

St Paul's HOPITAL MILLENIUM MEDICAL COLLEGE



**PREVALENCE AND ASSOCIATED FACTORS OF CHRONIC KIDNEY DISEASE
AMONG DIABETICS PATIENT THAT ATTENDED ST PAUL'S HOSPITAL
MILLENIUM MEDICAL COLLEGE**

BY:-ABDERAHIM SHIDE MOHAMMED

**ADVISERS: - Dr MAMO WUBISHET (Associate professor of public
& Environmental health)**

**-Dr BERHANU WORKU (MD, NEPHROLOGY
FELLOW)**

**A STUDENT RESEARCH TO BE SUBMITTED TO THE DEPARTMENT OF PUBLIC
HEALTH ,SPHMMC IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF DOCTOR OF MEDICINE**

SEP, 2017 ADDIS ABABA, ETHIOPIA

Acknowledgement

I would like to express my heart-felt thanks to my advisors Dr Mamo Wubishet(PhD) and Dr. Berhanu Worku(MD,Nephrology fellow) for their constructive comments and continuous guidance that they provided me throughout the development of this research.

Abstract

Background: Patients with diabetes mellitus are at an increased risk of developing chronic kidney disease (CKD). Patients with diabetes and chronic kidney disease; have a lower quality of life and higher health care costs, face the prospect of end-stage renal disease requiring dialysis, and more importantly, they have an extremely elevated cardiovascular risk and correspondingly reduced survival. In association with the increasing prevalence of diabetes and its chronic complications, the burden of chronic kidney disease and the associated risk factors among patients with diabetes mellitus in Ethiopia is unknown.

Objectives: The objective of this study is to determine the prevalence of chronic kidney disease and the associated risk factors among adult diabetes mellitus patients attending the diabetes clinic of St Paul Specialized Hospital, in Addis Ababa Ethiopia.

Methods: A hospital based cross sectional study will be conducted among 306 diabetes mellitus patients aged ≥ 19 years; during the period of March 2017 to July 2017. All necessary socio demographic and risk factor information's will be collected using structured formats. The estimated glomerular filtration rate (eGFR) for CKD; will be determined using the abbreviated MDRD equation from serum creatinine.

Results: 71(23.7%) of the study participants were found to have CKD, as defined by $\text{eGFR} < 60 \text{ ml/min/1.73 m}^2$, according to the MDRD equations. Significant risk factors for CKD in the study subjects were older age, longer duration of diabetes and the presence of hypertension with ($P < 0.001$).

Conclusion: CKD was present in about 23.7% diabetic adults attending the follow up clinic at St Paul hospital, in Addis Ababa Ethiopia. Risk factors for CKD were similar to those reported in developed country studies.

Recommendation: This study proposes that a large scale study to be conducted encompassing a large number of diabetic populations to find out the prevalence of CKD and its associated factors so that a preventive strategy implemented or designed to reduce the expansion of the disease.

Keywords: Chronic Kidney Disease, Diabetes, Risk Factors, Estimated Glomerular Filtration Rate

Acronyms

BSA	Body Surface Area
CKD	Chronic Kidney Disease
CV	Cardio Vascular
CVD	Cardio Vascular Disease
DM	Diabetic Mellitus
eGFR	Estimated Glomerular Filtration Rate
ESRD	End Stage Renal Disease
FPG	Fasting plasma Glucose
GFR	Glomerular Filtration Rate
GDM	Gestational Diabetes Mellitus
K/DOQI	Kidney Disease Outcomes Quality Initiative
MDRD	Modification of Diet in Renal Disease
OGTT	Oral Glucose Tolerance Test
SSA	Sub Saharan Africa
SPHMMC	St Paul Hospital Millennium Medical College
WHO	World Health Organization

List of Table

Table 1: Socio-Demographic Characteristics of Participants (n=300)

Table 2: Clinical Characteristics of Participants (n=300)

Table 3: Behavioral Characteristics of Participants (n = 300)

Table 4: Distribution of CKD by demographic characteristics of study participants using MDRD (n=300)

Table 5: Clinical Characteristics of Participants (n=300)

Table 6: Behavioral Characteristics of Participants (n = 300)

Table 7: Associated Factors with CKD among diabetic patient as St Paul hospital medical college

Figure 1: General Prevalence of CKD among diabetic patient at St Paul hospital, Addis Ababa, Ethiopia

Contents

1. Introduction.....	1
1.1 Background.....	1
1.2. Statement of the Problem.....	3
1.3 Significance of the study.....	4
2. Literature Review.....	4
2.3. Associated Factors of Chronic Kidney Disease.....	6
3. Objectives of the Research.....	8
3.1. General Objective	8
3.2. Specific Objectives	8
4. Methods	9
4.1 Study Area & Period.....	9
4.2 Study design.....	9
4.3 Population	9
4.4 Sample Size Determination and Sampling Procedure	9
4.5 Study Variables.....	10
4.6. Data Collection Instrument	10
4.7. Data Quality Management	11
4.8. Operational Definition	11
4.9. Method of Data Analysis	11
5. Ethical Consideration.....	12
6. Results.....	13
6.1. Demographic, Clinical and Behavioral Characteristics of Participants	13
6.2 Prevalence of CKD	17
6.3. Associated factors of CKD	17
7. Discussion.....	25
8. Limitation of the study.....	26
9. Conclusion.....	26
10. Recommendation.....	26
Referencing	27
Annex I: English Questionnaire Form	29
Annex II: Assurance of Principal Investigator.....	35

1. Introduction

1.1 Background

Chronic Kidney Disease (CKD) is a worldwide public health problem. (1) It is an ongoing loss in renal function over a period of months or years. The symptoms of the disease are nonspecific; the patients might have generally unwell feelings and decrease in appetite. (2) Kidney disease is usually evaluated in terms of both general renal function (glomerular filtration rate (GFR)) and the presence of kidney damage determined by either kidney biopsy or other signs of kidney damage such as proteinuria (albuminuria), abnormal urinary sediment, and abnormalities on imaging studies. GFR specifically estimates how much blood passes through the glomeruli. It is estimated in clinical practice using readily calculated equations that adjust serum creatinine values to age, sex and ethnicity. It is vital to be aware of that both serum creatinine and albuminuria can simply be evaluated by using readily available and inexpensive laboratory tests. (3) CKD has five stages, in which stage 1 and 2 are ascertained by proteinuria that shows the presence of kidney damage and reduced GFR as well. It has been referred by many authors that clinically significant CKD also known as 'moderate' stages to be stage 3 (GFR 30-59 ml/min/1.73m²), stage 4 (GFR 15- 29ml /min/1.73 m²) and stage 5 also called end stage renal disease (ESRD) is characterized by GFR below 15 % with < 60ml/min/ 1.73 m² chosen as a cut off because it represents loss of about 50 % of normal renal function. While 90ml/min/1.73m² being the normal GFR [3]. Worldwide prevalence of CKD is anticipated to be 8 to 16 %. (4) While its prevalence is estimated to be 10.4 % in Africa. In most cases CKD is diagnosed during the evaluation of patients that have high blood pressure and/or diabetes and those with blood relative who have Chronic Kidney Disease. In which these patients are known to be at risk of kidney problems. (2) Even though diabetes is among the main causes of CKD, routine screening of diabetic patients for CKD is not done in Sub Saharan Africa due to limited diagnostic resources. Diabetes Mellitus (DM) commonly known as Diabetes is a chronic disease that occurs when the body cannot produce enough insulin or cannot use the insulin produced effectively. Insulin is a hormone produced in the pancreas that allows glucose from food to enter

the body's cells where it is converted into energy needed by muscles and tissues to perform their functions appropriately. The tissues of a person with diabetes do not absorb glucose properly, and glucose remains circulating in the blood (a condition known as hyperglycemia) damaging body tissues over time. (5)

* In the absence of clear hyperglycemia, results should be confirmed by repeat testing. [6] Symptoms of high blood sugar include abnormal thirst, frequent urination, extreme tiredness, constant hunger, sudden weight loss, slow-healing wounds, recurrent infections and blurred vision. (5)

Diabetes can be categorized into the following general categories:

1. Type 1 diabetes is due to absolute insulin deficiency.
2. Type 2 diabetes is due to the inability of the body to respond properly to the available insulin.
3. Gestational diabetes mellitus (GDM) is diabetes diagnosed in the second or third trimester of pregnancy that is not clearly overt diabetes. It happens as a result of insulin resistance because of the hormones produced by placenta that will block the action of insulin.
4. Specific types of diabetes due to other causes such as glucocorticoid use, in the treatment of HIV/AIDS or after organ transplantation. (6) 415 million people have diabetes worldwide, while it is anticipated to affect 14.2 million people in Africa. The prevalence of diabetes is estimated to be 1.3 million in Ethiopia. (5) The prevalence of diabetic nephropathy is estimated to be 6 - 16 % in SSA (7) and 6.1 % in Ethiopia. (8)

People with diabetes are at risk of developing a number of disabling and life-threatening health problems. Consistently high blood glucose levels can lead to serious diseases affecting the heart and blood vessels, eyes, kidneys, and nerves. People with diabetes are also at increased risk of developing infections. In almost all high-income countries, diabetes is a leading cause of cardio-vascular disease, blindness, kidney failure, and lower-limb amputation. (5)

Kidney disease (nephropathy) is far more common in people with diabetes than in people without diabetes; and diabetes is one of the leading causes of chronic kidney disease. The disease

is caused by damage to small blood vessels, which can cause the kidneys to be less efficient, or to fail altogether. (5) It is estimated that more than 5 % of patients who are newly

diagnosed for type 2 diabetes already have CKD. Additionally, the lifetime risk of developing CKD for both types of diabetes is estimated to be 40 % in which case most patients develop the disease within 10 years of diagnosis. (3) It is better to screen diabetic patients for CKD regularly using estimated GFR (eGFR) derived from serum creatinine measurements. Moreover, as CKD is defined as $eGFR < 60 \text{ ml/min/1.73 m}^2$, usually diagnosed after it gets advanced. So it will be cost effective and has better outcome for diabetic patients if it is early identified and treated using eGFR [9]. Maintaining blood glucose levels, blood pressure and cholesterol close to normal can help delay or prevent diabetes complications especially risk of nephropathy. (5)

1.2. Statement of the Problem

Chronic kidney disease (CKD) is a global public health problem with estimated prevalence of 8 to 16 % globally. (4) The extent to which it affects individuals in largest parts of Africa is unknown mainly because of shortage of national registries and lack of community based studies. But there are some studies that show estimated prevalence of CKD in Africa population to be 10.4 %. (2) In most countries of the world hypertension and diabetes are becoming the main causes of CKD. But glomerulonephritis is still the main cause in China, India and Sub-Saharan Africa. Kidney disease associated with HIV infection was responsible for a major part of end stage renal disease (ESRD) burden in Africa. Diabetes causes for 30 - 50% of all cases of CKD and ESRD worldwide. (9) 415 million diabetic patients are found in the world currently, (5) of which around 30 % have diabetic nephropathy even though this number is even higher in some ethnic groups. (10) In Africa 14.2 million People are affected by diabetes. (5) From these populations the prevalence of diabetic nephropathy is anticipated to be 6 - 16 % in the whole SSA (7) while it accounts 6.1 % particularly in Ethiopia. (8) Data on its prevalence and determinant factors are very limited like other chronic non communicable diseases. Despite the fact that diabetic patients are more likely to have CKD, and thus extra morbidity and mortality than those without the disease; there are virtually no published studies on the prevalence and determinants of CKD among diabetic patients in our hospital. Understanding the prevalence and determinants of CKD among DM patients in our hospital could help to excel the effectiveness and efficiency of effort on prevention of further expansion of the disease in our community and

could be used as an input for the country level effort. Therefore, the aim of this study is to assess the prevalence and determinants of CKD among diabetic patients that attend St Paul's Hospital millennium Medical College (SPHMMC).

1.3 Significance of the study

Representative prevalence data is essential to estimate the true burden and distribution of CKD in diabetic patients. There are very limited researches regarding the prevalence of the disease in general and particularly among diabetic patients. Additionally hypertension, diabetes, obesity and cigarette smoking are considered to be determinants of Chronic Kidney Disease globally but not known in case of Ethiopia, and also in our hospital. Therefore, it is necessary and has a vital importance to conduct a study on the prevalence and associated factors of CKD among diabetic patients that attend St Paul Hospital Millennium Medical College (SPHMMC).

2. Literature Review

2.1. Introduction

2.1.1. Chronic Kidney Disease

Chronic Kidney Disease (CKD) is decrease in kidney function over a period of months or years progressively. Most patients are asymptomatic during the early stages of the disease, but as the stage of the disease increases some non-specific symptoms like feeling unwell and loss of appetite can occur. (2) Chronic Kidney Disease has five stages. It is mainly classified based on the level of GFR. In case of stage 1 and 2 the patients may be asymptomatic, while GFR may be normal or elevated and decline of 70 % in respective stages. In case of the rest stages the GFR will fall below 60%, 30 % and 15 % ml/min/1.73m² respectively. In this case the normal GFR is considered to be 90ml/min/ 1.73m². (11) The global prevalence of CKD is estimated to be 8 – 16 %, which shows it is becoming one of the public health problems. Lack of national registries and community based studies in Africa makes a challenge to know its prevalence in the continent. But there are some researches done that indicate its estimated prevalence to be 10.4% in Africa. (2) Like all other chronic non-communicable disease, data's on the prevalence of Chronic Kidney Disease (CKD) in Ethiopia are very limited. (12)

2.1.2. Diabetes Mellitus

Diabetes mellitus is a chronic disease condition characterized by hyperglycemia secondary to inability of the pancreas to produce enough insulin or the body does not respond properly for the produced insulin. It has four categories namely: -Type 1 happens due to b-cell destruction that leads to absolute insulin deficiency, Type 2 happens as a result of the body inability to respond properly for the produced insulin. Gestational Diabetes is diabetes that happens and recognized for the first time during pregnancy while Specific type of diabetes is due to other causes. (6)

2.1.3. Diabetes and its Association with Chronic Kidney Disease

It has been estimated that 415 million peoples globally are diabetic. Among these 14.2 million people are leaving in Africa while there are 1.3 million people are leaving with diabetes in Ethiopia. (5) The prevalence of diabetic nephropathy is estimated to be 6 – 16 % in SSA (7) while it is 6.1 in Ethiopia. (8) CKD is mainly caused by diabetes. Among the newly diagnosed Type II diabetic patients more than 5 % have already developed CKD. The life time risk of developing CKD among both types of diabetes is approximately 20 to 40%. (3) About 30 -50 % of CKD and ESRD worldwide are caused by diabetes. (9)

2.2. Prevalence of Chronic Kidney Disease

2.2.1. Worldwide Prevalence of Chronic Kidney Disease

Felix B, Herriot S, Michael M et al. conducted study on the prevalence and risk factors for Chronic Kidney Disease in a rural region of Haiti in 2014. The study was conducted on 608 participants from patients that visit the outpatients department of Hospital Albert Schweitzer (HAS) in Deschapelles, Haiti. The research's result indicated that 27 % of the participants had CKD. (13)

2.2.2. Prevalence of Chronic Kidney Disease in Africa

A study was done in Tanzania on the prevalence of Chronic Kidney Disease in diabetic adult out patients by Mubarakali N, Samuel E, Andreas M et al. The study was done from October 2011

and March 2012 among 369 diabetic patients. The result of the study reveals that the prevalence of CKD is 24.7 %. (14)

2.2.3. Prevalence of Chronic Kidney Disease in Ethiopia

Temesgen F, Mehidi K and Tilahun Y conducted a study on Chronic Kidney Disease and under diagnosis of renal insufficiency among diabetic patients attending a hospital in southern Ethiopia in 2014. A total of 214 diabetics attending the follow-up clinic at Butajira hospital of southern Ethiopia participated in the study. The result of the study showed that CKD was present in 18.2 % and 23.8 % of the study participants according to the MDRD and CockcroftGault (C-G) equations, respectively. Only 9.8 % of the total participants, and 48.7 % (for the MDRD) and 37.3 % (for C-G) of those with $eGFR < 60 \text{ ml/min/1.73m}^2$ had abnormal serum creatinine values. Normal serum creatinine was observed in 90.2% of the participants attending the hospital. A large proportion of the participants ranging from 38.9-56.5% have shown to have mild to moderate renal insufficiency (stage 2-3 CKD) despite normal creatinine levels. CKD was found in 10.4 and 16.9% of participants with normal serum creatinine using the MDRD and C-G equations, respectively. The researchers also concluded that CKD is present in no less than 18 % of diabetics attending the hospital, but it is usually undiagnosed. (15)

2.3. Associated Factors of Chronic Kidney Disease

2.3.1. Worldwide Associated Factors of Chronic Kidney Disease

A cross sectional study on the prevalence and risk factors for Chronic Kidney Disease in a rural region of Haiti in 2014. The study was conducted on 608 participants from patients that visit the outpatients department of Hospital Albert Schweitzer (HAS) in Deschapelles, Haiti. The research's result indicated that the overall prevalence of hypertension and diabetes mellitus was 49.2% and 36.3%, respectively. Risk factors independently associated with CKD were hypertension, HIV infection and age > 60 years, whereas diabetes mellitus was not independently associated. (13)

2.3.2. Associated Factors of Chronic Kidney Disease in Africa

A study was done in Tanzania on the prevalence of Chronic Kidney Disease in diabetic adult out patients which was done from October 2011 and March 2012 among 369 diabetic patients. The result of the study reveals that older age was significantly associated for with CKD. (14)

2.3.3. Associated Factors of Chronic Kidney Disease in Ethiopia

A Cross sectional Study on Chronic Kidney Disease and under diagnosis of renal insufficiency among diabetic patients attending a hospital in southern Ethiopia in 2014. A total of 214 diabetic patients attending the follow-up clinic at Butajira hospital of southern Ethiopia participated in the study. The result of the study showed that CKD was higher in female, older, and patients with high BMI. (15) There also other risk factors like older age (>60 years), female gender, type 2 diabetes, low monthly income, longer duration of diabetes, family history of kidney disease, elevated systolic blood pressure & obesity.

3. Objectives of the Research

3.1. General Objective

To assess the prevalence and associated factors of Chronic Kidney Disease among diabetic patients that attend St Paul's Hospital Millennium Medical College in Addis Ababa.

3.2. Specific Objectives

The specific objectives of the study that emanated from the general objective were;

- To estimate prevalence of Chronic Kidney Disease among diabetic patients that attend St Paul's Hospital Millennium Medical College in Addis Ababa, and
- To identify associated factors of CKD among diabetic patients that attended St Paul's Hospital Millennium Medical College in Addis Ababa.

4. Methods

4.1 Study Area & Period

The study will be conducted at the diabetic clinic of St Paul hospital Millennium Medical College, College of Public health and Medical Sciences, in Addis Ababa, Ethiopia during the period of January 10 2017 to March 10 2017. The study area, St Paul hospital is located in the northern part of Addis Ababa, the capital of Ethiopia. The area lies between a latitude of 9.0484° N, 38.7269° E and has an elevation of 2300 meters above sea level.

4.2 Study design

A hospital based cross sectional study will be conducted among diabetes mellitus patients aged 19 years and above attending the diabetic clinic of SPHMMC.

4.3 Population

4.3.1 Source Population

The source population will be all diabetes mellitus patients of SPHMMC.

4.3.2 Study Population

The study population will be all selected diabetes mellitus patients aged 19 years and above who are registered and currently attending the diabetic clinic of St Paul Specialized Hospital for check-up and/or follow-up during the study period. The clinical diagnostic criteria for grouping patients as diabetes mellitus will be based on the presence of patient history of diabetes and have been attending the diabetic clinic of St Paul Specialized Hospital.

4.3.3. Inclusion Criteria

Diabetic patients who attend the hospitals' outpatient department at the time of data collection and who are willing to participate in the study were included.

4.3.4. Exclusion Criteria

Pregnant women were excluded in order to avoid the effect of gestational diabetes whose effect may not last long. Individuals less than 18 years were excluded.

4.4 Sample Size Determination and Sampling Procedure

4.4.1 Sample Size Estimation

The sample size will be calculated with proportion (p) to be 24.7% for CKD among DM patients from the study done in Tanzania. (14) Based on this consideration, sample size will be calculated using the following single population proportion formula.

Where:

n= sample population

P = proportion of CKD among DM patients

d = marginal error (0.05)

Z ($\alpha/2$) = the reliability coefficient of 95% i.e. 1.96

By using this formula the calculated sample size will be 286. Since the target population is less than 10000, the sample size is determined to be 278 using Epi Info version 7. The final sample size with 10% non-response will be 306.

4.4.2 Sampling Procedure

The study participants will be selected with simple random sampling technique using the list of cases attending diabetic clinic from the registration book as a sampling frame. Excel 2010 will be used to generate random numbers of the study unit's on the registration book.

4.5 Study Variables

Dependent variables: - Presence of CKD.

Independent variables: - Age, sex, literacy status, raised blood sugar levels, duration of diabetes, hypertension, obesity, smoking, and family history of CKD.

4.6. Data Collection Instrument

From the samples of the study that were chosen based on the above mentioned sampling technique, data for the research will be collected through partially closed-ended questionnaires, interview and document analysis. The data collection will be done by nurses and the investigator play a supervisory role. The questionnaire was open ended and closed ended (i.e. Partially closed ended) and distributed to participants who fulfilled the inclusion criteria. It will be used to collect data that enables to know the prevalence and determinant factors of CKD among the DM

patients. Document analysis was used to gather the necessary data that enabled to know the CKD status and type of diabetes of the participants.

4.7. Data Quality Management

To ensure the quality of data, preceding data collection, training of the data collectors will be carry out for one day by the principal investigator on the objective, relevance of the study and confidentiality of information. The data collection tool was prepared in English and translated to Amharic with the intention that the respondents will understand it and provide an accurate response. The research's data collection mechanisms will be pre-tested before proceeding to the research participants with the objective of checking the validity and appropriateness of the questions included there in. The pre-test will be conducted in 36 patients (10% of the sample size).

4.8. Operational Definition

1. Chronic Kidney disease is defined as $eGFR < 60 \text{ ml/min/1.73 m}^2$ by CKD-EPI.
2. Diabetes Mellitus is defined as a case identified for having the disease by the clinician.
3. Type 1 Diabetes is defined as a case identified for having this type of diabetes by the clinician.
4. Type 2 Diabetes is defined as case identified for having this type of diabetes by the clinician.
5. Those considered having a systolic/diastolic BP $\geq 140/90\text{mmHg}$ or use of medication for hypertension irrespective of the blood pressure.

4.9. Method of Data Analysis

The data that collected by the above mentioned methods will be analyzed in a descriptive statistics binary regression using SPSS version 20 and computer programmes: MS excel. The data will presented using statistical data presentation methods: tables and bar graphs.

Modification of Diet in Renal Disease (MDRD) study equation: $186 \times [\text{serum creatinine (mg/dl)}]^{-1.154} \times (\text{age})^{-0.203} \times (0.742 \text{ if female}) \times (1.210, \text{ if African American})$ will be used. For the purposes of this study, CKD will be defined as $eGFR < 60 \text{ ml/min/1.73 m}^2$.

5. Ethical Consideration

Ethical approval will be obtained from Ethical Review Committee of SPHMMC, Department of Public Health and Medical Sciences; and a letter of support will be written to St Paul Hospital specialized hospital to conduct the pre-test and the study. The study participant will be informed about the purpose of the study and the importance of their participation in the study. And also they will be informed that he/she has a right to withdraw from the study when he/she doesn't feel comfort to continue before the collection of urine and blood without losing any of the benefits they were supposed to obtain from the hospital. Their participation will be purely on voluntary.

6. Results

The total sample size was 306. From these, 300 study participants were provided their complete and relevant responses which making response rates 98%.

6.1. Demographic, Clinical and Behavioral Characteristics of Participants

6.1.1 Socio-demographic characteristics of the Respondents

Demographic and clinical data of the 300 participants of the study was collected. The analysis of the demographic data found reveals the following results regarding age, gender, marital status and educational status of the respondents:

Among the participants 86(28.7%) are between the age of 19 and 39 years, 104 (34.7 %) of the participants are between the age of 40 and 49 years And 110 (36.7 %) of the participants are 50 and above years of age. Among the participant One hundred fifty five (51.7%) and one hundred forty five (48.3 %) were males and females respectively. Most of the respondent 202(67.3%) were married and 27(9%) of were single. The remaining were separated, divorced and widow with frequency of 20(6.7%),8(2.7%) and 43(14.3%) respectively. Regarding the educational status 70(23.3%) of the respondent were illiterate,52(17.3%)attended primary school,133(44.3%) attended high school,42(14%)of the respondent were attended college/University & 3(1%) were attended postgraduate school.

Table 3: Socio-Demographic Characteristics of Participants (n=300)

	Variables	Frequency	
		No	%
Age	19-39	86	28.7
	40-49	104	34.7
	>51	110	36.7
Gender	Male	155	51.7
	Female	145	48.3
Educational Status	Illiterate	70	23.3
	Primary education	52	17.3
	High school	42	44.3
	College/University	42	14
	Graduate school	3	1
Marital Status	Married	202	67.3
	Single	27	9
	Separated	20	6.7
	Divorced	8	2.7
	Windowed	43	14.3

6.1.2 Clinical Characteristics of Participants

All the 300 respondents of the study are diabetic patients who were randomly selected for the purpose of the study. 166(55.4%) participants had diabetes duration less than ten years and 134 (44.7%) greater than or equal to 10 years. 168 (56 %) of the participants has a co-existence of hypertension and 132 (44 %) of the participants had no hypertension. History of cardiovascular

disease was present among 56(18.7 %) of the respondents while 224 (81.3%) do not have the disease.52 (17.3 %) of the respondents had previous attack of recurrent kidney related illnesses while 248 (82.7%) do not have the disease.But 76(25.3%) of them had other chronic illness and among this 18(6%) of them had peptic ulcer disease.23(7.7%) of patient had family history of chronic kidney disease and majority 277(92.7%) of them had no family history of chronic kidney disease.

Table 4: Clinical Characteristics of Participants (n=300)

Variables	No	Percent
How long is DM		
Below 10 yrs.	166	55.3
>=10 years	134	44.7
Hypertension		
Yes	168	56
No	132	44
Cardiovascular disease		
Yes	56	18.7
No	244	81.3
Do you have any Chronic disease		
Yes	76	25.3
No	224	74.7
Family history of CKD		
Yes	23	7.7
No	277	92.3

6.1.3 Behavioral Characteristics of Participants

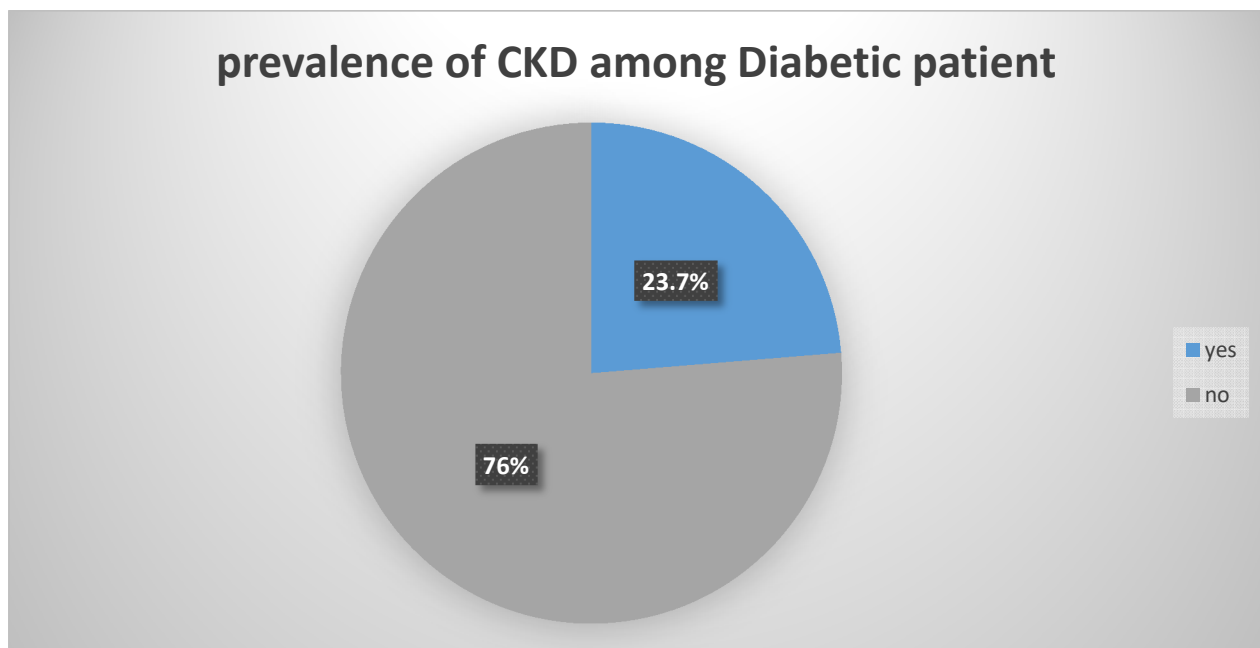
Respondent also asked whether they smoke cigarette or not and only 11(3.7%) of them was smoker. On the other hand 30(10%) of them consume alcohol currently while majority of them not consume alcohol currently. About 91(30.3%) of them used to drink alcohol before. 13 (4.3%) of respondent claimed they used traditional medicine before and 11(3.7%) still practice traditional medicine. About 49(16.3%) of the respondent used habitual anti pain.

Table 3: Behavioral Characteristics of Participants (n = 300)

Smoke cigar ate currently		
Yes	11	3.7
No	289	96.3
Smoke before		
Yes	51	17
No	249	83
Consume alcohol currently		
Yes	30	10
No	270	90
Alcohol use before		
Yes	91	30.3
No	209	69.7
Use of traditional medicine previously		
Yes	13	4.3
No	287	95.7
Traditional medicine uses till		
Yes	11	3.7
No	289	96.3
Habitual use of anti-pain		
Yes	49	16.3
No	251	83.7

6.2 Prevalence of CKD

Figure 1: General Prevalence of CKD among diabetic patient at St Paul hospital, Addis Ababa, Ethiopia.



6.3. Associated factors of CKD

6.3.1. Demographic Associated factors of CKD

Among those with CKD 35(22.6%) of them were male and 36(24.8%) were female. The prevalence of CKD with respect to age is 10.5% for those aged 19-39, 11.5 % for those aged 40-49 years and 45.5% for those aged 50 and above. The highest and lowest prevalence of CKD belongs to participants aged 50 years and above and 19-39 years respectively .Most 39(29.3%) patient with CKD educational level were at secondary school. The prevalence with respect to marital status of the respondents is found to be 5(17.90%), 52(25.70%), 5(26.30%), 2(25%), 2(25%) and 7(16.30%) respectively for single, married, separated, divorced and widowed.

Table 4: Distribution of CKD by demographic characteristics of study participants using MDRD (n=300)

		CKD		P value
		Yes	no	
gender	Male	35	120	
		22.60%	77.40%	
	Female	36	109	
		24.80%	75.20%	
marital status	Married	52	150	0.21
		25.70%	74.30%	
	Single	5	23	
		17.90%	82.10%	
	Separated	5	14	
		26.30%	73.70%	
	Divorced	2	6	
		25.00%	75.00%	
	Widow	7	36	
		16.30%	83.70%	
	level of education	12	58	
		17.10%	82.90%	
	Primary	12	40	0.423
		23.10%	76.90%	
	high school	39	94	
		29.30%	70.70%	
	college/universities	8	34	
		19.00%	81.00%	
	graduate school	0	3	
		0.00%	100.00%	

6.3.2. Clinical Associated Factors of Chronic Kidney Disease

By duration of diabetes 21(12.7 %) and 50(37.3%) % of respondents who got diabetic less than ten years and greater than or equal to 10 years have CKD respectively. These results indicate that the prevalence of CKD increases as the duration of diabetes increases. Out of the respondents with hypertension 69(41.1%) have CKD. Out of the respondents who do not have hypertension 2(1.5%) is found to have CKD. The result dictates that the prevalence of CKD among hypertensive diabetic respondents is higher than those who are not hypertensive. Among the respondents with Cardiovascular disease 11(19.60%) have CKD and out of those who do not have Cardiovascular disease 60(24.60%) are found to have CKD. By the Previous history of recurrent kidney related disease, Out of the respondents with previous history of recurrent kidney related disease 12(23.10%) have CKD. Out of the respondents who do not have previous history of recurrent kidney related disease 59(23.80%) have CKD. The prevalence of CKD among respondents with previous history of recurrent kidney related disease is less than that of the respondents who do not have previous history of recurrent kidney related disease. Out of the respondents who reported that their family members have CKD 5(21.70%) have CKD. And out of the respondents who reported that they do not have a family member with CKD 66(23.80 %) are found to have CKD. The result shows that the prevalence is higher among those respondents with no family member with CKD.

Table 5: Clinical Characteristics of Participants (n=300)

Variables		CKD		P value	COR(95%CI)
		yes	No		
Cardiovascular	Yes	11	45	0.432	
		19.60%	80.40%		
	No	60	184		
		24.60%	75.40%		
Have other chronic disease	Yes	14	62	0.214	
		18.40%	81.60%		
	No	57	167		
		25.40%	74.60%		
Family history of CKD	Yes	5	18	0.82	
		21.70%	78.30%		
	No	66	211		
		23.80%	76.20%		
Previous history of kidney disease	Yes	12	40	0.91	
		23.10%	76.90%		
	No	59	189		
		23.80%	76.20%		

6.3.3. Behaviours associated factor of CKD

3(27.3%) of the CKD patient claim they smoke cigarette currently while 10(19.6%) of them smoke cigarette before. 8 (26.7%) of the CKD patient consume alcohol currently while 21(23.1%) of them drinks alcohol previously. Only 2(18.2%) of CKD patient still use traditional medicine while 3(18.10%) used to use traditional medicine. On the other hand 11(22.4%) of CKD patient used ant pain habitually.

Table 6: Behavioral Characteristics of Participants (n = 300)

Smoke cigar rate currently	Yes	3	8	P value
		27.30%	72.70%	0.76
	No	68	221	
		23.50%	76.50%	
Smoke before	Yes	10	41	0.45
		19.60%	80.40%	
	No	61	188	
		24.50%	75.50%	
consume alcohol currently	Yes	8	22	0.68
		26.70%	73.30%	
	No	63	207	
		23.30%	76.70%	
Alcohol use before	Yes	21	70	0.87
		23.10%	76.90%	
	No	50	159	
		23.90%	76.10%	
Use of traditional medicine previously	Yes	3	10	0.95
		23.10%	76.90%	
	No	68	219	
		23.70%	76.30%	
Traditional medicine use still	Yes	2	9	0.66
		18.20%	81.80%	
	No	69	220	
		23.90%	76.10%	
Habitual use of anti-pain	Yes	11	38	0.83
		22.40%	77.60%	
	No	60	191	
		23.90%	76.10%	

6.3.4 Risk Factors Associated with CKD

Bi –vriate and Multi-vriate logistic regression was used to identify the factors contributing to the development of CKD among diabetic patient visiting St Paul hospital. Coefficients were expressed as crude and adjusted OR relative to the referent category and a number of risk factors were emerged as significant predictors for the development of CKD among diabetic patient visiting St Paul hospital. The risk factors associated with development of CKD among diabetic patient are older age, longer duration of diabetes and the presence of hypertension with ($P < 0.001$). Among the socio-demographic variables age were found to have association. Age interval 40-49 are 1.91 times risk to develop CKD than others age interval (AOR=1.91, CI= (0.75 – 4.86), age interval 50 years & above are 3.94 times high risk to develop CKD (AOR= 3.94, CI= (1.8, 8.59)). Among the clinical variable duration of diabetic and presence of hypertension were found to have association respectively. Those patients with diabetics for more than 10 years have 0.33 times risk to develop CKD than those with diabetic for less than 10 years (AOR=0.33, CI=(0.17-0.65)). And those patient with hypertension have a 0.036 times high risk to develop CKD than those without hypertension (AOR=0.036, CI=(0.008-0.16)).

Table 7: Associated Factors with CKD among diabetic patient as St Paul hospital medical college

Variables		CKD		P value	COR(95%CI)	AOR(95%CI)
		yes	No			
How long you have DM	below 10 years	21	145	0.001	1	1
		12.7%	87.3%			
	>=10 years	50	84		4.19(2.31,7.31)	0.33(0.17,0.65)*
		37.3%	62.7%			
Hypertension	Yes	69	99	0.001	0.22(0.005,0.92)	0.036(0.008,0.16)*
		41.1%	58.9%			
	No	2	130		1	1
		1.5%	98.5%			
Age	19-39	9	77	0.001	1	1
		10.5%	89.5%			
	40-49	12	92		7.13(3.24,15.64)	1.91(0.75,4.86)*
		11.5%	88.5%			
	>51	50	60		6.3(3.14,12.98)	3.94(1.8,8.59)*
		45.5%	54.5%			

NB * refers to significant association

7. Discussion

In this hospital based quantitative cross sectional study, prevalence and associated factors of CKD among diabetic patients that attend St Paul hospital millennium medical college have been studied. By using MDRD equation, prevalence of CKD has been found to be 23.7%. The prevalence of CKD among diabetic patients, as addressed in several studies, differs in different countries worldwide. The estimated prevalence of CKD by $eGFR < 60 \text{ ml/min/1.73 m}^2$ obtained in this study is lower than the study conducted in the adult population of Haiti was 27 % (13). And higher than the prevalence of CKD by MDRD in Canada, 15.5% (16). The reason for the difference might be due to the use of the laboratory finding of the participants at the time of data collection. The study done in Tanzania shows the prevalence of CKD among adult diabetic patients by Cockcroft Gault equation was 24.7% (14). Which is comparable with this research finding. The research done in Ethiopia among diabetic patients by using similar equations with this study have found the prevalence of CKD to be 18.8% and 23.8% by MDRD and Cockcroft Gault equation respectively (15). Not too many studies have reported results similar prevalence to this study because the studies found have determined the prevalence by using point prevalence where as this research uses period prevalence.

Regarding associated factors, different associated factors have been assessed to see whether they are associated factors in these study population or not. As for risk factors, this study found a significant association between older age and CKD. This is consistent with findings from other different studies conducted on the prevalence and risk factors for Chronic Kidney Disease in a rural region of Haiti in 2014 (13) , in a research done in Tanzania (14) & in a research done on Chronic Kidney Disease and under diagnosis of renal insufficiency among diabetic patients attending a hospital in southern Ethiopia in 2014 which showed similar result. (15) Regarding duration of diabetics there was a significant association between CKD and the presence of longer duration of diabetes in this study. This corresponds with the findings of Study done on Chronic Kidney Disease and under diagnosis of renal insufficiency among diabetic patients attending a hospital in southern Ethiopia in 2014 which showed similar result. (15) Hypertension was also found to be associated with CKD in this study. This corresponds with the findings of Study done

on Chronic Kidney Disease and under diagnosis of renal insufficiency among diabetic patients attending a hospital in southern Ethiopia in 2014 (15) and study on the prevalence and risk factors for Chronic Kidney Disease in a rural region of Haiti in 2014 showed similar result. (13)

8. Limitation of the study

Primarily is that the prevalence of CKD is done by using the serum creatinine level of patients which is done recently among the tests done in the last five years. This in turn affects the reliability of the prevalence obtained as some patients who had a normal creatinine level before two or three years may have elevated or normal status. Second, some questions had not been filled by the respondents and that in turn affects the analysis and the result of the study.

9. Conclusion

In conclusion, the study identified a high prevalence of CKD 71(23.7%) depending on the formula used to estimate GFR among diabetic adults attending St Paul hospital millennium medical college and significant risk factors for CKD in the study subjects were older age, longer duration of diabetes and the presence of hypertension. This study, therefore, proposes that a nationwide survey to be conducted encompassing the entire diabetes population to find out the prevalence of CKD and its associated risk factors, so that a preventive strategy or an entire defensive framework could be adopted or planned to reduce the disease and complications related to it in the community.

10. Recommendation

This study proposes that a large scale study to be conducted encompassing a large number of diabetic population to find out the prevalence of CKD and its associated factors so that a preventive strategy especially for the preventable associated factors or for an entire defensive framework could be implemented or designed to reduce the expansion of the disease.

Referencing

1. Prevalence, risk factors and patterns of chronic kidney disease in a rural community in south west Nigeria. **R, Oluyombo, A, Akinsola and Ayodele.** 65(1):271-2, s.l. : J Epidemiol community health 2011 August 1.
2. Emerging Public Health Problems in Ethiopia: Chronic Non Communicable Disease. Addis Ababa, Ethiopia : Ethiopian Public Health Association: Addis Ababa, Ethiopia, 2012.
3. The Contribution of Chronic Kidney Disease to the Global Burden of Major Non Communicable Diseases. **G, William, R, Guiseppe and al, Shanti M et.** s.l. : Kidney Int. 2011; 80: 1258 –1270.
4. Chronic kidney Disease: Global Dimension and Perspectives. **V, Jha, Garcia-Garcia G and al., Iseki K et.** s.l. : Lancet. 2013; 382(9888).
5. IDF Diabetes Atlas. Vol. Seventh edition. 2015.
6. American Diabetes Association. Classification and diagnosis of diabetes. s.l. : Sec. 2. In Standards of Medical Care in Diabetes 2016. Diabetes Care 2016; 39(Suppl. 1): S13–.
7. Burden of End Stage Renal Disease in Sub-Saharan Africa. **S., Naicker.**
8. Chronic Kidney Disease in Sub-Saharan Africa: Hypothesis for Research Demand. s.l. : Annals of African Medicine. 2012; 11 (2). DOI: 10.4103/1596-3519.93537.
9. The Impact of Chronic Kidney Disease Identification in Large Countries: The Burden of Illness. **Jha, Vivekanand, Yee, Angela and al., Moon W et.** s.l. : BMC Nephrology. 2012.
10. Chronic Kidney Disease as a Public Health Problem: Epidemiology, Social and Economic Implications. **R, Arrigo S and Giuseppe.** s.l. : Bergamo, Italy: Kidney International 2005; pp s7-s10. 2005.
11. Internal Medicine: Lecture Notes for Health Officers. **A., Getachew T and Tadesse.** s.l. : Jimma University: Ethiopian Public Health Training Initiative; 2006.

12. Pattern and Trend of Medical Admissions of Patients of Chronic Non-Communicable Diseases in Selected Hospitals in Addis Ababa. **B, Abebe, T, Habtamu and al., Mekonnen T et.** s.l. : American Scientific Research Journal for Engineering, Technology and Sciences (AJRJETS). Online: 2015; 15: 34-48.
13. Prevalence and Risk Factors for Chronic Kidney Disease in a Rural Region of Haiti. **B, Felix, S, Herriot and al., Michael M et.** s.l. : Swiss Med Wkly. 2014; 144(no page number) ow14067. DOI: 10.4414/smw.2014.14067.
14. A study was done in Tanzania on the prevalence of Chronic Kidney Disease in diabetic adult out patients. **N, Mubarakali, E, Samuel and al, Andreas M et.** s.l. : BMC Nephrology 2013, 14:183 <http://www.biomedcentral.com/1471-2369/14/183>.
15. Chronic Kidney Disease and Underdiagnosis of Renal Insufficiency among Diabetic Patients Attending a Hospital in Southern Ethiopia. **F, Temesgen and Y., Mehidi K and Tialhun.** s.l. : BMC Nephrology. 2014; 15.
16. **Ronald F, Mariam N and Steward B.** Prevalence, Determinants and Co-morbidities of Chronic Kidney Disease among First nations Adults with Diabetes.

Annex I: English Questionnaire Form

Information Sheet

Good morning/Good afternoon. This questionnaire is prepared for research work to be conducted on the prevalence and determinants of Chronic Kidney Disease among diabetic patients that attend St Paul specialized Hospital. The research is conducted in partial fulfillment of the requirement for the degree of Doctor of medicine: SPHMMC, Department of Public Health.

Dear respondents, below are questions, which are designed to assess the determinants of Chronic Kidney Disease among diabetic patients. Knowing the determinants will help us at city level as well as country level to work on the prevention of further expansion of the disease. You are selected for you are a diabetic patient and your participation depends on your voluntariness only. Even though you are sacrificing your time there is no benefit in personal or payment that you get for your participation in this study. But your honest response to these questions will help us to better understand the determinants of chronic kidney disease in diabetic patients and will also help as the contribution for the countries level effort to prevent the disease. You are not required to write your name, and it will never be used in connection with any of the information you provide. We would like to express our heartfelt appreciation for your collaboration and thank you in advance.

In case you need to contact the investigator you may use the following address:

Name: Abderahim shide Mohammed

Tel:+251920824993 Email: cabdi_shm@hotmail.com

Consent Form

I the selected participant heard the information in the study's information sheet and Understood the purpose and benefits; and what is required from me as well. I understood that all the information regarding me like name and all answers given by me will never be transferred to a third party. So, I am willing to participate in the study.

Signature of Participant _____ Date _____

Data Collector Name _____ Signature _____ Data _____

English Questionnaire Form

Section1: Distribution of Participants by their Demographic Characteristics

No	Questions	Alternative Responses(coding category)	Skip to
101	Sex	1. Male 2. Female	
102	Age	Age in year -----	
103	Marital Status	1. Married 2. Single 3. Separated 4.Divorced 5. Widower/widowed	
104	Please circle the highest year of school completed	Illiterate 1 2 3 4 5 6 7 8 9 10 11 12 (Primary) (High school) 13 14 15 16 17 18 19 20 21 22 (College/University) (Graduate School)	

Section 2: History of Diabetes, Hypertension and Cardiovascular Disease

No	Questions	Alternative responses (coding category)	Skip to
301	How long is it since you got Diabetic?	1. Below 10 years 2. Greater than or equal to 10 years 3. Do not know	
302	Are you diagnosed to have Hypertension?	1. Yes 2. No 3. I don't know	
303	Are you diagnosed to have Cardiovascular disease?	1. Yes 2. No 3. I don't know	If 'no' and 'I don't know' skip to 304, If 'yes' skip to 303
304	Do you have other chronic Diseases?	1. Yes 2. No 3. I don't know	If 'no' skip to the next section
305	Please specify		

Section 3: Smoking Habit and Alcohol Consumption

No	Questions	Alternative responses (coding category)	Skip to
401	Do you smoke cigarette currently?	1. Yes 2. No	
402	Have you been a smoker before?	1. Yes 2. No	
403	Do you consume alcohol currently?	1. Yes 2. No	
404	Have you been alcohol consumer?	1. Yes 2. No	

Section 4: Use of Traditional Medicine

No	Questions	Alternative responses (coding category)	Skip to
501	Do you have a previous history of Using traditional medicine?	1. Yes 2. No 3. I don't know	
502	Do you still use traditional Medicine?	1. Yes 2. No	

Section 5: Medications

No	Questions	Alternative responses (coding category)	Skip to
601	Do you have habitual use of anti-pains?	1. Yes 2. No	

Section 6: History of Kidney Disease

No	Questions	Alternative responses (coding category)	Skip to
701	Do you have family members who Have Chronic Kidney Disease?	1. Yes 2. No 3. I don't know	
702	Do you have previous frequent Kidney related illnesses?	1. Yes 2. No 3. I don't know	

Thank You!

Table 1 Criteria for the diagnosis of Diabetes

FPG 126 mg/dl (7.0 mmol/l). Fasting is defined as no caloric intake for at least 8 h.
* OR
2-h PG 200mg/dl (11.1mmol/L) during an OGTT. The test should be performed as described
by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose
dissolved in water.
* OR
In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random
plasma glucose 200 mg/dl (11.1 mmol/l).

Annex II: Assurance of Principal Investigator

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the research publications office in effect at the time of grant is forwarded as the result of this application.

Name of the student:-Abderahim shide Mohammed

Date September/2017 Signature_____

Approval of the Primary Advisor

Name of the primary Advisor Dr Mamo Wubishet

Date September/2017 Signature_____

