Madaala wal tahinsa hirmaana

Oddefannoo hirmaatootaf kenamu dubiseetin jira (kayyoon qo’anno naaf dubbifame jira) taayafi midhaa isaa waa’e iccitti eguufi mirgoota hirmaatoota gaatillee kamiyyum dhi heeswf akkan danda’uf iddolle sirriti hubadheen jira. Yeroon barbaedti qo’anaa adda murufi akkasumatille gafille akka hindebine barbaade deebisu dhabu mirga akkann qabn hubadheen jira kanaafu qo’anno irrati hirmaachuf fedhinaa akkaen qabu mallatto kiyaanin isiniif ibsa.

Maqaafi mallotto hirmaatoote _____

Maqaafi mallotto oddefano walisasabaa _____

Guyyaa itti informatina Gummachu

Waa’e dhukbsattoata sukora sadarka 2ffaa irrati dhukubota walfana toraniti sababota babali’nsa isaenii wajji wal qabatte hospital Dill chora kessatti qo’annoo gagessudha.

Gaafilee Hawasaafdhihatu

1) Saala

1) dhira
2) dhalaa

2) Umrii

_____waggaa

3) Saba

1) Oromou
2) Somaalee
3) Amaara
4) Guraage
5) Tigraai
6) kan bira yoojirata haa ibsamu _____

4) Amantii

1) Muslimaa
2) Ortodoksii
3) Protentansii
4) Kaatolikii
5) aadaan
6) kan bira yoojirata haa ibsaa _____

5) Gaafi lakkofsa shani (5) gubati debisaan kee eyye yota'e barnota idle waggaa meqaef hurdafte

1)
2) 1 – 6
3) 7 – 12
4) >12

6) haala cidha/fudhaaf heruma/nuuf ibsa

1) kan hin fune
2) kan fudhe
3) kan irra dlie/dute
4) kaneen adda bahan/wal hikan
5) kan bira yoojirata haa ibsaa _____

7) Hoji kam hojjechaa ot buulchitu

1) hojii dhabesa/kan wora irrati irkate
2) hojii dhunfaa/kanmottuma kan hojetu
3) hojii dhunfaa isa kan hojatu
4) kan bira yoojirata haa ibsamu _____

8) waligalati ji'a tokko kessati birri/malaqa meqa ar katu?

_____ birri

9) Dhukuba sukara akka qabdu ogessa fayyatim erga sitti himame wagga meqa ni taata?

_____ waggaa

10) mati kessan kessa dhukubsatan sukara jira?

1) eyye 2) lakki

11) Dhunkuba dhibbaa dhigaa qabdu laata?

1) eyye 2) lakki

12) Tambboo arsitu?

1) arse hin bekn

2) eyyee

3) sigaara xuxeen dhaabe

Annex VII Curriculum vitae

CURRICULUM VITAE

I. Personal Identification

Name Anteneh Berihe

Date of birth: 14 January 1991

Sex: Male

Place of birth: Addis Abeba

Marital status: Single

Nationality: Ethiopian

Address: - Mobile: 0913178143

: - email: antenehb2005@gmail.com

II. Educational Background

- Haramaya University: MPH (2nd year) (2016-2017)
- Gondar University: Clinical Pharmacy (2009-2013)
- Higher 23 preparatory school: high school 11-12 (2007-2008)
- Ayer Tena secondary school: high school 9-10(2005-2006)
- Ewket behebret elementary school: elementary education 1 -8 (1997-2004)

III. Work Experience.

1/ GendeGerada Health Center - I have work experience for 2yrs and 10 months as department head of Pharmacy and also I am serving the health center as member of management.

- **Awards**

1) Best performance at Gende Gerada health center

IV. Short Term Training.

- ART (adult HIV/AIDS care &ARV therapy)
- IPLS (integrated Pharmaceutical and Logistic System)
- IP (infection prevention)
- Hardware and Software troubleshooting.

V. Research;

Research methodology with two credit hours course and for final Pharmacy research paper with;

Topic; Knowledge attitude and practice on Antibiotic resistance in urban Gondar population, Gondar, Ethiopia, 2013

References; 1. Mehadi Abubeker Head of curative departrnent RHB,
mobil 0913703408
2.Dange Alemu RHB–mobil-0911026522

Annex VIII Approval Sheet

APPROVAL SHEET

SCHOOL OF GRADUATE STUDIES

HARAMAYA UNVERSITY

Proportion of Chronic Diabetic complications and its associated factors among Adult type 2 Diabetic patients in Dill chora Referral hospital, Dire Dewa, Ethiopia; from March 1 2017 to May 31 2017.

Submitted by:

Anteneh Berihe …… ……

Name of student Signature Date

Approved by:

1. ……. … ……...

Name of Major advisor Signature Date

2. …….. ……..

Name of Co- Advisor Signature Date

3. …… …….. ……..

Name of Chairman, DGC Signature Date

4…….. …… ……..

Name of Dean, SGS Signature Date

5……... …… ……

Name of chairman, CGS Signature Date

(WHO 2016) (WHO 2018)

(IDF 2017)

(Mistire 2013)

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