Arab American University-Jenin

Faculty of Graduate Studies

Prevalence and risk factors of chronic kidney disease with chronic diseases patients: Retrospective chart review in primary health care centers in Hebron

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This thesis was submitted in partial fulfillment of the requirements for

Master's degree in Health informatics

December/ 2020

Thesis Approval

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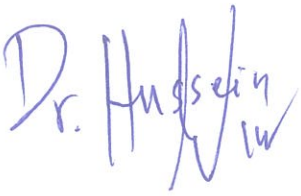
3. Dr. Hussein Jabareen: External Examiner	

Keywords

Chronic kidney disease, Glomerular filtration rate, MDRD equation, Prevalence, Risk factors, Hebron

Dedication

I sincerely dedicated this study to my family who has been my inspiration source and gave me power when I thought of giving up, who usually provide their emotional and spiritual support. To those who continually shared their word of advice, my sisters, brothers, friends, classmate, teachers.

Abstract

Background: CKD is increasingly recognized as a global public health problem, 8-10% of the adult population have some form of kidney damage, and every year millions die prematurely of complications related to CKD. Palestine has no clear data or registry about the prevalence and risk factors of chronic kidney disease. The aim of this study is to assess the prevalence and risk factors of CKD in primary health care clinics in Hebron.

Methods: A non-interventional retrospective review of medical records study was conducted for patient file from January 2019 to January 2020 in four primary health care clinics in Hebron. The target population included people aged 15 and above, who were living in the city of Hebron and visiting the chronic clinics for at least the previous year with confidence interval of 95% and 4% margin of error, the sample size was 587 patients and randomly selected from four directorate.

Results: Among the 587 Patient file reviewed, 69 % were female, their mean age was 61.52 ± 11.86 years, their eGFR mean is 75.54 ± 24.22, more than one quarter of the sample had CKD of 18.5%, 5.9%, 2.0%, and 0.3% match with mild, moderate, sever, and end stage renal disease (ESRD), respectively. Female gender, aging, diabetes mellitus (DM), hypertension (HTN), dyslipidemia, and coronary artery diseases (CAD) were risk factors of CKD development.

Conclusion: This study reported a high prevalence of CKD among patients with chronic diseases, CKD development are linked with several clinical and demographic factors, Therefore, a collaborative effort of stakeholders should be directed to more frequent monitoring and assessment of CKD to identify and solve CKD and its burden.

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List of Acronyms and Abbreviations

CKD	Chronic Kidney disease
ESRD	End-Stage renal disease
CrCl	Creatinine Clearance
GFR	Glomerular filtration rate
BMI	Body mass index
CVD	Cardiovascular disease
BP	Blood pressure
ACEI	Angiotensin Converting Enzyme Inhibitor
S.Cr	Serum creatinine
K/DOGI	Kidney disease outcome quality initiative
WHO	World health organization
DM	Diabetes Mellites
HbA1c	Glycosylated Hemoglobin, Type A1C
HTN	Hypertension
KDIGO	Kidney disease improving global outcome
CDC	Center of disease and control
SBP	Systolic Blood pressure
DBP	Diastolic Blood pressure
RBS	Random Blood sugar
FBS	Fasting Blood sugar
mmHg	millimeter of mercury
Mg/dl	milligrams per deciliter
MDRD	Modified of diet and renal disease
ACC	American college of cardiology
AHA	American heart association
CI	Confidence interval
P-Value	Probability Value
BUN	Blood urea nitrogen
M^2	Metered squired
AAUP	Arab American university of Jenin

ID	Identification
APA	American Psychological Association
CAD	Coronary artery diseases
Sd	Standard deviation
Hb	Hemoglobin
OR	Odd Ratio

List of appendices

Statement of Original Authorship

I certify that, this thesis content has not been submitted to fulfil the requirement for academic degree, it also includes no previously published material except where due reference is made.

Student Name: Ibrahim Issa Khalil Mughnamin

Signature: 

20 / 1 / 2021

Acknowledgements

First and foremost, commendations and thanks to Allah, the Almighty, for blessings throughout my study work to complete the study successfully.

I would like to express my profound and sincere gratitude to my study supervisor, **Dr. Shahenaz Najjar** for invaluable guidance thought my study that was great honor to study and work under her supervision.

I am extremely grateful to my mother for her love, prayers, and caring for educating and preparing me for future. So much thankful go to my wife and my children for their love, prayers and continuous support to accomplish this study work. Special thanks to my hospital (Yatta Governmental Hospital) administration and colleagues for their great support. My gratitude also extends to my classmate in health informatic master program for their motivation, friendship, and sense of humor.

I am also extending my thankful to the data collection team Mr. **Raed Jbour**, and **Radwan Jude'** for their help and support during data collection through all my study work period. A lot of love to my little son **Abed Al Rahman Mughnamin** (Abod) for his extreme help that is invaluable in data entry.

Finally, my gratitude goes to all who have supported me to complete the study work directly or indirectly.

1. Chapter 1: Introduction

1.1. Introduction

Kidney disease has been described as the extreme ignored chronic disease. Clear estimates of the global burden of kidney disease needs more population-based studies. WHO studies revealed that 1.2 million people died from kidney failure, with reported increase of 32% since 2005. In 2010, an average of 4.7 million death from end-stage kidney disease without access to chronic dialysis. Furthermore, each year, around 1.7 million people are expected to die from acute kidney injury. Overall, therefore, an estimated death annually from kidney disease is 5–10 million (Luyckx et al., 2018).

Globally, chronic kidney disease (CKD) is more and more recognized as a major public health concern noted to be main leading cause of morbidity and mortality, causes a high economic burden to healthcare systems (Evans & Taal, 2015; Jager & Fraser, 2017). Chronic kidney disease (CKD) is a progressive loss in kidney function over a period of months or years, it is increasingly recognized as a global public health problem (Jacobson, 2013).

A routine blood and urine test that measures the level of serum creatinine and albumin creatinine ratio or by multiple and different imaging studies used to detect the reduced renal function (Gharbi et al., 2016). Treatment of CKD depends on early detection, appropriate management of CKD progression can prevent further kidney damage.(D. W. Johnson et al., 2013). Aging, Hypertension, history of diabetes mellitus (DM), obesity and overweight, smoking, and regular intake of analgesics and herb were significant risk factors for CKD (Afolabi et al., 2009). Pharmacological and non-pharmacological

management usually used to treat different stages of CKD as well as the most important treatment modalities is the enhancement of self-care management by changing lifestyle to manage and overcome the complication of the diseases (Peng et al., 2019; Rastogi et al., 2008; Stevens et al., 2007) .

Different prevalence of CKD among different population, worldwide an estimate of 8-16% of population affected by some form of CKD (Jha et al., 2013). Early stage detection of CKD is difficult since those who have CKD have no symptoms and it is often remain undiagnosed until there is a significant kidney function loss, every year millions die prematurely of complications related to CKD (Raddad et al., 2016). Locally, there is limited information on the epidemiology of CKD in the Palestinian population. This is especially true for less advanced stages of renal impairment that are potentially more susceptible to therapeutic interventions aimed at changing the course of the disease and avoiding end stage renal diseases (ESRD). On the other data from Palestinian minister of heath reported that 1568 patients have ESRD.

1.2. Background

1.2.1. Definition and Classification of Chronic Kidney Disease

Chronic kidney disease (CKD) is a progressive loss in kidney function over a period of months or years ,it is a condition when kidneys are damaged and can't filter blood as needed and the damage happened slowly over a long period of time that is why it is a chronic which cause waste to build up in the body(Vaidya & Aeddula, 2019), Adopting the definition provided by the Kidney Disease Outcome Quality Initiative (K/DOQI)

should be confirmed based on the occurrence of kidney damage and kidney function level, regardless of the diseases and conditions causing the damage. CKD diagnosis based on the evidence of kidney damage and/or reduced kidney function lasting at least three months, this can be detected by routine blood and urine testing and was defined as creatinine clearance (CrCl) or glomerular filtration rate(GFR) less than 60 ml/min/1.73 m (Vaidya & Aeddula, 2019; C. A. Johnson et al., 2004b; Eknoyan & Levin, 2002)

1.2.2. Stages of Chronic Kidney Disease (CKD)

Usually, kidney disease starts slowly and silently, and progresses over a number of years. Not everyone progresses from Stage 1 to Stage 5. Stage 5 is also known as End-Stage Renal Disease (ESRD) (Arora et al., 2013; Raddad et al., 2016)..

Stage	Descriptions
Normal Function	Healthy kidney
Stage 1	Kidney damage with normal GFR
Stage 2	Kidney damage with mild decrease in GFR
Stage 3	Moderate decrease in GFR
Stage 4	Sever decrease in GFR
Stage 5	Established Kidney failure

Progressive loss of kidney functions of undetected CKD can lead to ESRD, which mandate a kidney transplant or regular dialysis, deterioration in kidney function can be prevented or slowed by early detection of CKD and associated complications can be minimized (Arora et al., 2013; Liu & Zhao, 2018)

1.2.3. Prevalence of Chronic Kidney Disease

Globally aging population and high prevalence of hypertension and diabetes raised the prevalence of CKD (Jager & Fraser, 2017). More recently, CKD prevalence has been identified to be 10- 15% worldwide and higher in the elderly (Levey & Levin, 2017 ;Levin, 2017), According to the Centers for Disease Control and Prevention 2020, the estimated prevalence of CKD in the **united states** of adult population is more than 10% (CDC, 2020). **Asian countries** CKD prevalence range from 13-17% (LI et al., 2011). In **Arab countries** the precise data about the prevalence of CKD still unavailable or limited, by reviewing recent literature we found no up to date information on the epidemiology of CKD (Farag et al., 2012). In **Saudi Arabia**, the prevalence of CKD has been reported to be 9.4% in all stages (Hussain Gadelkarim Ahmed1, 2* et al., 2019). **Locally** limited research focused on the prevalence and risk factors of CKD, most of local researches in Palestine focused on End-Stage Renal Disease (ESRD); stage five CKD patients who are on hospital hemodialysis treatment. None of them focused on early detection of CKD. Prevalence of CKD among hypertensive diabetic patient in Al-Watani hospital has been reported to be 35% (Sweileh et al., 2009).

1.2.4. Risk Factors of Chronic Kidney Disease

Chronic kidney disease has been recognized as a serious public health issue. Over 1.4 million patients receiving renal replacement therapy worldwide (Kazancioğlu, 2013). Early detection and intervention are the only way to decrease the health and economic burden of chronic kidney disease therefore identifying those who are at high risk of renal disease through understanding causes and risk factors.

CKD risk factors can be grouped into three major categories; first: biomedical category which includes diabetes, hypertension, CVD, systemic renal inflammation, and obesity. Second: behavioral risk factors include smoking, malnutrition, and low physical activity, while third category is fixed risk factors which includes family history, kidney disease, low birth weight, and male sex (Collins et al, 2020). Several significant preventable risk factors for developing CKD have been identified like diabetes, hypertension, dyslipidemia, smoking, obesity, alcohol (Luyckx et al., 2017).

Hypertension has been serious risk factor for CKD and ESRD. In the United States hypertension count for 27% of the CKD stage five patients who need kidney dialysis (Prevention, 2019). **Diabetes mellitus** (DM) is the main cause of CKD and ESRD worldwide. Around 30% to 40% of all diabetic patients will manifest nephropathy and most of them will end to ESRD that mandate renal replacement therapy (Prevention, 2019). **Obesity** is one of the terrible risk factors for CKD that is modifiable more studies that are recent have recognized overweight and obesity as independent risk factors. Overweight (BMI $\geq$ 25) at age of 20 was linked with three times higher risk for CKD, when compared to those with BMI < 25, obesity BMI $\geq$ 30 and morbid obesity BMI $\geq$ 35 for both sex during any tome was with three to four time increase in risk of CKD (Hsu et al., 2009)(Kazancioğlu, 2013). **Smoking** increase the risk of ESRD, in a study in a non-diabetic participants smoking more than 20 cigarette per day increase the risk of CKD, each additional 5 cigarettes per day was linked with an increase in creatinine level by 31% = 0.3mg/dl (Kwakernaak et al., 2013; Orth et al., 2005).

1.2.5. Causes of Chronic Kidney Disease

The most common causes of kidney disease are high blood pressure (hypertension) and diabetes. Diabetes considered the first cause of CKD and established around 35% of all cases of ESRD , the second is hypertension which causes just over 25% of all kidney failure cases (Perico & Remuzzi, 2012). Some research found a link between heart disease and kidney disease (Kazancioğlu, 2013). Family history of kidney failure found to be a risk factor of having CKD. Sometimes CKD is inherited (such as polycystic disease), other less common conditions include inflammation (glomerulonephritis) or infections (pyelonephritis), or the result of longstanding blockage to the urinary system (such as enlarged prostate or kidney stones),some drugs can cause CKD, especially some pain-killing drugs (analgesics) if taken over a long time (Tonelli & Riella, 2014).

1.2.6. Clinical Manifestation of Chronic Kidney Diseases

Chronic kidney disease is a silent disease, many people with CKD have no symptoms or have some non-specific clinical manifestation, patients with CKD may have gastrointestinal problem, elevated blood pressure, urination changes, flank pain, peripheral edema, appetite loss, headache, sleeping difficulties, concentration problem, shortness of breath, bad breath, nausea and vomiting, lethargy, itching, and Pruritus. Generally symptoms starts to be obvious when the patient become stage four and above as kidney functions deteriorate (Kakitapalli et al., 2020; Webster et al., 2017).

1.2.7. Management of Chronic Kidney Disease

Chronic kidney disease management should be considered depending on many factors; disease underlying cause, kidney function impairment severity and the existence of comorbid health conditions. Preventing or delaying the progression to ESRD, cardiac complication reduction, and quality of life improvement should be kept the most important aim of the management of CKD. (Jager & Fraser, 2017; Stevens et al., 2007). Pharmacological and non-pharmacological; self-care management enhancement are treatment strategies often used to treat different stages of CKD progression and complication (Peng et al., 2019; Rastogi et al., 2008). Whenever a patient reach a CKD stage five renal replacement therapy should be considered (Stevens et al., 2007;D. W. Johnson et al., 2013).

For patient with CKD it is important to control elevated blood pressure to delay the progression of the CKD and to minimize the cardiovascular disease risk (Judd & Calhoun, 2015;Lowth, 2016). It is still unclear what is the optimal blood pressure for those who have CKD, some update guidelines advice a blood pressure of 130/80 mm Hg to be a target BP for diabetic CKD patient (C. A. Johnson et al., 2004a), available evidence is not conclusive to confirm that the clinical outcome will be improved with BP target of 130/80 more than BP target of 140/90 (Upadhyay et al., 2011; Judd & Calhoun, 2015).The risk of composite outcome will be reduced with intensive decrease in BP (J. Lv et al., 2013).

Pharmacological therapy

For hypertension treatment in-patient with CKD antihypertensive medication that lower both blood pressure and albuminuria such as angiotensin-converting enzyme inhibitors

(ACEI) are mainly prescribed(Sinha & Agarwal, 2019; Judd & Calhoun, 2015), an adjunct diuretic antihypertensive may be used (Agarwal & Sinha, 2012), further antihypertensive medication may be used according to comorbidities (D. W. Johnson et al., 2013; Judd & Calhoun, 2015). Sugar level control is fundamental for patient with CKD as it helps prohibit the presence of microalbuminuria and delay the microvascular complication progression, hemoglobin A1C level below 7% is a target level that should be kept for a diabetic CKD patient (Hahr & Molitch, 2015; D. W. Johnson et al., 2013). Dyslipidemia itself is not a cause of CKD but high lipid level contributes to the progression of stages of CKD, therapy that lower the lipid level is highly recommended, lip-lowering therapy may benefit patient with CKD as it decrease the risk of CVDs (Tannock, 2018).

Non-pharmacological therapy

Non-pharmacological therapy; no matter whether medical treatment started or not, self-care enhancement through life style modification remains a vital component. Lifestyle modification such as stop smoking, low sodium intake, regular physical activity, and weight regulation are all important to minimize the risk of cardiovascular diseases (D. W. Johnson et al., 2013). Evidence suggest that smoking extend the risk of CVD in CKD patients (Kazancioğlu, 2013; Seibert et al., 2005), weight control should be encouraged with target BMI 18.5 – 24.9 (Kazancioğlu, 2013). It was approved that exercise for 30 minutes daily regularly needed for better CKD patients health (Howden et al., 2013), low salt died intake can help reduce blood pressure and albuminuria (D'Elia et al., 2015).

1.3. Significance of The Study

chronic kidney disease is a major serious public health issue, the disease is spread worldwide and expands by rate of 7% (Huang et al., 2013). Economic cost and human suffering are the main burden of CKD, and all effort should be directed toward the problem to delay the onset of CKD and to limit its progression. End Stage Renal Disease incidence and prevalence continues to increase worldwide. Data from 12 countries using dialysis programs reported that by the end of 2025 about 1,900,000 people were on Renal Replacement Therapy (Khader et al., 2013). Data from Palestinian ministry of health reported that 1568 patients are on renal replacement therapy where 25% of them were in Hebron, about 366 patients are in ESRD and on regular hemodialysis.

To date, no study was conducted in Palestine to assess the prevalence and addresses the factors that contribute for this increase in the incidences or investigated the risk factors for developing CKD. Services presented to CKD patients such as treatment and follow up are mainly offered in most of governmental hospitals that are distributed along the West Bank.

Beside MOH hospitals, Augusta Victoria (Jerusalem) and Al-Najah (Nablus) hospitals are the two main nongovernmental hospitals that provide treatment services for CKD patient which include regular hemodialysis and CKD progression follow-up.

However, there is no active screening or preventive program dealing with CKD in the Palestinian community. Hence, any research that focuses on the issue of CKD determinants would be of great value to help start establishing national programs dealing with the risk and protective factors of CKD. This study is a baseline study for decision makers to help in planning for a national strategy that can help in delaying the onset of CKD and to limit its progression.

1.4. Problem Statement

To our knowledge, limited studies have been done among Palestinians to investigate the prevalence and risk factors of CKD in Palestine. As a result, there is no clear image about the epidemiology of CKD in the Palestinian community and the reasons for its increase if compared to that reported in Asian countries as CKD prevalence range from 13-17%(LI et al., 2011), and international countries which has been identified to be 10- 15% worldwide and higher in the elderly people (Levey & Levin, 2017). The results will provide a baseline for future research focusing on understanding the risk factors and CKD progression that will support future care and quality of life of the Palestinian CKD patients.

However, protecting people at risk for CKD problems, such as hypertension, DM, smoking, obesity, physically inactive, was proved to be a tool of prevention from CKD progression.

Therefore, it is very important to specify the factors that play a role as risk/protective factors among the Palestinian Community. This data is not available in Palestine, which makes it a rich area for research. The results of this research will be the baseline for any future plans in the area of prevention of CKD.

1.5. Study Aim

The aim of the study is to identify the prevalence, determinants and risks factors of CKD progression among patients attending primary care clinics in Hebron.

1.6. Study Objectives

1. To estimate the prevalence of CKD in patients with chronic disease in primary care clinics.
2. To identify risk factors (ex. hypertension, DM, and Cancer, etc.) associated with CKD diagnosis in primary care clinics.
3. To determine the relationship between modifiable risk factors such as diet, physical activity, obesity, and smoking with CKD progression.
4. To examine the association between various socio-demographic factors and CKD progression.
5. To determine the association between biomedical risk factors such as diabetes and CKD progression.
6. To provide recommendations for MOH in order to prepare suitable policy and effective public health intervention to reduce the burden of this deadly disease.

1.7. Expected Outcomes

The main expected outcome of our study is to provide a scientific knowledge on understanding prevalence and risk factors associated with Chronic kidney disease (CKD) among Palestinians, and clarify the association between CKD and risks factors (demographic, clinical characteristics) among Palestinian patients. Our study will provide recommendations to prepare suitable policy and effective public health intervention to reduce the burden of this deadly disease.

1.8. Thesis Chapter Outline

This thesis consists of six chapters, listed as the following:

Chapter one: Introduction

This chapter is an introductory chapter w contains; background, significance of the study, problem statement, study aim, study objective, and expected outcome of the study.

Chapter two: Literature review

This chapter includes the physical, psychosocial, and socioeconomic impact of CKD, then literature review of the local, arabic and international studies on prevalence of CKD, moreover associated risk factors like hypertension, DM, obesity, and smoking will be discussed with relation to literature.

Chapter three: Conceptual framework

This chapter includes, the definition of CKD, diagnosis, associated risk factors which are the components of our study conceptual framework.

Chapter four: Methodology

In this chapter, the research methodology is presented. The study setting, study population, study design, study sample, data collection, study tool, variability of variables, and ethical consideration will be stated.

Chapter five: Results

In this chapter, data cleaning and preprocessing will be explained. Moreover, results were presented as descriptive analysis, univariate and multivariate analysis. Correlation and associations will also be done by regression analysis.

Chapter six: Discussion, Conclusion and Recommendations

In this chapter, the main study findings, the study's conclusion and recommendations will be presented, as well as CKD will be addressed as public health issue.

1.9. Summary

A chronic kidney disease is a major public health issue, which is underestimated. This chapter provides a brief overview of CKD. Diabetes and hypertension reported as the main risk factors. Economic cost and human suffering are the main burden of CKD; all effort should be directed toward the problem to delay the onset of CKD and to limit its progression. There is limited local research available locally on prevalence, risk factors, and burden of CKD. Public health policies for CKD should be adopted by the Governments. The next chapter is a literature review on CKD impact, CKD prevalence, and risk factors of CKD.

2. Chapter 2: Literature Review

2.1. Introduction

This chapter starts with highlighting the impact of CKD; physical, psychosocial, and socioeconomic impact. It attempts to review the updated pertinent researches regarding the prevalence of CKD globally, arab countries, and locally. The risk factors are the last issue to be discussed in this chapter through evidence- based literature.

2.2. Impact of Chronic Kidney Disease

A significant burden of CKD usually noted on different levels; individuals, families, employers, health care systems, and whole community (Braun et al., 2012). CKD impact increases mortality , morbidity, and overuse of healthcare resources by increasing the disease progression (Jager & Fraser, 2017). Three main categories of CKD impacts: physical, psychosocial, and socioeconomic (Filgueiras de Assis Mello & Angelo, 2018).

2.2.1. Physical Impact

CKD has many adverse effects on the physical health of individuals. CKD people usually experience a wide range of serious symptoms and physical changes in body image (E. Chang & Johnson, 2014). Skin changes, body weight, mobility, side effect of medication, and renal dialysis vascular access devices and procedure have a great effect on physical changes in body image (E. Chang & Johnson, 2014; Öyekçin et al., 2012). Fatigue considered as the most burdensome manifestation of CKD, lack of energy and tiredness feeling reported with 70-90% of CKD population (Bonner et al., 2010).

All CKD stages have a high symptom prevalence burden, regardless of the stage, five symptoms were the most common, 81% of all CKD people may have a fatigue and tiredness, 75% have drowsiness, 65% have pain, 61% may manifest pruritus, and 57% has dry skin (H. Almutary et al., 2013).

In other literature review, a study found that the most prevalent manifestation reported by CKD people were dementia, cognitive impairment, pain, sleep disturbance, and emotional and physical dysfunctions, while the most prevalent and weaken symptoms were physical dysfunction (Braun et al., 2012). Sleep disorder has significantly high prevalence in CKD, sleep disorder reported in 98.5 of CKD patient as shown in a study of 124 newly diagnosed CKD patients (De Santo et al., 2008). Physical function reduction were reported in advanced CKD, However physical functioning has been reported to be decreased in CKD as soon as in stages 1-3(Cruz et al., 2011). Quality of life of CKD people may be impacted by pain because of decreased physical activity and social activity avoidance (Kafkia et al., 2011).

2.2.2. Psychosocial Impact

Psychosocial functioning of individuals will be significantly impacted by decreased quality of life as it is associated with CKD, long-term illness, fear of dialysis, vague disease outcome and prognosis, health care system negative experiences, all these lead to depression and anxiety (Stavropoulou et al., 2017). In a study of 208 pre-dialysis CKD patients: 47.1% has high prevalence of depression and 27.6% has anxiety, which were closely associated to decrease quality of life (Lee et al., 2013). Other reported psychological stressors may include, anger, denial, sadness, fearfulness, frustration, loss of control, helplessness, and feeling of guilt (Harwood et al., 2009).

Depression prevalence reported to be higher with CKD people than in general population, around 25% of CKD patient diagnosed to have depression (Vecchio et al., 2012). Loss is a serious psychological issue for CKD people; they usually report loss of identity, role, employment, and body image, which they are all risk factors for depression. Early identification and intervention can alleviate the psychological burden of CKD (Bautovich et al., 2014).

Quality of life of family members is clearly impacted by CKD as it changes family life and imposes a fundamental burden on whole family, roles and responsibilities will be modified accordingly, furthermore, CKD people experience multiple psychological problems that may adversely affect their family members (Gayomali et al., 2008). CKD may affect the sexual relationship between couples as people with CKD may have both psychological and physical changes that affect sexual ability (Theofilou, 2012).

2.2.3. Socioeconomic Impact

Significant socioeconomic burden, which affect individual, family, and community as a whole are related to CKD, furthermore CKD people may have relationship problem, decrease autonomy, social isolation, and financial problem (Javalkar et al., 2014). Re-establishing normal relationships may be difficult for CKD people, which will affect the individual daily activities and social relationships such as inability to work, social activity engagement, or participating in family or community activities(Nicholas et al., 2015). A strong correlation between socioeconomic status and common CKD risk factors including hypertension, obesity, diabetes, smoking, and dyslipidemia (Nugent et al., 2011). It was

reported that a region of low income are most likely to have poor prognosis due to late detection and improper CKD management (Nugent et al., 2011). Most of CKD people will be unable to work or lose their jobs, their income will be decreased, further more themselves and their families will be highly affected (Jha et al., 2013).

Financial cost and productivity loss are the most apparent effect of CKD at the society level. Globally CKD poses a considerable financial burden to health care system more than 2–3% of annual health-care budget of High-income countries usually spent on the end-stage kidney disease therapy (Couser et al., 2011). Medicare expenditure in US were more than 34 billion for ESRD while 64 billion for CKD (Chapter, 2018). Locally, a study conducted in Palestine showed that the cost of kidney replacement therapy options was US$16,277 for the first year; and the cost of hemodialysis per patient averaged US$16,085 per year; nearly as much as a transplantation (Jabr, 2015).

As discussed above, chronic kidney disease affects various domains in diseased people lives. Therefore, highlighting the problem is required not only to overcome CKD related problem, but also for overall health and wellbeing.

2.3. Prevalence of CKD

Worldwide, CKD is becoming a common disease in the general population. About 1 in 10 people have some degree of CKD. It can develop at any age and various conditions can lead to CKD. It however becomes more common with increasing age. After the age of 40, kidney filtration begins to fall by approximately 1% per year. On top of the natural

aging of the kidneys, many conditions, which may damage the kidneys, are more common in older people including diabetes, high blood pressure and heart disease. Accurately detecting CKD in special groups remains inadequate, particularly among elderly persons, females or other ethnic groups such as Asians (Abumwais, 2012).

Global situation

Aging population and high prevalence of hypertension and diabetes raised the prevalence of CKD (Jager & Fraser, 2017). More recently, CKD prevalence has been identified to be 10- 15% worldwide and higher in the elderly (Levey & Levin, 2017; Levin, 2017), According to the Centers for Disease Control and Prevention 2019, the estimated prevalence of CKD in the **united states** of adult population is around 15%. Chronic kidney disease prevalence in **Canada** during the period 2007–2009 was 12.5%, with higher prevalence of diabetes, hypertension and hypertriglyceridemia among adults with chronic kidney disease with low kidney dysfunction awareness among adults (Arora et al., 2013). **Europe**: a study from 19 general-population from 13 European countries done to estimate prevalence of CKD in adult general population in Europe and to highlight variation in prevalence by sex, age, and presence of hypertension, diabetes, and obesity reported that there is a significant variation in prevalence of CKD stages 1-5 and stages 3-5 among European study population. The prevalence of adjusted CKD stage 1-5 varied from 3.31% in Norway and 17.3 in northeast Germany. The prevalence of adjusted CKD stages 3-5 varied between 1.0% in central Italy and 5.9% in northeast Germany (Brück et al., 2016).

Another systematic review of world-wide population based, done in 2015 indicated that, the number of those from high-income countries who have CKD is 109.9 million (56%

women where men is 44%) while the burden was 387.5 million in lower middle income countries (men 46%, women 54%)(Mills et al., 2015). 38% higher risk of development of cardiovascular disease is associated with patients having Glomerular filtration rate (GFR) between 15 and 59 ml/min/ 1.73 m2 than with patient with GFR 90 and 150 ml/min/1.73m2 (Manjunath et al., 2003).

Asian countries

Chronic kidney disease prevalence range from 13-17% (LI et al., 2011).in **India**; The overall Indian adult prevalence of CKD was 10.2%, highest prevalence was 17.2% and lowest prevalence was 4.2% reported among ≥ 20 years old adult in Delhi (A. K. Singh et al., 2013; N. P. Singh et al., 2009). At

Bangladesh; The overall Bangladeshi adults prevalence of CKD was 17.3%, highest prevalence of CKD was reported as 26.0% whereas the lowest prevalence was (12.8%) (Anand et al., 2014; Fatema et al., 2013). The overall Pakistani adults prevalence of CKD was 21.2% , highest CKD prevalence in Pakistan was reported as 29.9% lowest prevalence was 12.5% (Jafar et al., 2005; Jessani et al., 2014). In **Nepal** the prevalence of CKD among adult ≥20 years old was 10.6 and prevalence has shown elevation with increasing age (Sharma et al., 2013). While in **Singapore**: The crude prevalence of CKD in Singapore was 12.8%. In addition a prospective study program in Singapore recruit a 4499 participant of different Asian population "Chinese, Malay and Indian ethnicity, who are 24-95 years" in Singapore found that the prevalence of CKD is 15.6% (11.4 Chines, 18.6 Malaya, and 17.6 Indians) , with similar risk factors in all ethnic groups. (Wong et al., 2018; Sabanayagam et al., 2010). A systematic review conducted by Mehedi Hasan in 2018 found a high prevalence of CKD in **South Asian** countries with ranged from 10.6%

in Nepal to 23.3% in Pakistan with higher prevalence among older age group people. Equal number of studies reported high prevalence among male and female each (Hasan et al., 2018).

In Arab countries

The precise data about the prevalence of CKD still unavailable or limited. By reviewing recent literature we found no up to date information on the epidemiology of CKD. **In Saudi Arabia**, The prevalence of CKD in 5000 Saudi selected from 30 primary health centers has been reported to be 9.4% in all stages, Stage 5, Stage 4, and stage 3, were reported 0.4%, 0.5%, and 7.8%, respectively (Ahmed et al., 2014; Hussain Gadelkarim Ahmed1, 2* et al., 2019). Another study in northern Saudi Arabia for 2800 from 13 towns reported CKD prevalence to 7.8 %, female 56.2% and male 43.8 (Ahmed et al., 2014).. A study for 540 outpatient in Jordan from 13 hospital selected randomly found that the prevalence of underdiagnosed CKD was 31.1% in all stages, stage 5 (0.7%), stage 4(0.7%), and stage 3 and 2 was (23.5%). Being male, smoker, employed, with history of CAD noted to be of high prevalence, DM, and hypertension were significant risk factors (Khalil et al., 2018)., anothe study in Lebanon conducted in rural outpatient setting found that the prevalence of CKD was 12.5%. 8.5% with stage three, 2.5% with stage four, and stage five was 1.6% (SLEILATY et al., 2019). While **United Arab emirate**prevalence of CKD from stage 3 to stage 5 was 7.4%. CKD was higher in male 4.6% and 2.8% of females (Richards et al., 2015).

Palestinian situation

Chronic kidney disease tend to have progressive and irreversible decline in kidney function and increased mortality rates. Locally there is no exact statistics about CKD, the only statistics we have is for stage 5 which is ESRD that needs kidney dialysis. According to the annual report of ministry of health the number of ESRD (CKD stage 5) who receive dialysis in Palestinian hospital is 2071 case. Chronic renal failure was the ninth leading cause of death, accounting for 2.9% of all deaths (Palestinian Health Information Center, 2018). Few studies focused on chronic kidney disease and hemodialysis patients. Retrospective cohort study was done in Al-watani hospital during the period from 2006 to 2007 to assess the prevalence and the risk factors of reduced renal function among hypertensive diabetic patients. The overall CKD prevalence was 35 %. 63.5% of the CKD patients had stage 3, 21.7% had stage 4 and 13% had stage 5 (Sweileh et al., 2009). A cross-sectional study was carried out across all dialysis units in the West Bank to evaluate the prevalence of CKD stage 5 (ESRD) and found that the total number of patients on dialysis in the West Bank at the time of study was 604, with a prevalence rate of 240.3 per million population (PMP) (Khader et al., 2013).

2.4. Chronic Kidney Disease risk factors

Chronic kidney disease considered as an under-recognized public health problem causes death more than breast or prostate cancer. 37 million (15% of adult population) in US has been impacted with some kind of CKD, 90% of them they do not know they have CKD. Around 80 million American people (1 in 3 adults) is at risk of CKD, it is less common in men 12% than women 15%. In 2017. It is reported as ninth leading cause of death in US. More than 500,000 patients are on dialysis treatment, and more than 200,000 kidney

transplant patient (Prevention, 2019). In Palestine, the number of ESRD (CKD stage 5) is 2071 case, and chronic renal failure was the ninth leading cause of death, accounting for 2.9% of all deaths (Palestinian Health Information Center, 2018).

CKD risk factors can be grouped into three major categories; First: **biomedical** category which includes diabetes, hypertension, CVD, systemic renal inflammation, and obesity. Second: **Behavioral** risk factors include smoking, malnutrition, and physical activity, while third category is **Fixed risk** factors which includes family history, kidney disease, low birth weight, and male sex. (Collins et al., n.d.). Several significant preventable risk factors for developing CKD: Diabetes, hypertension, dyslipidemia, smoking, obesity, alcohol (Yamagata et al., 2007).

2.4.1. Hypertension

Hypertension has been considered as serious risk factor for CKD and ESRD. The relationship between chronic kidney disease and high blood pressure is well recognized as hypertension affect the arteries, which reduce the blood flow to the kidneys and result in glomeruli damage, uncontrolled hypertension leads to high intraglomerular pressure, which affect the glomerular filtration(Leticia & Charlotte, 2015).

In the **United States** hypertension count for 27% of the CKD stage five patients who need kidney dialysis(Lea & Nicholas, 2002). Hypertension and chronic kidney disease both are interrelated public health problem. Prevalence of hypertension is more and control is difficult with advanced cases of CKD since hypertension can cause CKD or could be a result of CKD. In US about 30% of adult population have hypertension and 15% have CKD (Horowitz et al., 2015). **Globally**, prevalence of hypertension was rated

to be around 26% in adults, 66% of them in developing countries (Sa'adeh et al., 2018). The overall **Palestinian** hypertension prevalence was 27.6%, male more than female with percentage of 29.2% and 26.4% respectively. In addition, hypertension increased with age (Khdour et al., 2013). In a study of 3612 CKD patient participants to investigate the risk factors for the progression of CKD, 86% of them reported hypertension (Lash et al., 2009).. Moreover, untreated hypertension in CKD patient can easily and quickly progress to an end-stage kidney disease (Kazancioğlu, 2013). Almutary et al. stated that hypertensive nephropathy present in 36% of all ESKD in Saudi Arabia (H. H. Almutary et al., 2013).

2.4.2. Diabetes Mellitus (DM)

DM is a metabolic disorder identified by complete insulin insufficiency in type 1 or relative insufficiency in type 2. It damages the glomerulus by microscopic blood vessels changes in the glomeruli (Gharbi et al., 2016). Those who have diabetes can develop kidney disease and about 35% develop diabetic nephropathy, which leads to ESRD in most new cases about 9.1-29.9% that mandate renal replacement therapy. Generally, diabetes is one of the most prevalent risk factors that are significantly linked with higher risk of CKD and diabetic kidney disease (Duan et al., 2019)(Plantinga et al., 2010).

In **Palestine**, DM has become a major cause of morbidity and mortality. It is the fifth leading cause of death with reported Diabetes Mellitus deaths from the all deaths is 7.5%; and incidence rate of **DM** is 210.7 per 100,000 population. In 2018, there were 538 deaths due to complications of diabetes, with mortality rate of 20.4 per 100,000 populations in West Bank, with 259 deaths among males, 19.8 cases per 100,000 males

and 279 deaths among females, 21.6 cases Per 100,000 females in West Bank (MOH, 2018).

DM is the main cause and major risk factor of CKD and ESRD worldwide, many individuals in developing nations are suffering from diabetes. Chronic kidney disease as result of diabetes and hypertension affects about 5-7% of the all world population and it is increased in disadvantaged and developing countries (Couser et al., 2011).

Epidemiological studies in most countries suggest that the prevalence and incidence rate of chronic kidney disease are increasing rapidly due to non-communicable diseases high prevalence, particularly hypertension and **DM** (Eggers, 2011; J.-C. Lv & Zhang, 2019). Worldwide, end stage renal disease remains a life-threatening health issue, due to high prevalence of DM and the aging population (J.-C. Lv & Zhang, 2019). The highest impact of DM reported in middle and low-income countries, because of limited resources to deal with microscopic complication of **DM**, as well as poor health system regarding prevention, and early recognition and treatment (Eggers, 2011; J.-C. Lv & Zhang, 2019).

2.4.3. Obesity

In **Palestine**, there are very little number of studies deal with overweight and obesity. The prevalence of obesity has been reported by WHO to be as high as 26.8 % of **Palestinian** population (23.3% males, 30.8% females)(WHO,2020). Overweight (BMI $\geq$ 25) at age of 20 was linked with three times higher risk for CKD, when compared to those with BMI < 25, obesity BMI $\geq$ 30 and morbid obesity BMI $\geq$ 35 for both sex with three to four time increase in risk of CKD (Hsu et al., 2009; Kazancioğlu, 2013).

Obesity is one of the terrible risk factors for CKD that is modifiable, recent studies have recognized overweight and obesity as independent risk factors (A. Chang & Kramer,

2012). Obesity and overweight affect kidneys by inflammation, endothelial dysfunction, oxidative stress, hypovolemia, and prothrombotic state, which finally result in kidney damage causing different stages of CKD (Mirrakhimov, 2012). Obesity and overweight considered as the fifth leading risk for global mortality. Around 2.8 millions deaths die yearly due to obesity or overweight (Soliman et al., 2018). There are many reports in **Palestine** indicates an increase in level of Non-Communicable Diseases (NCDs) such as DM, HTN, stroke and heart disease which all related directly to **obesity** and **overweight**. The death related to NCDs are also increased. Besides high BMI increased waist circumferences has significant increase of CKD, higher waist to hip ratio reported to be linked with lower GFR, decrease renal plasma flow, and higher filtration ratio with adjustment to BMI and sex (Kwakernaak et al., 2013).

2.4.4. Smoking

Smoking tobacco is one of the serious public health concerns worldwide, as more than 7 million die annually which represent 12% of all deaths because of tobacco use(Marie et al., 2014; Organization, 2018). Studies have reported different rates of smoking in Palestine depending on the studied population, smoking prevalence range between 19.6 - 26.3 in general population and among university students the prevalence rate found to be between 35 – 56% .(Eldalo, 2016)(Absi, 2015)(Musmar, 2012). Smoking increase the risk of ESRD, In a study in a non-diabetic participants smoking more than 20 cigarette per day increase the risk of CKD, each additional 5 cigarettes per day was linked with an increase in creatinine level by 31% = 0.3mg/dl (Bleyer et al., 2000; Orth et al., 2005).

Smoking tobacco increases the risk of CKD development; this is of high evidence when it is joint with other CKD risk factors as it reduces flow of the blood to the kidneys causing

nephrosclerosis. ESRD progression and nephropathy in people with chronic diseases such as hypertension and DM can be impacted by tobacco smoking (Orth & Hallan, 2008).

Limited studies locally focused on the risk factors of chronic kidney disease and hemodialysis patients. In 2009 a study done in Al-watani hospital reported that the overall CKD prevalence is 35 %. 63.5% of the them had stage 3, 21.7% had stage 4 and 13% had stage 5. The study reported diabetes and hypertension are the main risk factors, higher prevalence in men than women and higher rate among elderly people (Sweileh et al., 2009). Other study done in Jenin hospital among patients who are on hemodialysis treatment reported that the patients suffered from diabetes mellitus (33.32%), hypertension (16.7%), and chronic glomerulonephritis (13.1%). Inherited kidney diseases (17.85%), primary hyperoxaluria 10.71%), Alport's syndrome (5.95%), and adult polycystic kidney disease (1.19%), are most common causes and risk factors of renal failure in Jenin district (Abumwais, 2012).

A comparison of Local studies and current study could be summarized as follow:

Study Year	***Setting***	***Study objectives***
2006	Hypertensive diabetic patient in Al Watani hospital	To assess the prevalence and risk factors of CKD in hypertensive diabetic patients in Al Watani Hospital
2012	ESRD patient in Jenin hospital	To assess the risk factors of ESRD
2013	Dialysis units in west bank	To assess the prevalence CKD stage 5 “ESRD”
This study	Patient with chronic diseases in primary health care	To assess the prevalence of all stages and risk factors of CKD

2.5. Research Gap:

Research in kidney disease locally has been largely focusing on the assessment of prevalence and risk factors of CKD stage five “ESRD” in hospital settings. None of them focused on the overall prevalence of CKD stages and their risk factors in primary health care.

2.6. Summary

Several studies outside Palestine described CKD as a global health problem. Limited research locally focused on the prevalence and risk factors of CKD in Palestine. Most of local researches in Palestine focused on ESRD. None of them focused on CKD as increasing public health issue and investigated the prevalence of CKD and its variation with chronic disease (Diabetes, Hypertension, Heart Diseases, and Aging). The following chapter discusses the conceptual framework and theoretical framework for CKD.

3. Chapter 3: Conceptual and theoretical Framework for CKD

3.1. Introduction

Chronic kidney disease (CKD) is a public health concern worldwide, with raising prevalence, bad prognosis and outcome, and high financial burden. Further extensive effort at prevention, early discovery, evaluation, and CKD management, and preceding conditions may prevent decreased renal function complications, delayed the progression to renal failure, and prevent CVD risk.

3.2. Theoretical and conceptual framework

According to the literature review and after reviewing all models suggested for risk factors of CKD, we adopted the theoretical models in the world summary i.e. National Kidney Foundation's and adopted by an international consensus under the sponsor of "Kidney Disease: Improving Global Outcomes" (KDIGO).

The risk factors for CKD are summarized as follows:

- Socio-demographic factors (e.g. age, sex).
- Life style factors (e.g. weight, Hight (BMI), obesity, smoking).
- Clinical profile: (hypertension, DM, dyslipidemia, CAD and eGFR)

Conceptual framework for this study: The conceptual model of CKD which was developed by the National Kidney Foundation's and adopted by an international consensus under the sponsor of "Kidney Disease: Improving Global Outcomes" (KDIGO) in 2005 will be used in this study with permission and license Number "4904380790623". This model involves concepts of definition, staging, outcomes, treatment, and risk factors for the

development, progression, and complications of chronic kidney disease. **Treatment** for high-risk patient and for every stage of CKD, which include CKD progression delay, complication prevention and treatment of reduced GFR, and minimizing risk factors of CVD. In fact, steps to improve the prevention, detection, and treatment may minimize adverse outcomes, promote quality of life, and increase CKD individual survival. The chronic kidney disease conceptual model is now used by CDC as a public health approach for the prevention of CKD development, progression, and complications (Levey et al., 2009). *Primary prevention is defined as prevention of CKD; secondary and tertiary prevention are defined as improving outcomes of patients with CKD stages 1 to 4 and kidney failure (CKD stage 5), respectively* (Levey et al., 2005*;* Levey et al., 2002)

3.3. Conceptual Framework.

Figure 1: represents the conceptual model for CKD, its development, progression, and complications. The conceptual model defines renal failure as the end stage of CKD and links it to earlier stages. So that, renal failure is preceded by a decline in GFR, which is preceded by renal injury or damage. CKD develop over a long time, starting with prolonged hidden period when the disease may go undiscovered, followed by delayed onset of symptoms because of complications of decreased renal function. Therefore, it is likely to detect CKD before renal failure through testing markers of renal damage and/or estimating GFR. The horizontal arrows between circles in *Figure 1* pointing from left to right confirm the nature of progression of CKD. However, progression rate is variable, and it does not happen in all patient; So, CKD diagnosis does not parallel with final development of renal failure. Early interventions may prevent or slow the progression to later stages. CKD early stages may be reversible, and renal failure can go back to earlier stages only by kidney transplantation, the

dashed arrowheads pointing from right to left, indicating that progression is more than remission. (Eknoyan et al., 2013).

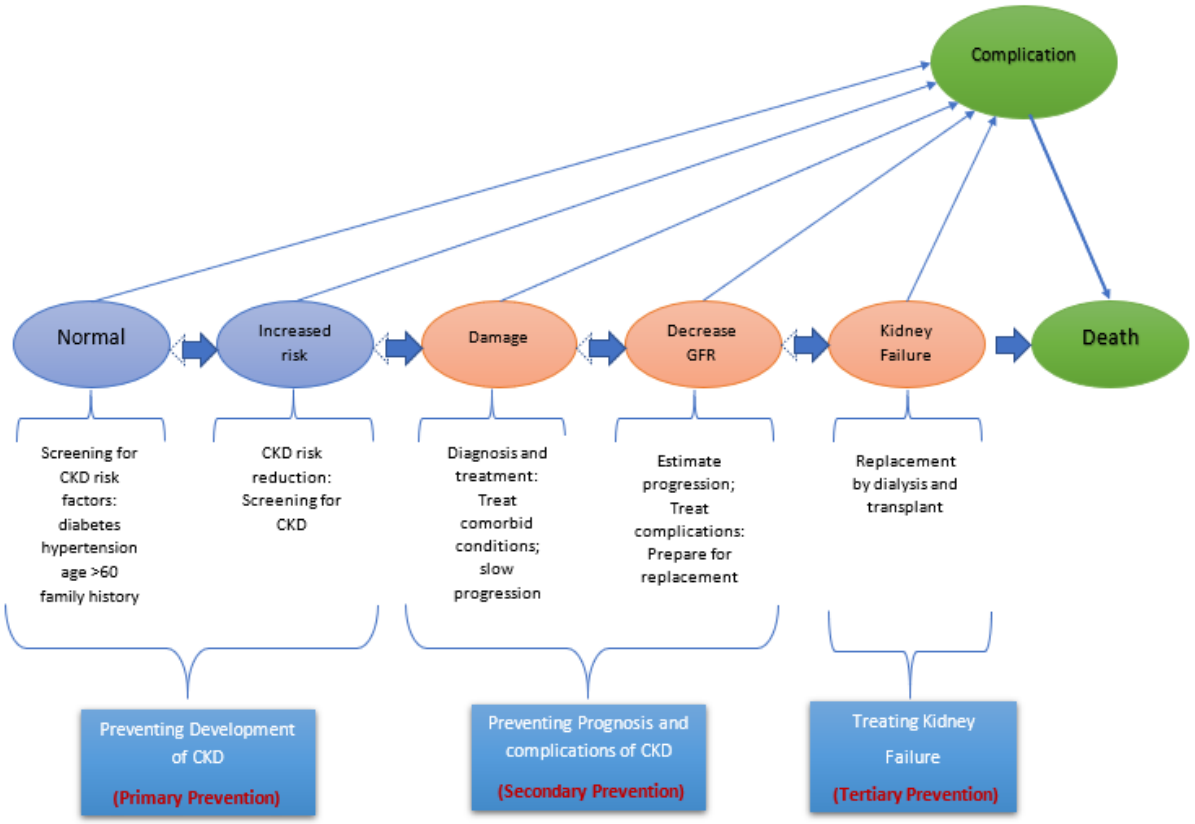


Figure 1: Conceptual model of chronic kidney disease (CKD)

This scheme shows the process of development, progression, and complications of CKD. Orang circles, stages of CKD, blue circles, potential antecedents of CKD, green circles outcomes of CKD, thick arrows between circles, risk factors associated with the development and progression and remission of CKD. Complications" refer to all complications of CKD and its treatment including complications of decrease GFR and cardiovascular disease, Preventive strategies of CKD "primary, secondary, and tertiary" are shown under the appropriate target population. Used and modified by permission of National Kidney Foundation(Levey et al., 2002).

The model identifies those who are susceptible for CKD development. Risk factors are the **attributes** that distinguish a people with great risk form people with low risk of developing

CKD. Some of them could be modifiable that may prevent or delay the CKD development (Eknoyan et al., 2013).

Furthermore, the conceptual model focused on the earlier stage complication that may lead to death without reaching end stage renal failure. Planning for early detection, prevention, and CKD complication treatment may improve quality of life and prolong survival (Eknoyan et al., 2013).

The following variables and definitions were used in our study:

3.3.1. Definition

According to the K/DOQI; CKD is defined as kidney damage or glomerular filtration rate (GFR) < 60 mL/min/1.73 m for 3 months or more, irrespective of cause (Levey et al., 2005). **Kidney damage;** in most of CKD can be realized by albumin in urine, known as *albumin-to-creatinine ratio > 30 mg/g in two of three spot urine specimens.* ***GFR****; can be estimated from calibrated serum creatinine and estimating equations, such as the Modification of Diet in Renal Disease (MDRD) equation or the Cockcroft-Gault formula*(Levey et al., 2005)(Eknoyan et al., 2013).

3.3.2. Stages

In CKD, the kidneys do not usually fail suddenly. It usually progresses slowly over a long time, earlier stages of CKD are often asymptomatic; they are detected during the routine evaluation of comorbid conditions, and sometimes may be reversible. Renal failure may occur in rapidly progressive disease within months, but most disease develop over decades, and good disease follow up may prevent any disease progression (Eknoyan et al., 2013).

GFR: is the best indicator of kidney function. It is the number used to detect a stage of kidney disease. *"A math formula using the person's age, race, gender and their serum creatinine used to calculate a GFR. Creatinine is a waste product that comes from muscle activity. When kidneys are working well they remove creatinine from the blood. As kidney function slows, blood levels of creatinine rise".* Table(1) shows the stages of CKD (Thomas et al., 2008)(Eknoyan et al., 2013).

For our study, "*eGFR was estimated using Modification of Diet in Renal Disease (MDRD) equation : eGFR = 186 × (SCr) −1.154 × (Age) −0.203 × (0.742 if female). In this equation, GFR and SCr are expressed as mL/min per 1.73 m2 and mg/dL, respectively" (NKF, 2020).*

Table 1: ***GFR categories in CKD***

Stage	*Description*	*GFR*	*% of Kidney function*
1	*normal to highly functioning kidney*	*>90 mL/min*	*>90%*
2	*mild decrease in kidney function*	*60–89 mL/min*	*60–89%*
3a	*mild-to-moderate decrease in kidney function*	*45–59 mL/min*	*45–59%*
3b	*mild-to-moderate decrease in kidney function*	*30–44 mL/min*	*30–44%*
4	*severe decrease in kidney function*	*15–29 mL/min*	*15–29%*
5	*kidney failure*	*<15 mL/min*	*<15%*

Abbreviations: CKD, chronic kidney disease; GFR, glomerular filtration rate

3.3.3. Outcomes

Main outcomes of CKD include renal function loss possibly leading to renal failure, complications of reduction in GFR (fluid retention, elevated potassium level, anemia,

decrease sex drive, central nervous system symptoms, decrease immune system which make them prone more for infections, mineral and bone disease, and increased risk of CVD) and death (Eknoyan et al., 2013; Thomas et al., 2008 ; Clark & Khan, 2010).

3.3.4. Treatments

Treatments to slow progression of CKD depending on the underline cause of the disease. The best results maintained with rigorous hypertension control and use of antihypertensive agents that inhibit the renin-angiotensin system in people with more rapidly decreasing GFR(Clark & Khan, 2010)(Eknoyan et al., 2013).

3.3.5. Risk Factors:

3.3.5.1. Hypertension

Hypertension or high blood pressure is defined by two levels by 2017 American College of Cardiology/American Heart Association (ACC/AHA) guidelines (Whelton et al., 2018),:

1. "***Elevated BP**, with a systolic pressure (SBP) between 120 and 129 mm Hg and diastolic pressure (DBP) less than 80 mm Hg*".

2. "***Stage one hypertension**, with an SBP of 130 to 139 mm Hg or a DBP of 80 to 89 mm Hg", and.*

*3. "**Stage two hypertension**, with an SBP of 140 mm Hg and more or a DBP of 90 and more"*

3.3.5.2. Diabetes Mellitus

Diabetes mellitus: More commonly referred to as "diabetes": "*describes a group of metabolic disorders characterized and identified by the presence of abnormally high levels of the sugar glucose in the blood "hyperglycemia" in the absence of treatment. The heterogeneous aetio-pathology includes defects in insulin secretion, insulin action, or both, and disturbances of carbohydrate, fat and protein metabolism"* and diagnosed by:

- A "fasting blood sugar level less than 100 mg/dL is normal. level from 100 to 125 mg/dL is considered prediabetes. If it is 126 mg/dL or higher on two separate tests, confirmed diabetes" (UK, 2019).
- "HbA1C level below 6.0% is normal: 6.0 to 6.4% is considered Prediabetes: 6.5% or over confirmed Diabetes" (UK, 2019)

3.3.5.3. Obesity

Overweight and obesity are defined as "abnormal or excessive fat accumulation that presents a risk to health. A crude population measure of obesity is the body mass index (BMI), a person’s weight (in kilograms) divided by the square of his or her height (in metres). A person with a BMI of 30 or more is generally considered obese. A person with a BMI equal to or more than 25 is considered overweigh" (WHO, 2020).

Body Mass Index (BMI). Weight (in kilograms) and height (in meters) were used to calculate BMI, which was categorized as 3 groups of <18.5 kg/m2, 18.5 to 24.9 kg/m2, and ≥25 kg/m2(CDC, 2020).

3.3.5.4. Smoking

Smoking is a derivative of the intransitive verb "smoke" meaning "the act of inhaling and exhaling the fumes of burning plant material and especially tobacco " (Sweanor, 2020).

3.3.6. Prevention Strategies

CKD prevention strategies may be divided into primary, secondary, and tertiary prevention depending on the stage and severity of the diseases.

3.3.6.1. Primary prevention

Primary prevention aims to prevent the development of CKD risk factors, such as diabetes, and hypertension, and to prevent the high-risk population from developing CKD. Recent studies reported that lifestyle modification could minimize the incidence rate of diabetes in individuals with risk factors for CKD (D. W. Johnson et al., 2013; Tseng, 2006). The incidence rate of hypertension can be reduced by avoiding high salt diet (Judd & Calhoun, 2015). Several studies have reported that the chance to delay or prevent the albuminuria in patient with DM through control of glucose level or by using ACEI (angiotensin-converting enzyme inhibitor)(Ritz et al., 2012) (Jermendy & Ruggenenti, 2007).

3.3.6.2. Secondary prevention

Secondary prevention aims to slowing the progression and treating complications and decreased GFR in CKD patient in different stages (Eknoyan et al., 2013). In patients with **stages 1 to 2**, where GFR is normal or only with little impairment, interventions may include evaluating, treating the cause of kidney disease, and comprehensive

measures to slow progression of CKD and to reduce the risk of CVD. In patients with **stages 3 to 5**, where the reduction in GFR is moderate or severe, more interventions are needed to decrease GFR complications such as anemia, malnutrition, bone and mineral disorders, and hypertension. The effectiveness of secondary prevention is highly related to the early identification and treatment of chronic kidney disease in people with increased risk. The key to effective secondary prevention is the early identification and treatment of CKD in those at increased risk(Eknoyan et al., 2013; D. W. Johnson et al., 2013)

3.3.6.3. Tertiary Prevention

Tertiary prevention aims to improve the care for patients with renal failure

The prevalence of chronic kidney disease is dynamic and can be affected by multiple factors, such as, age, sex, and co-morbid health conditions or risk factors such as hypertension, DM, smoking, and obesity. Understanding the prevalence and risk factors of CKD of different stages help planning for appropriate prevention and treatment modalities.

For the purpose of this study and according to the literature review of the prevalence and risk factors of CKD, the conceptual framework contains the following variables (age, sex, weight, height, hypertension, DM, obesity, smoking, and GFR). **Operational definitions for all study variable**s have been mentioned previously**.**

3.4. Summary

In this chapter, the conceptual framework, which was developed by the National Kidney Foundation, used as the theoretical framework of the study with operational definitions of several independent variables as conceptual definitions. The next chapter describes the study methodology and how the study was carried out.

4. Chapter 4: Study Methodology

4.1. Introduction

This chapter describes the study design and methods used to measure the prevalence and risk factors of CKD. First, the study settings and population characteristics; followed by a description of the study design, study setting, study data collection, study tool, data analysis, and study subject "Inclusion and Exclusion Criteria ". Then study ethical consideration are presented, and finally the chapter summary that addresses the data management and analysis.

A quantitative research was conducted; retrospective descriptive study design used to assess the prevalence and identify the risk factor of CKD.

4.2. Study Settings and Population Characteristics

The study was conducted at primary health care clinics in Hebron. Hebron is located in the south of Palestine, 30 km south of Jerusalem; it lies 930 meters above sea level. It is the largest governate in the West Bank, Palestine. In the 2017 census, the population of Hebron was 707,017 and comprised of 51% male and 49% female, which represent 15% of all Palestinian population and 25% of west bank population, and estimated to be 782,227 in 2021(State of Palestine Palestinian Central Bureau of Statistics, 2018). Primary health care clinics are governmental clinics affiliated to Palestinian primary health care general administration in Palestinian ministry of health that provides health care services and screening to the local community. In Hebron, Primary health care centers consist of 42 chronic diseases Clinic, which is designed to support people with chronic diseases such as diabetes, hypertension, and cardiovascular disease. So**,** the study setting consisted of patients

visit chronic clinics in governmental primary health care centers in 42 clinics in Hebron; in four different directorates" Hebron, North Hebron, South Hebron, and Yatta directorate". The study population included all adult and elderly patient visiting the chronic clinics during the period from 2019-2020. With a total population of 24554.

4.3. Study Subjects:

Patients who visit chronic clinics in governmental primary health care centers in Hebron

- **Inclusion Criteria**: all adult and elderly patients (15 years old and above) who visited the chronic clinics between January 2019 to January 2020.
- **Exclusion Criteria**: Patients who had no visit for the clinic for more than three months.

4.4. Study Design

Retrospective review of medical records (Jan 2019 to Jan 2020).

4.5. Study Sample

Sample size was calculated through a web-based program "Raosoft" according to (confidence interval CI 95% and 4% margin of error). A total of 587 Patient medical record were randomly selected stratified random sampling. The calculated sample was divided between four directorate according to density of population as shown in the following Table 2:

Table 2: Sample distribution by directorate

Directorate	Population	Percent	Sample	Detailed Sampling
Hebron	7839	31%	183	***Table 3***
Yatta	3580	14%	84	***Table 4***
North Hebron	7482	30%	174	***Table 5***
South Hebron	6247	25%	146	***Table 6***

Sum	25148	100%	587	

Table 3: sample number and percentage in Hebron primary health directorate

Hebron Primary Health Directorate			
Clinic name	No of Pat.	Population %	Sample
Al Ramah	1370	5.4%	32
Al Haram	584	2.3%	14
Ein Sarah	942	3.7%	22
Beit Kahel	420	1.7%	10
Idna	929	3.7%	22
Al Radwan	263	1.0%	6
Al Masharqa	279	1.1%	7
Tafoh	547	2.2%	13
Al Manshar	1036	4.1%	24
Glgs	57	0.2%	1
Khalet Al Dar	108	0.4%	3
Abo Aiash	145	0.6%	3
Al Salam	847	3.4%	20
Em El daliah	312	1.2%	7
Sum	7839	31%	183

Table 4: sample number and percentage in Yatta primary health directorate:

Yatta Primary Health Directorate			
Clinic name	No of Pat.	Population %	Sample
Al Shoda	121	0.5%	3
Al Aross	660	2.6%	15
Al Khaweta	614	2.4%	14
Yatta	1613	6.4%	38
Al Karmel	214	0.9%	5
Talet Alsomod	67	0.3%	2
Em Elkhair	14	0.1%	0
Em Amer	16	0.1%	0
Zoiden	12	0.0%	0

Hmedah	13	0.1%	0
Beit Emra	116	0.5%	3
Khalet Elmaiah	120	0.5%	3
Khalet saleh	0	0.0%	0
Hdedeh	0	0.0%	0
	3580	14%	84

Table 5: Sample number and percentage in North Hebron primary health directorate:

North Hebron Primary Health Directorate			
Clinic name	No of Pat.	Population %	Sample
Soreef	706	2.8%	16
Shokh	419	1.7%	10
Halhul	1629	6.5%	38
Sheokh Al Arob	82	0.3%	2
Bein Enon	216	0.9%	5
Kharas	378	1.5%	9
Noba	349	1.4%	8
Ras Eltawel	27	0.1%	1
Haja Mariam	13	0.1%	0
Beit Ommar	925	3.7%	22
Khofan Khames	104	0.4%	2
Beit ola	555	2.2%	13
Bani Naeim	1117	4.4%	26
Khadeer	962	3.8%	22
	7482	30%	174.0

Table 6: Sample number and percentage in South Hebron primary health directorate:

South Hebron Primary HealthDirectorate			
Clinic name	No of Pat.	Population %	Sample
al Sokri	1128	4.5%	26
Khorsa	173	0.7%	4
Seri	170	0.7%	4

Abda	86	0.3%	2
Kurza	152	0.6%	4
Ramaden	73	0.3%	2
Al Berj	138	0.5%	3
Beit Alrosh F	73	0.3%	2
Der El Asal F	106	0.4%	2
seka	76	0.3%	2
Beit Awa	521	2.1%	12
Der Samet Sh	124	0.5%	3
Alkom	191	0.8%	4
Al Samo'	454	1.8%	11
Al Taqua	373	1.5%	9
Rehia	217	0.9%	5
Dahreih	1000	4.0%	23
Al Majd	129	0.5%	3
Dora	866	3.4%	20
Karma	100	0.4%	2
Hadb Fawar	97	0.4%	2
	6247	25%	146.0

4.6. Methods

A non-interventional retrospective review of paper based medical records study was conducted for patient file from January 2019 to January 2020 in four primary health care clinics in Hebron "Yatta, South Hebron, North Hebron, and Hebron Directorate". The target population included people aged 15 and above, who were living in the governate of Hebron and visiting the chronic clinics for at least the previous year. Taking into account a confidence interval of 95% with a margin of error of 4%, the sample size was 587 patients and randomly selected from four directorate.

4.7. Data Collection

Data collectors who are two nurses working in hospital (with experience of more than ten years working with patient and patients files) received a rigorous training on data collection methods and had a real training on a sample of 20 patient files to assist in the study. Our data collectors have a good English language as well as Arabic, visited every directorate, reviewed the patient chart and completed a data collection sheet. This process continued until the entire cluster of eligible sample size patient were completed. The researcher made sure that all data collectors adhered to data collection procedure.

4.8. Study Tool

Data collection sheet (as shown in appendix 7) included demographic data (age, gender,), and clinical profile (hypertension, diabetes, coronary artery disease,). In addition, "Height, weight" to calculate BMI, and mean of blood pressure, fasting blood sugar (FBS), blood urea nitrogen (BUN), creatinine (Cr), cholesterol, triglycerides, hemoglobin level. Using the formula of modification of diet in renal disease (MDRD) (GFR (mL/min/1.73 m2) = 186 × (Serum Cr)-1.154 × (Age)-0.203 × (0.742 if female)), estimated GFR was calculated for all the subjects and based on the results, people with abnormal GFR were divided to 5 categories; stages 1: GFR ≥ 90 mL/min, stages 2: GFR 60 - 89 mL/min and stages 3: GFR 30 - 59 mL/min, stages 4: GFR 15 - 29 mL/min, stages 5: GFR< 15 mL/min.

4.9. Variables Rational

- According to Modified diet and renal disease (MDRD) formula used by National Kidney foundation "Age, sex, and Creatinine level variables" must be collected to calculate the estimated GFR to assess the prevalence of CKD accordingly.

- Weight and hight variables are needed to calculate BMI to define the level of obesity
- Comorbid variables such as "DM, hypertension, anemia, obesity, dyslipidemia, and smoking" and it is relation with CKD were investigated in many previous studies, and were recommended to be studied by two urologist and two internist physicians working in kidney units.

4.10. Data Analysis

Statistical analysis was performed using the SPSS software V 23,. Preprocessing and data cleaning were done. Continuous variables were approached as mean and categorical variables as proportion. CKD prevalence estimates were performed and reported and compared among age, sex, and co-morbid groups, the overall prevalence of CKD, defined as eGFR below 60mL/minper1.73m2. Two-tailed t-test used to examine the differences between subjects for continuous data while chi-squire test for categorical variable, logistic regression used to assess CKD associated factors, linear and multiple regression analysis performed to test the effects of variables, which are age, sex, smoking, DM, hypertension, heart disease.

4.11. Ethical Considerations

All needed permissions were obtained from the AAUP, Palestinian Ministry of Health and primary healthcare centers. Privacy and confidentially were completely protected; no identifiers or personal information were collected or stored including participants' name, ID's and others, all information collected were treated as confidential and will not be released to a third party unless required to do so by law and will not be used for any purpose rather than scientific issue, legal and ethical principles were maintained at all the times of thesis writing process. Medical records were reviewed, so no harm was subjected to the patients, anonymity of individual and organization had been ensured. The authors of the

studies and materials used in this literature review were given full credit, and referenced accordingly. Plagiarism was avoided, and copyrighted work was respected and not used in a bad manner, a permission from National Kidney Foundation to use their conceptual framework was officially obtained, APA style sixth edition guidelines for referencing were followed at all time to ensure transparency.

4.12. Summary

This chapter presented the study methodology. First, an elaboration of the research aim was given, then an overview of the study setting and population, design, sampling technique, data collection, and data analysis methods that used in the study, finally ethical consideration were described. The next chapter presents the study's results

5. Chapter 5: Results

5.1. Introduction

This chapter shows the results of the conducted study to evaluate the prevalence and risk factors of CKD, the chapter started with demographic and clinical characteristics description of sample, followed by the results of renal clinical characteristics, and end with a summary of relationship between different variables.

52. Data Preparation and Cleaning.

Prior to analyzing the data, data was inserted to excel sheet then imported to SPSS version 23.0 where coding was prepared. Each item was given a unique variable name. Data cleaning was performed for data entry errors, outliers, and missing value. Demographic data had no missing data. However, some clinical data were noted as missing in patients charts. So, for 3% missing value data analysis was done by replacing missing value by the mean others which were analyzed with available data. Data collection was conducted between April and October 2020. From 24570 patient file a 587 Patient file was reviewed. All of them met the eligible criteria, and none of them was excluded from the analysis.

5.3. Socio-demographic and Clinical Characteristics of the Sample.

Among the 587 Patient file reviewed, 62.8 % were female. Our study sample have mean age of 61.52 ± 11.86 SD years. According to gender the main clinical characteristics and sociodemographic of the patients are shown in (Table 7)

Gender comparisons showed that males had a significantly higher triglyceride, uric acid, and BUN level, and a lower BMI and cholesterol level, while both genders have no significant

differences of systolic blood pressure, diastolic blood pressures, RBS, and HbA1C level. Regarding co-morbidities, females reported significantly higher prevalence of hypertension, diabetes and dyslipidemia. CAD are noted to be significantly higher in Males, as shown (Table 7)

Table 7: Sample Characteristics

Clinical status	Females	Males	P-Value
	Mean ± SD or %	Mean ± SD or %	
N	370	219	.
Age	61.4 ± 11.9	61.71 ± 11.83	*0.760
BMI /Kg/m2	32.86 ± 6.59	30.55 ± 5.31	*0.001
Systolic BP	137.53 ± 17.97	138.8 ± 18.83	*0.388
Diastolic BP	77.2 ± 10.89	77.8 ± 9.99	*0.388
RBS	143.9 ± 64.19	142.5 ± 62.07	*0.388
HbA1C	7.692 ± 2.34	7.702 ± 2.288	0.964
Cholesterol	180.9 ± 45.13	167.26 ± 47.248	*0.001
Triglyceride	157.15 ± 78.1	161.5 ± 81.21	0.556
Uric Acid	5.095 ± 1.802	5.718 ± 1.869	*0.003
BUN	27.15 ± 15.99	30.52 ± 15.89	*0.032
Creatinine	0.94 ± 0.4	1.1 ± 0.042	*0.001
eGFR	72.89 ± 23.77	79.97 ± 24.38	*0.001
Hb	12.55 ± 1.318	14.41 ± 1.65	*0.001
Hypertension	66.40%	33.60%	*0.001
Diabetes	62%	38%	*0.431
Dyslipidemia	59.40%	40.60%	*0.037
Smoking	34.60%	65.40%	*0.001
CAD	45.6%	54.4%	*0.001
Chronic Kidney Disease	69%	31%	*0.037

Abbreviations: BMI: body mass index. **BP**: blood pressure, **RBS**: random blood sugar, **BUN**: blood urea nitrogen. **eGFR**: estimated Glomerular filtration rate, **Hb**: Hemoglobin, **CAD**: coronary artery disease.

5.4. CKD Prevalence in the Study Sample.

Overall, 26.7% of the patients had normal eGFR, whereas 46.5 % of the patients had slightly reduced renal function “eGFR: 60–90 ml/min/1.73 m2”. About 18.5% of the patients had mild to moderate reduction in kidney function with remaining 45-59% of kidney function and 5.9% of patients had mild to moderate reduction in kidney function with remaining 30-44% of kidney function. Furthermore, 2% of patient had sever kidney damage and only two patients (0.3%) had end stage renal disease, (Table 8) (Figure 2). The percentages of CKD stages 1, 2, 3, 4 were higher in female while both gender has the same prevalence of CKD stage 5. Almost one fourth of the study population had CKD with substantial reduction in renal function (Table 9) (Figure 3)

Table 8: Shows the comparison of different stages of CKD between genders

	Male		Female		Total	
CKD stages	CKD Number	Prevalence %	CKD Number	Prevalence %	CKD Number	Prevalence %
Stage 1 " Healthy"	73	44.80%	84	55.2%	157	26.7%
Stage 2	96	35.70%	178	64.3%	274	46.5%
Stage 3a	37	35.7%	72	64.3%	109	18.5%
Stage 3b	10	24.2%	25	75.8%	35	5.9%
Stage 4	1	9.1%	11	90.9%	12	2.0%
Stage 5 "ESRD"	1	50.0%	1	50.0%	2	0.3%
Total	219	37.0%	370	63.0%	589	100.0%

Abbreviation: **CKD**: chronic kidney disease

Table 9:shows the overall Prevalence of CKD and gender comparison:

	CKD		None CKD		Total	
Sex	CKD Number	Prevalence %	CKD Number	Prevalence %	Number	Prevalence %
Female	109	18.51%	261	44.31%	370	62.8%
Male	49	8.32%	170	28.86%	219	37.2%
Total	158	26.830%	431	73.17%	589	100.0%

Abbreviation: **CKD**: chronic kidney disease

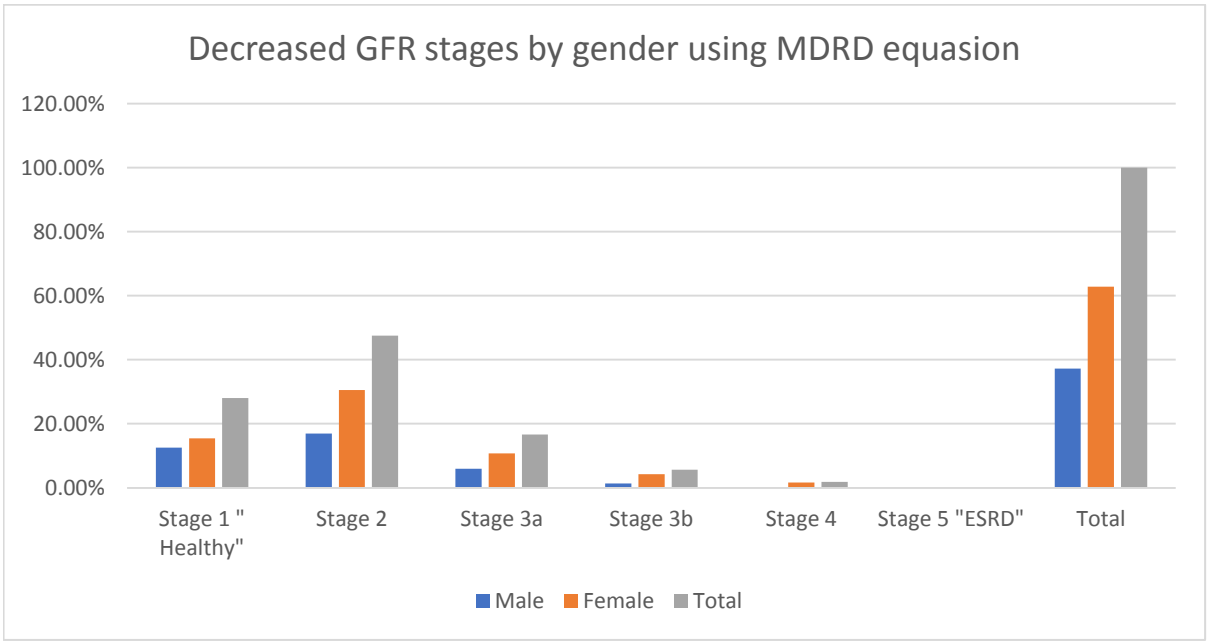


*Figure 2: CKD stages by gender using **MDRD***

Abbreviation: **CKD**: chronic kidney disease, **MDRD**: Modification of Diet in Renal Disease, GFR: Glomerular filtration rate

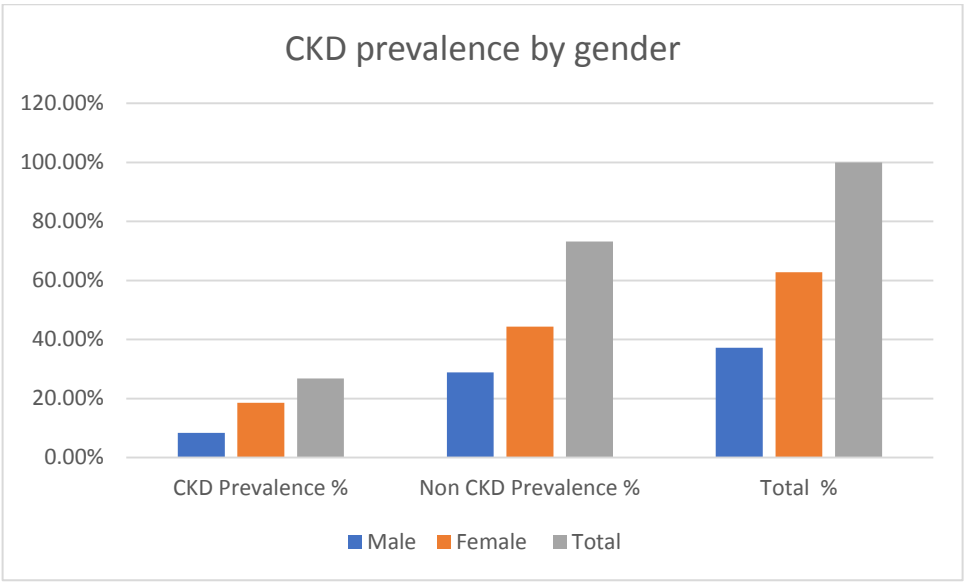


Figure 3: overall CKD prevalence by gender

CKD defined as (GFR) < 60 mL/min/1.73 m according to the K/DOQI

Abbreviation: **CKD**: chronic kidney disease, **K/DOQI** Kidney disease outcome quality initiative

Table 10: shows prevalence of CKD stages 3 to stage 5 in different age groups within genders. Overall prevalence of CKD was 26.8 % for stages 3 to stage 5 established by estimating GFR < 60mL/min/1.73m2 (based on MDRD equation). Regarding the patients age categories, prevalence of CKD stage 3 to stage 5 were 4 % in the 40-49 years age group, 15 % in the 50– 59 years age group, 36% in the 60-69 years age group, and 44% in the more than 70 years age group. CKD prevalence increased with age among both sex (P = 0.038). It was highest among female within all age groups (69%).

	Male		Female		Total	
Age Groups	CKD Number	Prevalence %	CKD Number	Prevalence %	CKD Number	Prevalence %
Less than 30	0	0.00%	0	0.0%	0	0.00%
30 - 39	0	0.00%	0	0.0%	0	0.00%
40 - 49	1	3.0%	6	1.9%	7	4%
50 - 59	7	12.7%	17	15.6%	24	15%
60 - 69	21	28.8%	36	34.0%	57	36%
More than 70	20	39.2%	50	61.7%	70	44%
Total	49	31%	109	69%	158	26.8%

Table 10:shows CKD prevalence in age groups with relation to sex

In our study CKD prevalence was clearly associated with increasing age (p-value< 0.001) as shown in, as shown in **figure 4**

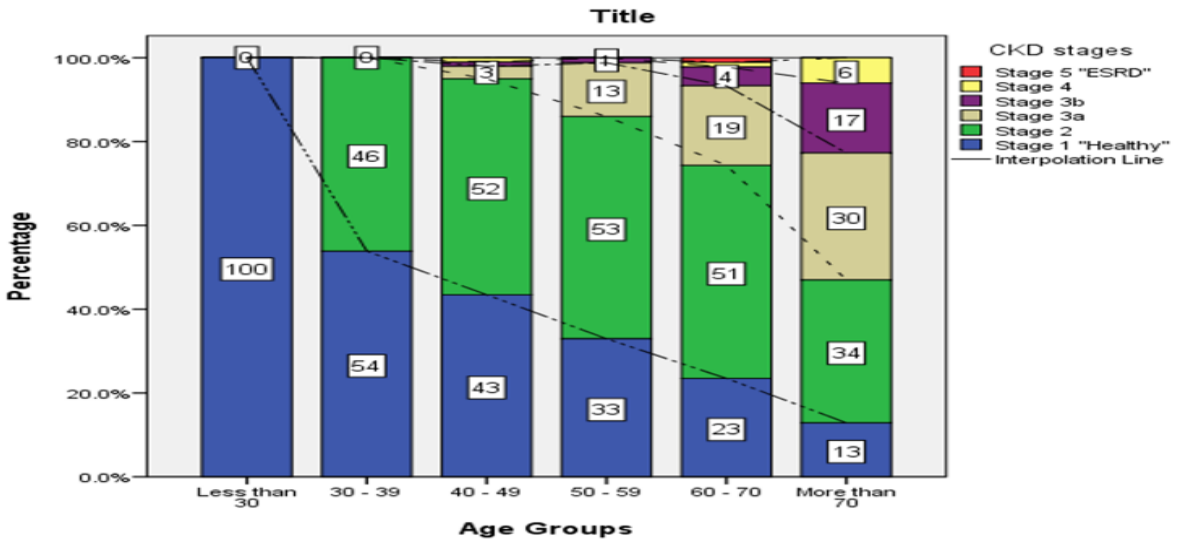


Figure 4: CKD by age group

Abbreviation: CKD chronic Kidney disease

CKD patients showed when compared to patient without kidney disease a more gender differences (69.0% vs. 60.6% females, p = 0.037), and significantly older (mean age 68.8 vs 58.8 years, P-value 0.001). They showed a significantly higher prevalence of hypertension, (89.9% vs. 71.9%, P-value 0.001), dyslipidemia, (63.9% vs 51.5%, P-value 0.005), Diabetes (75.9% vs 61.7%, P- value 0.001), and CAD (30.4% vs 20.9%, P value 0.012). Moreover, no significant differences were found concerning BMI (31.87 vs. 32.05, P-Value 0.850). On the other hand, they showed a lower prevalence of smoking (12% vs 25.8%, P value 0.001) as shown in (Table: 11) (Figure5).

Table 11:Comparison of demographic and co morbidities among Patient with and without CKD

Diagnosis	CKD	Non-CKD	P-Value
	Mean ± SD or %	Mean ± SD or %	
N	158	431	
Age	68.87 ± 10.72	58.81 ± 11.26	*0.001
BMI /Kg/m2	31.87 ± 6.57	32.05 ±6.18	0.758
Hypertension	89.9%	71.9%	*0.001
Diabetes	75.9%	61.7%	*0.001
Dyslipidemia	63.9%	51.5%	*0.005
Smoking	12%	25.8%	*0.001
CAD	30.4%	20.9%	*0.012
Gender (Female)	69%	60.6%	*0.037
Overweight	89.2%	89.1%	0.547

Abbreviations: BMI: body mass index., **CAD**: coronary artery disease, **CKD**: chronic kidney disease

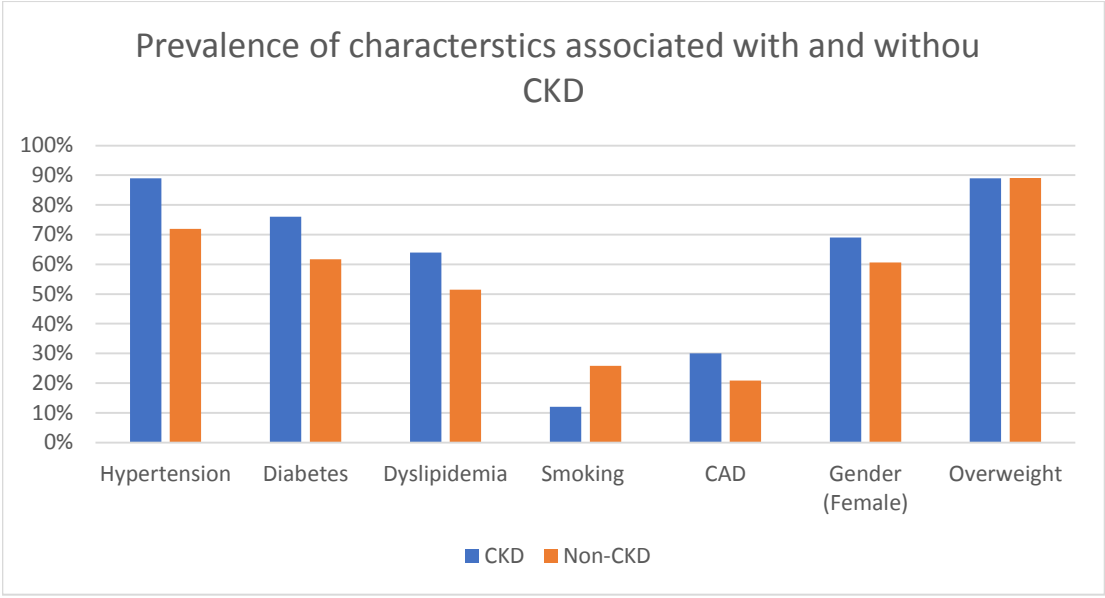


Figure 5: Prevalence of characteristics associated with and without CKD

Abbreviation: CKD: Chronic kidney disease

5.5. CKD Patient Laboratory Findings

When comparing the results of laboratory findings CKD patient with patient without kidney damage we found significant differences in SBP (P value 0.001), DBP (P value 0.026), HbA1C(P value 0.012), uric acid(P value 0.001), BUN(P value 0.001), creatinine(P value 0.001), eGFR(P value 0.001), and Hb level(P value 0.001). Whereas no significant differences were noted in RBS, cholesterol, and triglyceride level with P-Value 0.06, 0.081, 0.51, respectively(Table 12).

Table 12:Laboratory findings with coloration to CKD

Diagnosis	CKD	Non CKD	P-Value
	Mean ± SD or %	Mean ± SD or %	
N	158	431	
Systolic BP	145.5 ± 18.89	135.2 ± 17.3	*0.001
Diastolic BP	79.04 ± 10.57	76.85 ± 10.51	*0.026
RBS	151.46 ± 59.3	140.6 ± 62.88	*0.06
HbA1C	8.16 ± 2.22	7.5 ± 2.3	*0.012
Cholesterol	181.5 ± 50.4	173.6 ± 44.52	0.081
Triglyceride	170.65 ± 86.1	154.64 ± 76.38	0.051
Uric Acid	6.22 ± 2.01	4.91 ± 1.61	*0.001
BUN	35.87 ± 21.54	25.85 ± 12.1	*0.001
Creatinine	1.417 ± 0.57	0.853 ± 0.171	*0.001
GFR	47.1 ± 10.82	85.9 ± 18.04	*0.001
Hb	12.7 ± 1.76	13.43 ± 1.63	*0.001

Abbreviations: BMI: body mass index. **BP**: blood pressure, **RBS**: random blood sugar, **BUN**: blood urea nitrogen. **eGFR**: estimated Glomerular filtration rate, **Hb**: Hemoglobin, **CAD**: coronary artery disease.

5.6. CKD Risk Factors

According to **Table 13**, age was the strongest risk factor for chronic kidney disease (adjusted OR: 5.153, 95 CI: 3.389 - 7.833, P value 0.001). The second most important CKD risk factor was HTN (adjusted OR: 3.464, 95% CI: 1.983 - 6.052, P Value 0.001). The third risk factor was dyslipidemia (adjusted OR: 1.668,95% CI: 1.146 - 2.429, P Value 0.001). The fourth risk factor was being a female (adjusted OR: 1.449,95% CI: 0.982 - 2.137, P Value 0.001). The fifth was DM (adjusted OR: 1.959, 95% CI: 1.296 - 2.961, P Value 0.001). However, CAD was the sixth risk factor for CKD (adjusted OR: 1.653, 95% CI: 1.096 - 2.494, P Value 0.012). Finally, the study reported no significant relation between BMI and CKD (adjusted

OR: 1.015, 95% CI: 0.564 - 1.826). Moreover, smoking had not been noted to be a risk factor for CKD (adjusted OR: 0.394,95% CI: 0.233 - 0.667) even with P-value less than 0.05 as it could be a relation without causation.

Table 13:Risk factors associated with CKD based on Odd Ratio

Variables	Adjusted OR	95% CI	P-Value
Age	5.153	3.389 - 7.833	*0.001
HTN	3.464	1.983 - 6.052	*0.001
DM	1.959	1.296 - 2.961	*0.001
Dyslipidemia	1.668	1.146 - 2.429	*0.005
CAD	1.653	1.096 - 2.494	*0.012
Sex /Female	1.449	0.982 - 2.137	*0.037
BMI	1.015	0.564 - 1.826	0.547
Smoking	0.394	0.233 - 0.667	*0.001

Abbreviations: BMI: body mass index. **HTN**: hypertension, **DM**: diabetes multiuse., **CAD**: coronary artery disease. **OR**: odd ration

5.7. Regression Analyses

Regression analysis was done to control factors that may cause eGFR reduction and progression of CKD. Regarding eGFR, in the first generalized linear model (GLMs), age (P-Value 0.001), gender (P-Value 0.0010), were significantly and independently correlated with eGFR. In the second GLMs, correlation was statistically significant with eGFR with Systolic blood pressure (SBP) (P-Value 0.0010), glycated hemoglobin (HbA1C) (P-Value 0.001), uric acid (P-Value 0.001), blood urea nitrogen (BUN) (P-Value 0.001), hemoglobin (Hb) (P-Value 0.001). Cholesterol level (P-Value 0.0129), while no statistically significant

correlation was noted with random blood sugar (RBS) (P-Value 0.303), triglyceride level (P-Value 0.085), and body mass index (BMI) (P-Value 0.764). In another model by combining all statistically significant factors, age, gender, SBP, cholesterol, BUN, uric acid, and HbA1c, remained significantly correlated with eGFR. Variable combination in this model in a simple linear regression model proved a strong relationship with the eGFR (R = 0.890, adjusted R square = 0.886), (P-value 0.001). (figure 6 – figure 13)

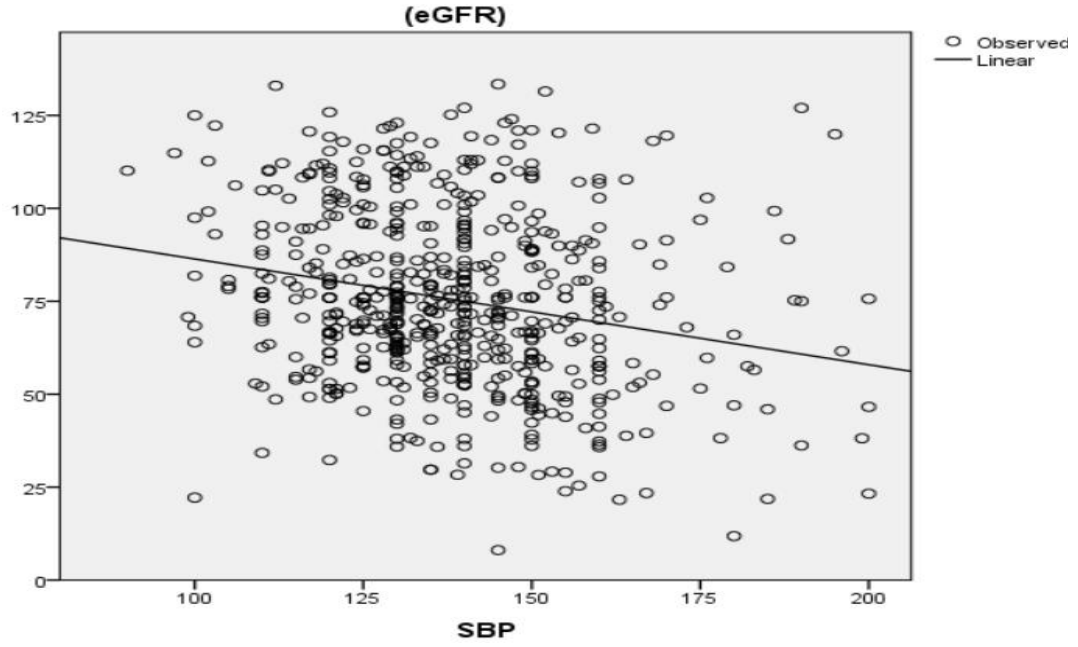


*Figure 6: linear regression correlating **SBP** with **eGFR***

Abbreviation: **CKD**: Chronic Kidney Disease, **GFR**: Glomerular filtration rate, **SBP**: systolic blood pressure

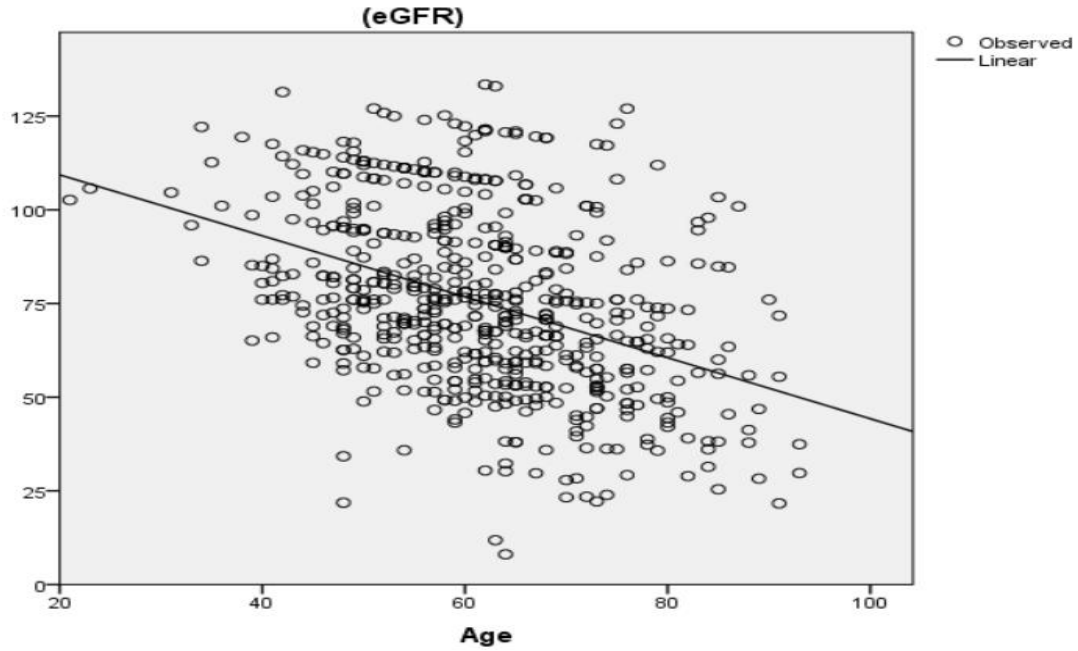


*Figure 7: Linear regression correlating **Age** with **eGFR***

Abbreviation: **CKD**: Chronic kidney disease, **GFR**: Glomerular filtration rate

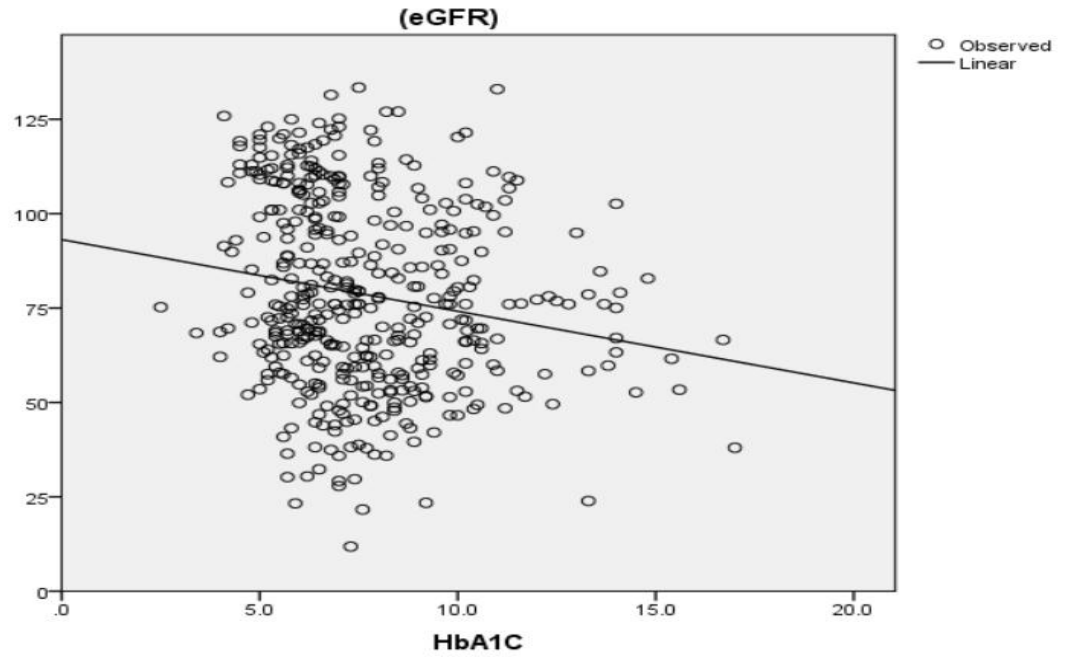


*Figure 8: Linear regression correlating **HbA1C** with **eGFR***

Abbreviation: **CKD**: Chronic Kidney Disease, **GFR**: Glomerular filtration rate, **HbA1C**: Glycated Hemoglobin type A1C

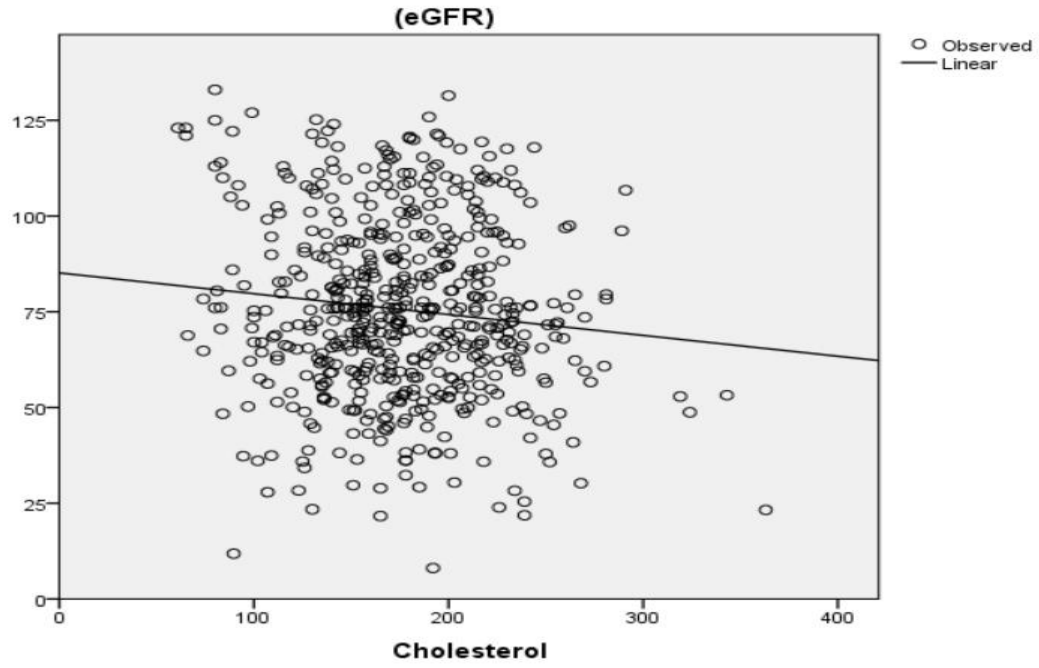


*Figure 9: linear regression corelating cholesterol with **eGFR***

Abbreviation: **CKD**: Chronic Kidney Disease, **GFR**: Glomerular filtration rate

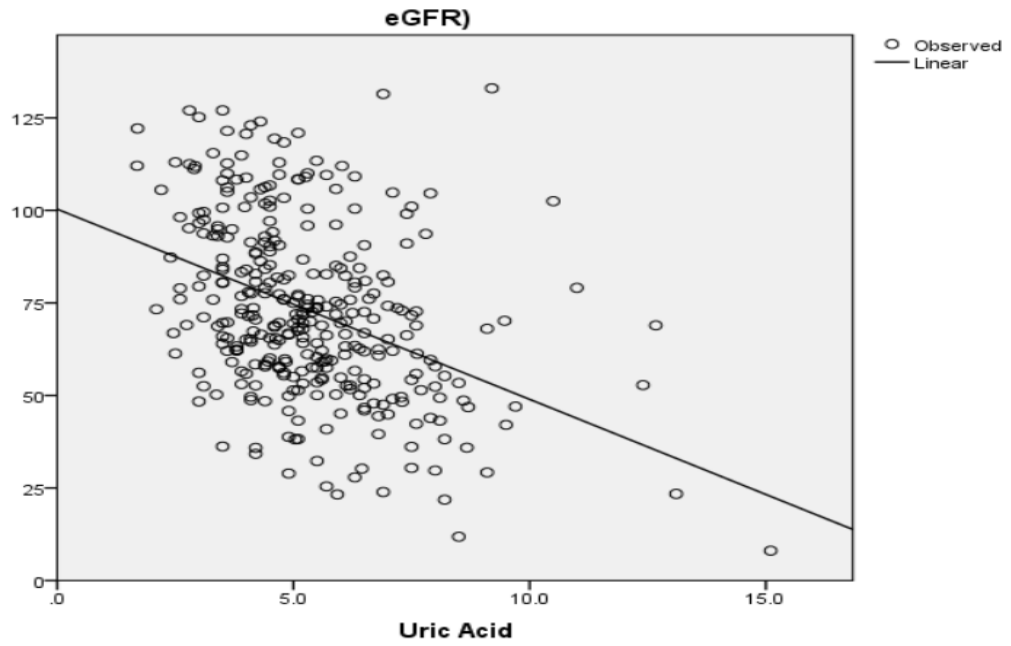


*Figure 10: linear regression corelating Uric acid with **GFR***

Abbreviation: **CKD**: Chronic Kidney Disease, **GFR**: Glomerular filtration rate

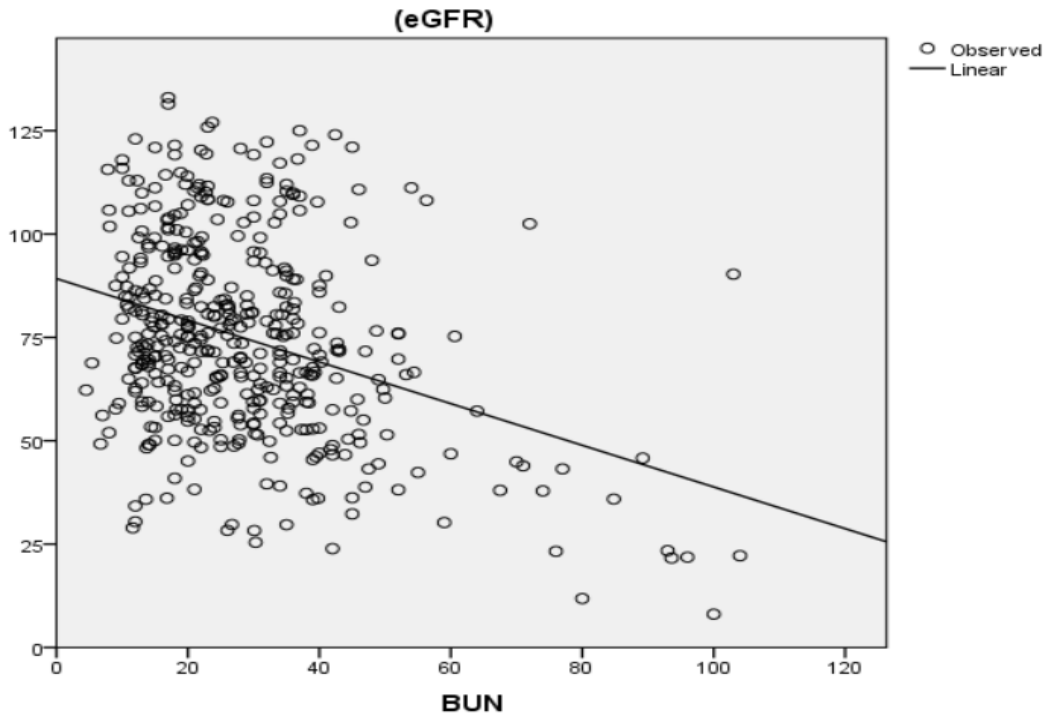


*Figure 11: Linear regression corelating **BUN** with **eGFR***

Abbreviation: **CKD**: Chronic Kidney Disease, **GFR**: Glomerular filtration rate, **BUN**: blood urea nitrogen

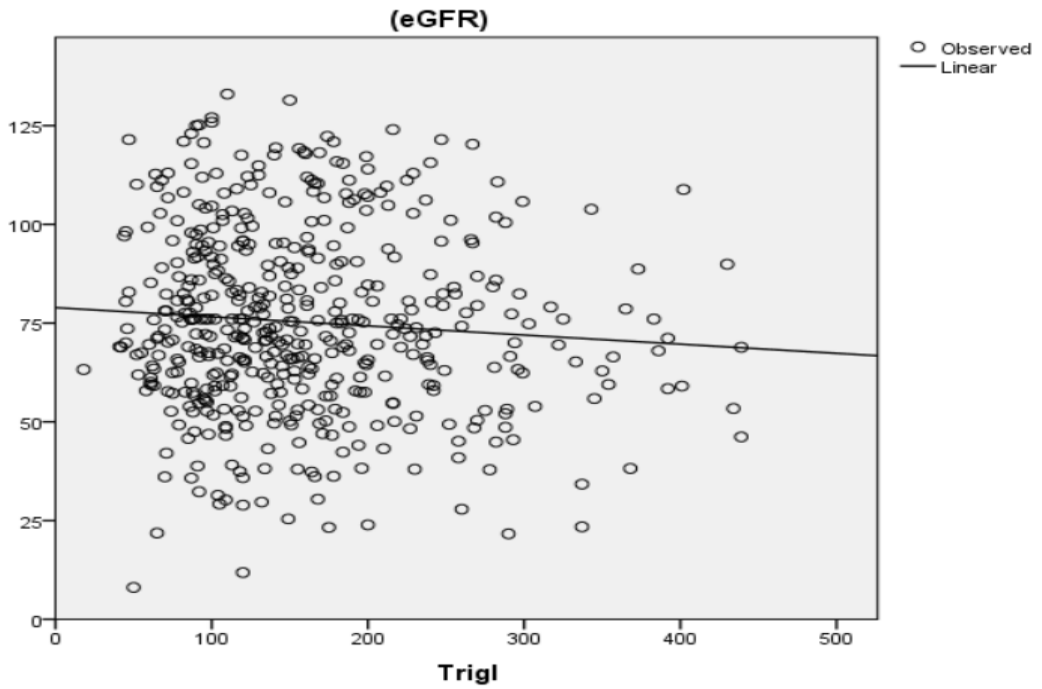


*Figure 12: Linear regression corelating Triglyceride with **eGFR***

Abbreviation: **CKD**: Chronic Kidney Disease, **GFR**: Glomerular filtration rate

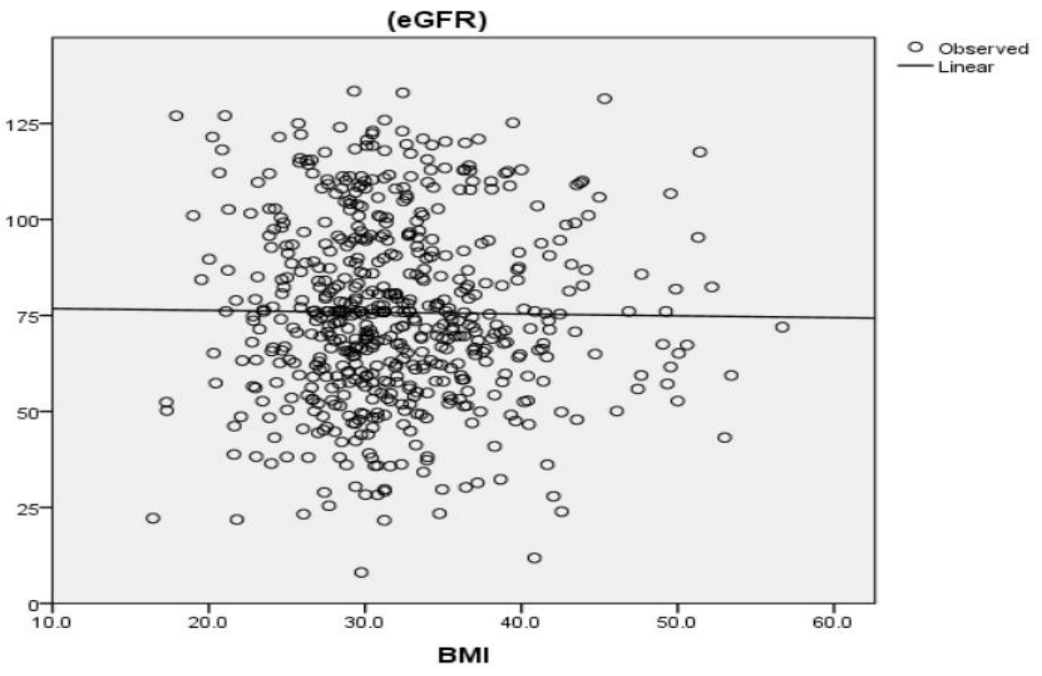


*Figure 13: Linear regression corelating **BMI** with **eGFR***

Abbreviation: **CKD**: Chronic Kidney Disease, **GFR**: Glomerular filtration rate, **BMI**: Body mass index

5.8. Summary

The result of the study was presented in this chapter. We started with data cleaning and preprocessing, then a descriptive analysis for sociodemographic and clinical characteristics of study population, followed by the main part of this chapter was CKD prevalence and their risk factors of the study population, finally a regression analysis was conducted to control factors that may cause eGFR reduction and CKD progression. Next chapter discuss the result of the study comparing with global situation

6. Chapter 6: Discussion and conclusion

6.1. Introduction

The aim of this study was to identify the prevalence, determinants and risks factors of CKD progression among patients attending primary care clinics in Hebron. This chapter start with discussion of how the study result fit with the theoretical framework. Then we discuss our results alongside present evidence from the literature of CKD prevalence and risk factors. Both discussions lead us to the practical implication for Practice, Education, and Research.

6.2. Chronic Kidney Disease in Primary Healthcare

As the number of people with earlier stages of chronic kidney disease is increasing, primary health care become a right place for identification and management of chronic kidney disease. (Fraser & Blakeman, 2016). According to the World Health Organization, the condition where the people born, live, grow, and work determine the health of people weather it is good or ill (Braveman & Gottlieb, 2014). Recently, the role of the economic conditions and social environment has gained greater interest as crucial component in the progression pathway of CKD to ESRD (Nicholas et al., 2015).

This study has presented further demographic and renal characteristics of those with CKD visiting primary healthcare care clinics in Hebron. Given CKD prevalence in elderly and in those with chronic diseases, raising awareness in these populations as well as a good monitoring of the disease can slow CKD progression to more critical stages, it may help in burden costs reduction on health care system because of elevated cost of renal replacement therapy.

6.3. Main Study Findings

6.3.1. Chronic Kidney Disease Prevalence

The result of the study suggests the prevalence of CKD in primary health care chronic clinics in Hebron is considerably high, 26.8 % of patient fulfilled the adopted criteria of CKD (eGFR <60 ml/min/1.73m2) according to KDIGO guidelines. The prevalence of CKD stage 1, 2, 3a, 3b, 4, and 5 was 28.0%, 47.5%, 16.6%, 5.6%, 1.9%, and 0.3%, respectively, that is nearly lower than local prevalence study done in Al-watani hospital which reported a prevalence rate of 35 % among hypertensive patient (Sweileh et al., 2009), but nearly in line with the result of international study with the same population done in Ghana which reported a prevalence rate of 27.8% (Osafo et al., 2011). The prevalence of CKD in our study was found to be higher in female 69% which was seen in many previous studies (Mills et al., 2015). Like other studies (Hasan et al., 2018; Abumwais, 2012; Neugarten & Golestaneh, 2019; Mallappallil et al., 2014). The study reported an increase in the CKD prevalence with increasing age was clearly noted in both gender. Thus, the patient with CKD stage 3-5 were significantly older than patients with stage 1-2, the increasing prevalence of decreased kidney function in older patient may be as a result of age-related risk factors for the CKD progression (Abumwais, 2012; Hosseinpanah et al., 2009). Several changes in the body that is closely related to aging may impact renal function that cause a reduction in GFR (Mallappallil et al., 2014).

6.3.2. Chronic Kidney Disease Risk Factors

A chronic kidney disease prevalence differences in gender were noted in most relevant studies (Mills et al., 2015; Goldberg & Krause, 2016), like other studies, our study presented a high CKD prevalence in female (69%) compared with male (31%), therefore female gender was a strong CKD risk factor in this study (Table 8), In spite of a local study in hospital setting that reported a high prevalence in men (Sweileh et al., 2009). Generally, it has been seen that the CKD prevalence was high in female than in male in each age group. This is may be due to gender differences in glomerular structure and hemodynamics, muscle mass, and hormonal differences (Goldberg & Krause, 2016).. The study conclude that the most important CKD risk factor are **hypertension, dyslipidemia, diabetes Miletus, and CAD**. These findings were similar to few previous local studies done in Palestine that define **DM** and **HTN** as risk factors for CKD(Sweileh et al., 2009; Abumwais, 2012) and international studies that reveal a significant association with,

1) **hypertension, that** has been a serios risk factor for CKD and ESRD. The hypertension may affect the arteries, which may reduce the blood flow to the kidneys that may slow down the filtration capacity of the kidneys (Horowitz et al., 2015; Leticia & Charlotte, 2015; Sa'adeh et al., 2018).

2) **Diabetes Miletus** has been considered as a serious CKD risk factors as it may damages the glomerulus by microscopic blood vessels changes (Gharbi et al., 2016; Duan et al., 2019; Plantinga et al., 2010).

3). **Dyslipidemia** was identified in literature to be a risk factors in CKD (Reich et al., 2011)**.** Furthermore

4) **CAD** in our study noted to be a risk factor in line with many literatures that conclude CAD as a CKD risk factors**.** On the hand our study failed to find association between **smoking**, and **BMI** with CKD. For smoking this could be due to the low prevalence of smoking in the study sample. Elevated BMI in most of the sample; 89.6% of the sample was classified as obese, this could be the cause of insignificant relationship between BMI and CKD.

6.4. Addressing CKD Public Health Issue

As our study reported a high prevalence of CKD with several preventable risk factors which make it is necessary to address the CKD as public health issue. Several additional elements are needed to address CKD effectively. A comprehensive effort which requires patient and professional education, and involvement of payers. As well as the involvement of the community, and government. More research efforts will be needed to measure and track the CKD burden, identify populations at risk, and target program efforts. Local real statistics about the prevalence of different stages of CKD, Risk factors, complication and high cost of treatment among different population, should be available at national level.

Effective interventions have been shown to improve clinical outcomes and reduce health care costs in patients with CKD. This can be achieved through population-based prevention and promotion interventions that will be discussed below.

6.4.1. Disease Prevention:

This can be achieved through individual and population-based intervention as primary and secondary (early detection) prevention, aiming to minimize the burden

of diseases and associated risk factors. Primary prevention aims to prevent the development of CKD risk factors, such as diabetes, and hypertension and to prevent the high-risk population from developing CKD this can be achieved by lifestyle modification, avoiding high salt diet, and control the glucose level (Secondary prevention aims to slowing the progression and treating complications and decreased GFR in CKD patient in different stages, interventions may include evidence-based screening programs for early detection of diseases, evaluating, and treating the cause of kidney disease, as well as comprehensive measures to slow progression of CKD and to reduce the risk of CVD.(Snively & Gutierrez, 2004)(Li et al., 2020)(Liu & Zhao, 2018).

6.4.2. Health Promotion

Health promotion is the process of empowering people to increase control over their health and its determinants through health literacy efforts and multisectoral action to increase healthy behaviors. This process includes activities for the community-at-large or for populations at increased risk of negative health outcomes. Health promotion usually addresses behavioral risk factors such as tobacco use, obesity, diet and physical inactivity, drug abuse control, alcohol control.(Liu & Zhao, 2018; Li et al., 2020).

6.5. Study Strength And Limitations

Although this study is the first study of its kind in Palestine, however it has some few obstacles, first it was not easy for us to get permission for data collection. Second, difficulties that we have face during data collection period due to the general health

conditions and Corona pandemic. Third lake of information concerning proteinuria as it is not a policy to test proteinuria for all chronically ill patients in this study so for CKD staging we depend on the eGFR that was founded by using creatinine level only which may not be enough for older people. As a retrospective chart review design many limitations that has been faced including incomplete, inaccurate or sometimes illegible documentation, some missing or incomplete data, as well as differences in location and quality of information in patient files

6.6. Implication to Public Health, Research and Health Informatics

The findings of this study reported that around 26.8% of the study sample had eGFR less than 60 that were not diagnosed as CKD patients, those who are affected are mainly old, female, with hypertension, diabetes, and hyperlipidemia. Therefore, a collaborative effort should be directed to more frequent monitoring and assessment of CKD to identify and solve CKD and its burden. In spite of several conducted studies in developed countries that highlight the importance of early screening and prevention of CKD, evidence in developed countries and locally are still incomplete to help making a clinical decision. Furthermore, future CKD registry development could help in prediction of prevalence and risk factors of CKD, that could lead to better assessment, monitoring, and control of CKD in Palestine.

6.7. Conclusion:

chronic kidney disease is a major public health issue, which is underestimated. Diabetes and hypertension are the main risk factors. Economic cost and human suffering are the main burden of CKD, all effort should be directed toward the problem to delay the onset of CKD and to limit its progression, Limited local research available, future research locally on different population prevalence, risk factors, and burden are needed. A public health policy for CKD should be adopted by the Governments

6.8. Recommendations

1. An ongoing prevalence assessment of CKD should be done in different population
2. Increase staff capacity toward health education, identification of risk factors of CKD and support mechanism for health promotion and disease prevention should be implemented through:
    - CKD awareness program through the whole population is the first and most important step to improve CKD progression
    - Reduction of CKD risk by encouraging healthier lifestyle through educational and social activities
    - Awareness program of the CKD main risk factors for doctors and nurses can lead to an earlier detection and treatment of renal disease.
    - Patients with moderate to severe stages should be referred to a nephrologist to receive a proper disease management, according to patient characteristics, disease severity, and underlying causes.

3. A well-organized and well-defined public health plan to control the prevalence and risk factors of CKD. That may include

    - Implementation of CKD surveillance system
    - An effective performance management, especially through rigorous, real-time monitoring, evaluation, and program improvement.
    - Partnerships with public- and private-sector organizations.

4. CKD registry development that could help in prediction of prevalence and risk factors of CKD, which could lead to better assessment, monitoring, and control of CKD in Palestine

Bibliography

- Absi, M. (2015). Smoking emerging epidemic in Palestine. *Al Ranteesy Specialist Pediatric Hospital*.

- Abumwais, J. Q. (2012). Etiology of chronic renal failure in Jenin district, Palestine. *Saudi Journal of Kidney Diseases and Transplantation*, *23*(1), 158.

- Afolabi, M. O., Abioye-Kuteyi, E. A., Arogundade, F. A., & Bello, I. S. (2009). Prevalence of chronic kidney disease in a Nigerian family practice population. *South African Family Practice*, *51*(2), 132–137.

- Agarwal, R., & Sinha, A. D. (2012). Thiazide diuretics in advanced chronic kidney disease. *Journal of the American Society of Hypertension*, *6*(5), 299–308.

- Ahmed, H. G., Ginawi, I. A., Haridi, H. K., Eltom, F. M., & Al-hazimi, A. M. (2014). Distribution of CKD and Hypertension in 13 Towns in Hail Region, KSA. *Egyptian Academic Journal of Biological Sciences. C, Physiology and Molecular Biology*, *6*(2), 39–45.

- Almutary, H., Bonner, A., & Douglas, C. (2013). Symptom burden in chronic kidney disease: a review of recent literature. *Journal of Renal Care*, *39*(3), 140–150.

- Almutary, H. H., Bonner, A., & Douglas, C. (2013). Chronic kidney disease in Saudi Arabia: a nursing perspective. *Middle East Journal of Nursing*, *101*(900), 1–9.

- Anand, S., Khanam, M. A., Saquib, J., Saquib, N., Ahmed, T., Alam, D. S., Cullen, M. R., Barry, M., & Chertow, G. M. (2014). High prevalence of chronic kidney disease in a community survey of urban Bangladeshis: a cross-sectional study. *Globalization and Health*, *10*(1), 9.

- Arora, P., Vasa, P., Brenner, D., Iglar, K., McFarlane, P., Morrison, H., & Badawi, A. (2013). Prevalence estimates of chronic kidney disease in Canada: results of a nationally representative survey. *Cmaj*, *185*(9), E417–E423.

- Bautovich, A., Katz, I., Smith, M., Loo, C. K., & Harvey, S. B. (2014). Depression and chronic kidney disease: A review for clinicians. *Australian & New Zealand Journal of Psychiatry*, *48*(6), 530–541.

- Bleyer, A. J., Shemanski, L. R., Burke, G. L., Hansen, K. J., & Appel, R. G. (2000). Tobacco, hypertension, and vascular disease: risk factors for renal functional decline in an older population. *Kidney International*, *57*(5), 2072–2079.

- Bonner, A., Wellard, S., & Caltabiano, M. (2010). The impact of fatigue on daily activity in people with chronic kidney disease. *Journal of Clinical Nursing*, *19*(21- 22), 3006–3015.

- Braun, L., Sood, V., Hogue, S., Lieberman, B., & Copley-Merriman, C. (2012). High burden and unmet patient needs in chronic kidney disease. *International Journal of Nephrology and Renovascular Disease*, *5*, 151.

- Braveman, P., & Gottlieb, L. (2014). The social determinants of health: it's time to

consider the causes of the causes. *Public Health Reports*, *129*(1_suppl2), 19–31.

- Brück, K., Stel, V. S., Gambaro, G., Hallan, S., Völzke, H., Ärnlöv, J., Kastarinen, M., Guessous, I., Vinhas, J., & Stengel, B. (2016). CKD prevalence varies across the European general population. *Journal of the American Society of Nephrology*, *27*(7), 2135–2147.

- CDC. (2020). *Centers of Disease Control and Prevention*. Division of Nutrition, Physical Activity, and Obesity,Calculating BMI Using the Metric System.
- https://www.cdc.gov/nccdphp/dnpao/growthcharts/training/bmiage/page5_1.html

- Chang, A., & Kramer, H. (2012). CKD progression: a risky business. *Nephrology Dialysis Transplantation*, *27*(7), 2607–2609.

- Chang, E., & Johnson, A. (2014). *Chronic illness and disability: Principles for nursing practice*. Elsevier Health Sciences.

- Chapter, 9. (2018). Healthcare expenditures for persons with ESRD. *Am. J. Kid. Dis.*, *71*, S433–S440.

- Clark, L. E., & Khan, I. (2010). Outcomes in CKD: what we know and what we need to know. *Nephron Clinical Practice*, *114*(2), c95–c103.

- Couser, W. G., Remuzzi, G., Mendis, S., & Tonelli, M. (2011). The contribution of chronic kidney disease to the global burden of major noncommunicable diseases. *Kidney*

International, *80*(12), 1258–1270.

- Cruz, M. C., Andrade, C., Urrutia, M., Draibe, S., Nogueira-Martins, L. A., & Sesso, R. de C. C. (2011). Quality of life in patients with chronic kidney disease. *Clinics*, *66*(6), 991–995.

- D'Elia, L., Rossi, G., di Cola, M. S., Savino, I., Galletti, F., & Strazzullo, P. (2015). Meta-analysis of the effect of dietary sodium restriction with or without concomitant renin-angiotensin-aldosterone system–inhibiting treatment on albuminuria. *Clinical Journal of the American Society of Nephrology*, *10*(9), 1542–1552.

- De Santo, R. M., Bartiromo, M., Cesare, C. M., & Cirillo, M. (2008). Sleep disorders occur very early in chronic kidney disease. *Journal of Nephrology*, *21*, S59.

- Duan, J., Wang, C., Liu, D., Qiao, Y., Pan, S., Jiang, D., Zhao, Z., Liang, L., Tian, F., & Yu, P. (2019). Prevalence and risk factors of chronic kidney disease and diabetic kidney disease in Chinese rural residents: a cross-sectional survey. *Scientific Reports*, *9*(1), 1–11.

- Eggers, P. W. (2011). Has the incidence of end-stage renal disease in the USA and other countries stabilized? *Current Opinion in Nephrology and Hypertension*, *20*(3), 241–245.

- Eknoyan, G., Lameire, N., Eckardt, K., Kasiske, B., Wheeler, D., Levin, A., Stevens, P. E., Bilous, R. W., Lamb, E. J., & Coresh, J. (2013). KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. *Kidney Int*, *3*(1), 5–14.

- Eldalo, A. S. (2016). Prevalence and perception of smoking habits among the Palestinian population in the Gaza Strip. *Journal of Multidisciplinary Healthcare*, *9*, 297.

- Evans, P. D., & Taal, M. W. (2015). Epidemiology and causes of chronic kidney disease. *Medicine*, *43*(8), 450–453.

- Farag, Y. M. K., Kari, J. A., & Singh, A. K. (2012). Chronic kidney disease in the Arab world: a call for action. *Nephron Clinical Practice*, *121*(3–4), c120–c123.

- Fatema, K., Abedin, Z., Mansur, A., Rahman, F., Khatun, T., Sumi, N., Kobura, K., Akter, S., & Ali, L. (2013). Screening for chronic kidney diseases among an adult population. *Saudi Journal of Kidney Diseases and Transplantation*, *24*(3), 534.

- Filgueiras de Assis Mello, M. V., & Angelo, M. (2018). The impact of chronic kidney disease: experiences of patients and relatives from the extreme north of Brazil. *Investigación y Educación En Enfermería*, *36*(1).

- Fraser, S. D. S., & Blakeman, T. (2016). Chronic kidney disease: identification and management in primary care. *Pragmatic and Observational Research*, *7*, 21.

- Gayomali, C., Sutherland, S., & Finkelstein, F. O. (2008). *The challenge for the caregiver of the patient with chronic kidney disease*. Citeseer.

- Gharbi, M. B., Elseviers, M., Zamd, M., Alaoui, A. B., Benahadi, N., Trabelssi, E. H.,

Bayahia, R., Ramdani, B., & De Broe, M. E. (2016). Chronic kidney disease, hypertension, diabetes, and obesity in the adult population of Morocco: how to avoid "over"-and "under"-diagnosis of CKD. *Kidney International*, *89*(6), 1363–1371.

- Goldberg, I., & Krause, I. (2016). The role of gender in chronic kidney disease. *EMJ*, *1*(2), 58–64.

- Hahr, A. J., & Molitch, M. E. (2015). Management of diabetes mellitus in patients with chronic kidney disease. *Clinical Diabetes and Endocrinology*, *1*(1), 2.

- Harwood, L., Wilson, B., Locking-Cusolito, H., Sontrop, J., & Spittal, J. (2009). Stressors and coping in individuals with chronic kidney disease. *Nephrology Nursing Journal*, *36*(3), 265–301.

- Hasan, M., Sutradhar, I., Gupta, R. Das, & Sarker, M. (2018). Prevalence of chronic kidney disease in South Asia: a systematic review. *BMC Nephrology*, *19*(1), 291.

- Horowitz, B., Miskulin, D., & Zager, P. (2015). Epidemiology of hypertension in CKD. *Advances in Chronic Kidney Disease*, *22*(2), 88–95.

- Hosseinpanah, F., Kasraei, F., Nassiri, A. A., & Azizi, F. (2009). High prevalence of chronic kidney disease in Iran: a large population-based study. *BMC Public Health*, *9*(1), 1–8.

- Howden, E. J., Leano, R., Petchey, W., Coombes, J. S., Isbel, N. M., & Marwick, T. H.

(2013). Effects of exercise and lifestyle intervention on cardiovascular function in CKD. *Clinical Journal of the American Society of Nephrology*, *8*(9), 1494–1501.

- Hsu, C., Iribarren, C., McCulloch, C. E., Darbinian, J., & Go, A. S. (2009). Risk factors for end-stage renal disease: 25-year follow-up. *Archives of Internal Medicine*, *169*(4), 342–350.

- Huang, C.-C., Chan, W.-L., Chen, Y.-C., Chen, T.-J., Chung, C.-M., Huang, P.-H., Lin, S.-J., Chen, J.-W., & Leu, H.-B. (2013). The beneficial effects of statins in patients undergoing hemodialysis. *International Journal of Cardiology*, *168*(4), 4155–4159.

- Hussain Gadelkarim Ahmed1, 2*, F. S. M. A., Ali, H. K., Albluwe1, Alosayfir1, Z. A. S., Aljarallah1, M. Y. J., Besher, Alghazi1, K. M., & Alshammari1, and M. A. G. (2019). Etiology of Chronic Kidney Disease (CKD) in Saudi Arabia. *International Journal of Medical Research & Health Sciences, 2019, 8(5): 177-182*, *2019*, *8(5)*(2019), 177–182.

- Jabr, S. (2015). *A Cost Analysis of Kidney Replacement Therapy Options in Palestine*.

- Jacobson, S. (2013). Chronic kidney disease--a public health problem? *Lakartidningen*, *110*(21), 1018.

- Jafar, T. H., Schmid, C. H., & Levey, A. S. (2005). Serum creatinine as marker of kidney function in South Asians: a study of reduced GFR in adults in Pakistan. *Journal of the American Society of Nephrology*, *16*(5), 1413–1419.

- Jager, K. J., & Fraser, S. D. S. (2017). The ascending rank of chronic kidney disease in the global burden of disease study. *Nephrology Dialysis Transplantation*, *32*(suppl_2), ii121–ii128.

- Javalkar, K., Fenton, N., Cohen, S., & Ferris, M. (2014). Peer Reviewed: Socioecologic factors as predictors of readiness for self-management and transition, medication adherence, and health care utilization among adolescents and young adults with chronic kidney disease. *Preventing Chronic Disease*, *11*.

- Jermendy, G., & Ruggenenti, P. (2007). Preventing microalbuminuria in patients with type 2 diabetes. *Diabetes/Metabolism Research and Reviews*, *23*(2), 100–110.

- Jessani, S., Bux, R., & Jafar, T. H. (2014). Prevalence, determinants, and management of chronic kidney disease in Karachi, Pakistan-a community based cross-sectional study. *BMC Nephrology*, *15*(1), 90.

- Jha, V., Garcia-Garcia, G., Iseki, K., Li, Z., Naicker, S., Plattner, B., Saran, R., Wang, A. Y.-M., & Yang, C.-W. (2013). Chronic kidney disease: global dimension and perspectives. *The Lancet*, *382*(9888), 260–272.

- Johnson, C. A., Levey, A. S., Coresh, J., Levin, A., & Eknoyan, J. G. L. (2004a). Clinical practice guidelines for chronic kidney disease in adults: part 1. Definition, disease stages, evaluation, treatment, and risk factors. *American Family Physician*, *70*(5), 869–876.

- Johnson, C. A., Levey, A. S., Coresh, J., Levin, A., & Eknoyan, J. G. L. (2004b). Clinical practice guidelines for chronic kidney disease in adults: Part II. Glomerular filtration rate,

proteinuria, and other markers. *American Family Physician*, *70*(6), 1091–1097.

- Johnson, D. W., Atai, E., Chan, M., Phoon, R. K. S., Scott, C., Toussaint, N. D., Turner, G. L., Usherwood, T., & Wiggins, K. J. (2013). KHA- CARI Guideline: early chronic kidney disease: detection, prevention and management. *Nephrology*, *18*(5), 340–350.

- Judd, E., & Calhoun, D. A. (2015). Management of hypertension in CKD: beyond the guidelines. *Advances in Chronic Kidney Disease*, *22*(2), 116–122.

- Kafkia, T., Chamney, M., Drinkwater, A., Pegoraro, M., & Sedgewick, J. (2011). Pain in chronic kidney disease: prevalence, cause and management. *Journal of Renal Care*, *37*(2), 114–122.

- Kakitapalli, Y., Ampolu, J., Madasu, S. D., & Kumar, M. L. S. S. (2020). Detailed Review of Chronic Kidney Disease. *Kidney Diseases*, *6*(2), 85–91.

- Kazancioğlu, R. (2013). Risk factors for chronic kidney disease: an update. *Kidney International Supplements*, *3*(4), 368–371.
- Khader, M. I., Snouber, S., Alkhatib, A., Nazzal, Z., & Dudin, A. (2013). Prevalence of patients with end-stage renal disease on dialysis in the West Bank, Palestine. *Saudi Journal of Kidney Diseases and Transplantation*, *24*(4), 832.

- Khalil, A. A., Abed, M. A., Ahmad, M., & Mansour, A. H. (2018). Under- diagnosed chronic kidney disease in Jordanian adults: prevalence and correlates. *Journal of Renal Care*, *44*(1), 12–18.

- Khdour, M. R., Hallak, H. O., Shaeen, M., Jarab, A. S., & Al-Shahed, Q. N. (2013). Prevalence, awareness, treatment and control of hypertension in the Palestinian population. *Journal of Human Hypertension*, *27*(10), 623–628.

- Kwakernaak, A. J., Zelle, D. M., Bakker, S. J. L., & Navis, G. (2013). Central body fat distribution associates with unfavorable renal hemodynamics independent of body mass index. *Journal of the American Society of Nephrology*, *24*(6), 987–994.

- Lash, J. P., Go, A. S., Appel, L. J., He, J., Ojo, A., Rahman, M., Townsend, R. R., Xie, D., Cifelli, D., & Cohan, J. (2009). Chronic Renal Insufficiency Cohort (CRIC) Study: baseline characteristics and associations with kidney function. *Clinical Journal of the American Society of Nephrology*, *4*(8), 1302–1311.

- Lea, J. P., & Nicholas, S. B. (2002). Diabetes mellitus and hypertension: key risk factors for kidney disease. *Journal of the National Medical Association*, *94*(8 Suppl), 7S.

- Lee, Y., Kim, M. S., Cho, S., & Kim, S. R. (2013). Association of depression and anxiety with reduced quality of life in patients with predialysis chronic kidney disease. *International Journal of Clinical Practice*, *67*(4), 363–368.

- Leticia, B., & Charlotte, R. (2015). Chronic Kidney Disease and Hypertension: A Destructive Combination.[cited 2015 January 5]. *Avaiable from: Http://Www. Medscape. Com/Viewarticle/766696_2*.

- Levey, A. S., Coresh, J., Bolton, K., Culleton, B., Harvey, K. S., Ikizler, T. A., Johnson, C. A., Kausz, A., Kimmel, P. L., & Kusek, J. (2002). K/DOQI clinical practice guidelines

for chronic kidney disease: evaluation, classification, and stratification. *American Journal of Kidney Diseases*, *39*(2 SUPPL. 1).

- Levey, A. S., Eckardt, K.-U., Tsukamoto, Y., Levin, A., Coresh, J., Rossert, J., Zeeuw, D. D. E., Hostetter, T. H., Lameire, N., & Eknoyan, G. (2005). Definition and classification of chronic kidney disease: a position statement from Kidney Disease: Improving Global Outcomes (KDIGO). *Kidney International*, *67*(6), 2089–2100.

- Levey, A. S., & Levin, A. (2017). A Rebuttal to "The CKD Classification System in the Precision Medicine Era." *Clinical Journal of the American Society of Nephrology*, *12*(10), 1711–1713.

- Levey, A. S., Schoolwerth, A. C., Burrows, N. R., Williams, D. E., Stith, K. R., & McClellan, W. (2009). Comprehensive public health strategies for preventing the development, progression, and complications of CKD: report of an expert panel convened by the Centers for Disease Control and Prevention. *American Journal of Kidney Diseases*, *53*(3), 522–535.

- Li, P. K.-T., Garcia-Garcia, G., Lui, S.-F., Andreoli, S., Fung, W. W.-S., Hradsky, A., Kumaraswami, L., Liakopoulos, V., Rakhimova, Z., & Saadi, G. (2020). *Kidney health for everyone everywhere: from prevention to detection and equitable access to care*. Oxford University Press US.

- LI, P. K., Chow, K. M., Matsuo, S., Yang, C. W., Jha, V., Becker, G., Chen, N., Sharma, S. K., Chittinandana, A., & Chowdhury, S. (2011). Asian chronic kidney disease best practice recommendations: positional statements for early detection of chronic kidney disease from Asian Forum for Chronic Kidney Disease Initiatives (AFCKDI).

Nephrology, *16*(7), 633–641.

- Liu, H. H., & Zhao, S. (2018). Savings opportunity from improved CKD care management. *Journal of the American Society of Nephrology*, *29*(11), 2612–2615.

- Lowth, D. M. (2016). Chronic kidney disease. *Practice Nurse*, *46*(8), 28–32.

- Luyckx, V. A., Tonelli, M., & Stanifer, J. W. (2018). The global burden of kidney disease and the sustainable development goals. *Bulletin of the World Health Organization*, *96*(6), 414.

- Luyckx, V. A., Tuttle, K. R., Garcia-Garcia, G., Gharbi, M. B., Heerspink, H. J. L., Johnson, D. W., Liu, Z.-H., Massy, Z. A., Moe, O., & Nelson, R. G. (2017). Reducing major risk factors for chronic kidney disease. *Kidney International Supplements*, *7*(2), 71–87.

- Lv, J.-C., & Zhang, L.-X. (2019). Prevalence and disease burden of chronic kidney disease. In *Renal Fibrosis: Mechanisms and Therapies* (pp. 3–15). Springer.

- Lv, J., Ehteshami, P., Sarnak, M. J., Tighiouart, H., Jun, M., Ninomiya, T., Foote, C., Rodgers, A., Zhang, H., & Wang, H. (2013). Effects of intensive blood pressure lowering on the progression of chronic kidney disease: a systematic review and meta-analysis. *Cmaj*, *185*(11), 949–957.

- Mallappallil, M., Friedman, E. A., Delano, B. G., McFarlane, S. I., & Salifu, M. O.

(2014). Chronic kidney disease in the elderly: evaluation and management. *Clinical Practice (London, England), 11*(5), 525.

- Manjunath, G., Tighiouart, H., Ibrahim, H., MacLeod, B., Salem, D. N., Griffith, J. L., Coresh, J., Levey, A. S., & Sarnak, M. J. (2003). Level of kidney function as a risk factor for atherosclerotic cardiovascular outcomes in the community. *Journal of the American College of Cardiology*, *41*(1), 47–55.

- Marie, N. G., Freeman, M. K., Fleming, T. D., Robinson, M., Dwyer-Lindgren, L., Thomson, B., Wollum, A., Sanman, E., Wulf, S., & Lopez, A. D. (2014). Smoking prevalence and cigarette consumption in 187 countries, 1980-2012. *Jama*, *311*(2), 183–192.

- Mills, K. T., Xu, Y., Zhang, W., Bundy, J. D., Chen, C.-S., Kelly, T. N., Chen, J., & He, J. (2015). A systematic analysis of worldwide population-based data on the global burden of chronic kidney disease in 2010. *Kidney International*, *88*(5), 950–957.

- Mirrakhimov, A. E. (2012). Obstructive sleep apnea and kidney disease: is there any direct link? *Sleep and Breathing*, *16*(4), 1009–1016.

- MOH, P. (2018). Health Anual Report 2018, Palestine. *State of Palestine, Ministry of Health*.

- Musmar, S. G. (2012). Smoking habits and attitudes among university students in Palestine: a cross-sectional study. *EMHJ-Eastern Mediterranean Health Journal, 18 (5), 454-460, 2012*.

- Neugarten, J., & Golestaneh, L. (2019). Influence of sex on the progression of chronic kidney disease. *Mayo Clinic Proceedings*, *94*(7), 1339–1356.

- Nicholas, S. B., Kalantar-Zadeh, K., & Norris, K. C. (2015). Socioeconomic disparities in chronic kidney disease. *Advances in Chronic Kidney Disease*, *22*(1), 6–15.

- NKF. (2020). *National Kidney Foundation*. MDRD Study Equation. https://www.kidney.org/content/mdrd-study-equation

- Nugent, R. A., Fathima, S. F., Feigl, A. B., & Chyung, D. (2011). The burden of chronic kidney disease on developing nations: a 21st century challenge in global health. *Nephron Clinical Practice*, *118*(3), c269–c277.

- Organization, W. H. (2010). *A conceptual framework for action on the social determinants of health*.
- Organization, W. H. (2018). *Tobacco: key facts. 2019*.

- Orth, S. R., & Hallan, S. I. (2008). Smoking: a risk factor for progression of chronic kidney disease and for cardiovascular morbidity and mortality in renal patients—absence of evidence or evidence of absence? *Clinical Journal of the American Society of Nephrology*, *3*(1), 226–236.

- Orth, S. R., Schroeder, T., Ritz, E., & Ferrari, P. (2005). Effects of smoking on renal function in patients with type 1 and type 2 diabetes mellitus. *Nephrology Dialysis Transplantation*, *20*(11), 2414–2419.

- Osafo, C., Mate-Kole, M., Affram, K., & Adu, D. (2011). Prevalence of chronic kidney disease in hypertensive patients in Ghana. *Renal Failure*, *33*(4), 388–392.

- Öyekçin, D. G., Gülpek, D., Sahin, E. M., & Mete, L. (2012). Depression, anxiety, body image, sexual functioning, and dyadic adjustment associated with dialysis type in chronic renal failure. *The International Journal of Psychiatry in Medicine*, *43*(3), 227–241.

- Peng, S., He, J., Huang, J., Lun, L., Zeng, J., Zeng, S., Zhang, L., Liu, X., & Wu, Y. (2019). Self-management interventions for chronic kidney disease: a systematic review and meta-analysis. *BMC Nephrology*, *20*(1), 142.

- Plantinga, L. C., Crews, D. C., Coresh, J., Miller, E. R., Saran, R., Yee, J., Hedgeman, E., Pavkov, M., Eberhardt, M. S., & Williams, D. E. (2010). Prevalence of chronic kidney disease in US adults with undiagnosed diabetes or prediabetes. *Clinical Journal of the American Society of Nephrology*, *5*(4), 673–682.

- Prevention, C. for D. C. and. (2019). *Chronic kidney disease in the United States, 2019*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease ….

- Raddad, A. R., Rashed, A. O., Bsharat, A., Abu-Ghazaleh, D., Yasin, E., & Shehab, O. (2016). Evaluation of potential drug-drug interactions among Palestinian hemodialysis patients. *BMC Nephrology*, *17*(1), 96.

- Rastogi, A., Linden, A., & Nissenson, A. R. (2008). Disease management in chronic kidney disease. *Advances in Chronic Kidney Disease*, *15*(1), 19–28.

- Reich, H. N., Gladman, D. D., Urowitz, M. B., Bargman, J. M., Hladunewich, M. A., Lou, W., Fan, S. C. P., Su, J., Herzenberg, A. M., & Cattran, D. C. (2011). Persistent proteinuria and dyslipidemia increase the risk of progressive chronic kidney disease in lupus erythematosus. *Kidney International*, *79*(8), 914–920.

- Richards, N., Hassan, M., Saleh, A. K., Dastoor, H., Bernieh, B., Abouchacra, S., Al Jabri, O., Fleischmann, A., Richards, M., & Marcelli, D. (2015). Epidemiology and referral patterns of patients with chronic kidney disease in the Emirate of Abu Dhabi. *Saudi Journal of Kidney Diseases and Transplantation*, *26*(5), 1028.

- Ritz, E., Menne, J., & Haller, H. (2012). Prevalence of microalbuminuria in type 2 diabetes: lessons learned from the ROADMAP study. *Nephrology Dialysis Transplantation*, *27*(suppl_4), iv28–iv30.

- Sa'adeh, H. H., Darwazeh, R. N., Khalil, A. A., & Sa'ed, H. Z. (2018). Knowledge, attitudes and practices of hypertensive patients towards prevention and early detection of chronic kidney disease: a cross sectional study from Palestine. *Clinical Hypertension*, *24*(1), 6.

- Sabanayagam, C., Lim, S. C., Wong, T. Y., Lee, J., Shankar, A., & Tai, E. S. (2010). Ethnic disparities in prevalence and impact of risk factors of chronic kidney disease. *Nephrology Dialysis Transplantation*, *25*(8), 2564–2570.

- Seibert, E., Kuhlmann, M. K., & Levin, N. W. (2005). Modifiable risk factors for cardiovascular disease in CKD patients. In *Cardiovascular Disorders in Hemodialysis* (Vol. 149, pp. 219–229). Karger Publishers.

- Sharma, S. K., Dhakal, S., Thapa, L., Ghimire, A., Tamrakar, R., Chaudhary, S., Deo, R., Manandhar, D., Perico, N., & Perna, A. (2013). *Community-based screening for chronic kidney disease, hypertension and diabetes in Dharan*.

- Singh, A. K., Farag, Y. M. K., Mittal, B. V, Subramanian, K. K., Reddy, S. R. K., Acharya, V. N., Almeida, A. F., Channakeshavamurthy, A., Ballal, H. S., & Gaccione, P. (2013). Epidemiology and risk factors of chronic kidney disease in India–results from the SEEK (Screening and Early Evaluation of Kidney Disease) study. *BMC Nephrology*, *14*(1), 114.

- Singh, N. P., Ingle, G. K., Saini, V. K., Jami, A., Beniwal, P., Lal, M., & Meena, G. S. (2009). Prevalence of low glomerular filtration rate, proteinuria and associated risk factors in North India using Cockcroft-Gault and Modification of Diet in Renal Disease equation: an observational, cross-sectional study. *BMC Nephrology*, *10*(1), 4.

- Sinha, A. D., & Agarwal, R. (2019). Clinical pharmacology of antihypertensive therapy for the treatment of hypertension in CKD. *Clinical Journal of the American Society of Nephrology*, *14*(5), 757–764.

- SLEILATY, G., TABBAH4, R., ANTOUN4, L., MATTA5, H., & Dania CHELALA1. (2019). PREVALENCE OF CHRONIC KIDNEY DISEASE IN AN OUTPATIENT SETTING A Lebanese Cross-Sectional Study. *Lebanese Medical Journal 2019, Vol 67 (2)*, 89–93. www.lebanesemedicaljournal.org/articles/67-2/original6.pdf

- Snively, C. S., & Gutierrez, C. (2004). Chronic kidney disease: prevention and treatment of common complications. *American Family Physician*, *70*(10), 1921–1928.

- *State of Palestine Palestinian Central Bureau of Statistics*. (2018). Preliminary Results of the General Census of Population, Housing and Establishments. http://www.pcbs.gov.ps/site/lang__ar/600/default.aspx

- Stavropoulou, A., Grammatikopoulou, M. G., Rovithis, M., Kyriakidi, K., Pylarinou, A., & Markaki, A. G. (2017). Through the patients' eyes: The experience of end-stage renal disease patients concerning the provided nursing care. *Healthcare*, *5*(3), 36.

- Stevens, P. E., O'donoghue, D. J., De Lusignan, S., Van Vlymen, J., Klebe, B., Middleton, R., Hague, N., New, J., & Farmer, C. K. T. (2007). Chronic kidney disease management in the United Kingdom: NEOERICA project results. *Kidney International*, *72*(1), 92–99.

- Sweanor, D. T. (2020). *Smoking*. https://www.britannica.com/topic/smoking-tobacco/The-goals-and-strategies-of-public-policy-on-smoking

- Sweileh, W. M., Sawalha, A. F., Sa'ed, H. Z., Al-Jabi, S. W., & Shraim, N. Y. (2009). Prevalence of reduced renal function among diabetic hypertensive patients. *International Journal of Physiology, Pathophysiology and Pharmacology*, *1*(1), 41.

- Tannock, L. (2018). Dyslipidemia in chronic kidney disease. In *Endotext [Internet]*. MDText. com, Inc.

- Theofilou, P. A. (2012). Sexual functioning in chronic kidney disease: the association with depression and anxiety. *Hemodialysis International*, *16*(1), 76–81.

- Thomas, R., Kanso, A., & Sedor, J. R. (2008). Chronic kidney disease and its complications. *Primary Care: Clinics in Office Practice*, *35*(2), 329–344.

- Tseng, K. H. (2006). Standards of medical care in diabetes–2006: response to the American Diabetes Association. *Diabetes Care*, *29*(11), 2563–2564.

- UK, D. (2019). Blood Sugar Level Ranges. *Retrieved On*, *26*. https://www.diabetes.co.uk/diabetes_care/blood-sugar-level-ranges.html

- Upadhyay, A., Earley, A., Haynes, S. M., & Uhlig, K. (2011). Systematic review: blood pressure target in chronic kidney disease and proteinuria as an effect modifier. *Annals of Internal Medicine*, *154*(8), 541–548.

- Vaidya, S. R., & Aeddula, N. R. (2019). Chronic Renal Failure. In *StatPearls [Internet]*. StatPearls Publishing.

- Vecchio, M., Palmer, S. C., Tonelli, M., Johnson, D. W., & Strippoli, G. F. M. (2012). Depression and sexual dysfunction in chronic kidney disease: a narrative review of the evidence in areas of significant unmet need. *Nephrology Dialysis Transplantation*, *27*(9), 3420–3428.

- Webster, A. C., Nagler, E. V, Morton, R. L., & Masson, P. (2017). Chronic kidney disease. *The Lancet*, *389*(10075), 1238–1252.

- Whelton, P. K., Carey, R. M., Aronow, W. S., Casey, D. E., Collins, K. J., Himmelfarb,

C. D., DePalma, S. M., Gidding, S., Jamerson, K. A., & Jones, D. W. (2018). 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Pr. *Journal of the American College of Cardiology*, *71*(19), e127–e248.

- WHO. (2020). *Obesity*. https://www.who.int/topics/obesity/en/

- Wong, L. Y., Liew, A. S. T., Weng, W. T., Lim, C. K., Vathsala, A., & Toh, M. (2018). Projecting the burden of chronic kidney disease in a developed country and its implications on public health. *International Journal of Nephrology*, *2018*.

Appendices

***Appendix** 1: Ministry of health approval for Data collection*

State of Palestine
Ministry of Health - Nablus
General Directorate of Education in Health

دولة فلسطين
وزارة الصحة- نابلس
الإدارة العامة للتعليم الصحي

Ref.: .....
Date:.....

الرقم: ٢٠٢٠/٤٨٠/١٦٦٠
التاريخ: ٢٠٢٠/٥/١٤

الأخ مدير عام الادارة العامة للرعاية الصحية الأولية المحترم،،،

تحية واحترام،،،

الموضوع: تسهيل مهمة

بناءً على موافقة معالي وزيرة الصحة، يرجى تسهيل مهمة الطالب: **ابراهيم عيسى مغنمين**- ماجستير معلوماتية صحية – الجامعة العربية الامريكية/ رام الله، تحت اشراف د. شهناز النجار، في عمل بحث علمي بعنوان: **"Prevalence and risk factors of chronic kidney disease with "" chronic diseases patients: Retrospective chart review in primary health care centers in Hebron"**، وذلك بالسماح له بالحصول على بيانات تخص البحث من ملفات المرضى عينة الدراسة، وذلك في:

- **مراكز الصحة الأولية الحكومية في محافظة الخليل**

علما بأنه سيتم الالتزام بمعايير البحث العلمي والحفاظ على سرية المعلومات.

مع الاحترام،،،

دولة فلسطين وزارة الصحة
د. أمل ابو عواد
مدير عام التعليم الصحي

***Appendix 2**:Student letter asking for Data Collection Permission from MOH*

State of Palestine
Ministry of Health
Martyr Abu Al-Hasan Qasem/Yatta
Tel:2271019/ 2271017
Fax: 2271018

دولة فلسطين
وزارة الصحـــــة
مستشفى الشهيد أبو الحسن قاسم /يطا
تلفون: 2271019 / 2271017
فاكس: 2271018

الرقم:

التاريخ : 2019/08/20

معالي وزيرة الصحة الدكتورة مي سالم الكيلة المحترمة ,,,,,,,

بواسطة مدير عام الادارة العامة للمستشفيات المحترم,,,

بواسطة مدير مستشفى يطا المحترم,,,,,,

تحية فلسطينية وبعد,,,,,,,

الموضوع: دراسة بحثية بعنوان

"Prevalence and risk factors of chronic kidney disease with chronic diseases patients:
Retrospective chart review in primary health care centers in Hebron"

ارجو العلم بانني السيد ابراهيم مغنمين مدير التمريض في م الشهيد ابوالحسن القاسم/يطا ملتحق بمنحة ماجستير المعلوماتية الصحية "Health Informatics " في الجامعة العربية الامريكية قد حصلت على موافقة لاطروحة بحثية بالعنوان المذكور اعلاه وذلك استكمالا لرسالة الماجستير, لذا ارجو من معاليكم السماح لي بجمع البيانات من مراكز الصحة الاولية التابعة لوزارة الصحة في محافظة الخليل. مع التاكيد بان عملية جمع البيانات سوف تكون بسرية تامة وكاملة ومراعيا جميع اخلاقيات البحث العلمي.

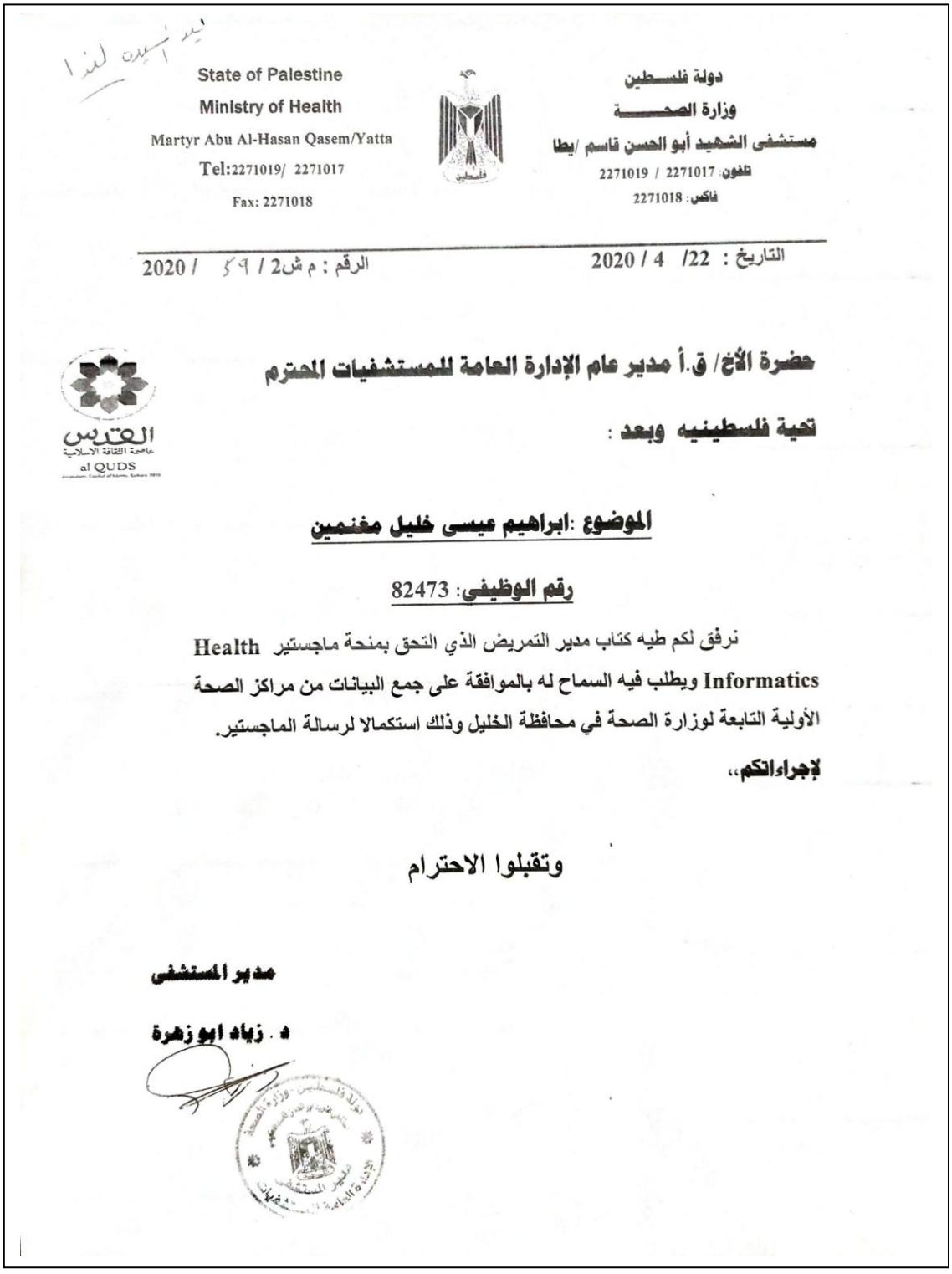
"دمتم ودام الوطن سليما معافا"

واقبلو فائق الاحترام

- مرفق ملخص البحث.

مقدم الطلب
ابراهيم مغنمين
20/8/2019

***Appendix 3**:Hospital facilitating letter for data collection permission*



State of Palestine
Ministry of Health
Martyr Abu Al-Hasan Qasem/Yatta
Tel:2271019/ 2271017
Fax: 2271018

دولة فلسطين
وزارة الصحة
مستشفى الشهيد أبو الحسن قاسم /يطا
تلفون: 2271019 / 2271017
فاكس: 2271018

التاريخ : 22/ 4 / 2020

الرقم : م ش2 / ٥٩ / 2020

القدس
عاصمة الثقافة الإسلامية
al QUDS

حضرة الأخ/ ق.أ مدير عام الإدارة العامة للمستشفيات المحترم

تحية فلسطينيه وبعد :

الموضوع :ابراهيم عيسى خليل مغنمين

رقم الوظيفي: 82473

نرفق لكم طيه كتاب مدير التمريض الذي التحق بمنحة ماجستير Health Informatics ويطلب فيه السماح له بالموافقة على جمع البيانات من مراكز الصحة الأولية التابعة لوزارة الصحة في محافظة الخليل وذلك استكمالا لرسالة الماجستير.

لإجراءاتكم،،

وتقبلوا الاحترام

مدير المستشفى

د . زياد ابو زهرة

***Appendix 4**:General hospital directorate facilitating letter for data collection permission*

04/05/2020 13:48 092385956 GEN HOSP ADMIN PAGE 01/04

State of Palestine
Ministry of Health
General Hospital Directorate
Nablus
Fax : 092385956 Tel 2374840
P.O :14

دولـــة فلســـطين
وزارة الصـــحة
الادارة العامة للمستشفيات
نابلس
فاكس : 092385956 تلفون 092384740
ص.ب : 14

Date:----------

التاريخ: ٤/٥/٢٠٢٠
الرقم: ٢٠٢٠/٥٢٦

القدس
جامعة القدس الإسلامية
al QUDS

الدكتورة مي سالم الكيله
معالي وزيرة الصحه حفظها الله

تحية طيبة وبعد ،،

الموضوع : الموظف ابراهيم عيسى مغنمين

مرفق طيه لمعاليكم كتاب مدير مستشفى يطا ، بخصوص مدير التمريض في المستشفى ابراهيم عيسى مغنمين والذي يطلب فيه الموافقة جمع البيانات الخاصه بدراسته بمنحة الماجستير من مراكز الصحة الاولية التابعه لوزارة الصحه في محافظه الخليل .
لاطلاعكم وتعليماتكم .

مع الاحترام

ق.أ. مدير عام الإدارة العامة للمستشفيات

الدكتور نجلى محمود نـزال

دولة فلسطين
وزارة الصحة
مدير عام المستشفيات
الإدارة العامة للمستشفيات

س ل

Appendix 5:*National Kidney foundation approval to use their conceptual framework*

copyrightpermissions <copyrightpermissions@kidney.org>
14 sept.
10:40 pm
To: Ibrahim Mughnamin <mughnamin@gmail.com>

Dear Ibrahim I. Mughnamin,

The National Kidney Foundation (NKF) is the copyright holder and owner of all content, videos, and images.

As such, the National Kidney Foundation hereby grants permission to Ibrahim I. Mughnamin, a Graduate student from Arab American University of Jenin –Palestine research and thesis study paper abstract titled "prevalence of Chronic Kidney diseases in south west Bank – Palestine" under the direction of Dr. Shahenaz Najjar to use NKF "Chronic Kidney Disease" conceptual framework.

The National Kidney Foundation gives copyright permission for the use of content only that is requested and no use of any other NKF logos or images.

We require that credit and copyright is clearly noted as follows:

"Produced by the National Kidney Foundation, Inc. All rights reserved."

We appreciate your interest in helping us share NKF content and educational tools.

Please let me know if you need more information or further assistance.

Kind regards,

LESLEY HUNTER, Medical and Scientific Programs Associate

copyrightpermissions@kidney.org | www.kidney.org

30 East 33rd Street, New York, NY 10016

NATIONAL KIDNEY FOUNDATION.

Appendix 6:*cooperation letter between MOH and AAUJ in research.:*

State of Palestine
Ministry of Health
Minister's Office

دولـــة فـلسـطين
وزارة الصحة
مكتب الوزير

القدس
al QUDS

19/461/ت/16
2019/6/23

الاستاذ الدكتور علي زيدان ابو زهري حفظه الله
رئيس الجامعة العربية الامريكية

تحية طيبة وبعد،،

الموضوع : التعاون بين الجامعة العربية الامريكية وقسم المعلومات الصحية في وزارة الصحة الفلسطينية لاجراء دراسات في مجال المعلوماتية الصحية والخدمات الصحية المقدمة للمواطن

تهديكم وزارة الصحة أطيب التحيات ، وبالاشارة الى كتابكم بخصوص الموضوع المذكور اعلاه ، يرجى العلم انه لامانع لدينا من الحصول على المعلومات الصحية اللازمة من طرفنا لاجراء الدراسات الصحية، على ان تزودونا بنتائج هذه الدراسات .

وتفضلوا بقبول فائق الاحترام والتقدير ،،،

وليد سالم الكيلة
وزارة الصحة

الاخ م.د. وليد ذيب احمد
للاطلاع واجراءاتكم
٢٠١٩/٦/٢٤

نسخة : عطوفة الوكيل المساعد المحترم

Ministry of Health - Nablus- Tel.: 09/2384771/6 - Fax : 09/2384777
Ministry of Health -Ramallah- Behind Palestine Medical Complex
Tel.: 02/2964183 - Fax : 02-2964182
Ministry of Health - Gaza- Tel. : 08/2846949 - Fax : 08/2826295

وزارة الصحة - نابلس - تلفون : 09/2384771/6- فاكس : 09/2384777
وزارة الصحة - رام الله - خلف مجمع فلسطين الطبي
تلفون : 02/2964183 فاكس : 02/2964182
وزارة الصحة - غزة - تلفون : 08/2846949 فاكس : 08/2826295

***Appendix 7**:Data Collection sheet*

Arab American University
Ramallah Site

الجامعـــة العربيـــة الأمريكيـــة
موقع رام الله

Study data collection sheet

Date:

عنوان البحث باللغة العربية: تقييم مدى انتشار مرض الكلى المزمن وعوامل اختطاره لدى مرضى الأمراض المزمنة الذين يعالجون في الرعاية الصحية الأولية في الخليل

الباحث: الطالب ابراهيم عيسى خليل مغنمين

Directorate								
No	1	2	3	4	5	6	7	8
DOB								
Age								
Sex								
HTN								
CAD								
DM								
Dyslipidemia								
Height								
Weight								
BMI								
SBP								
DBP								
Smoking								
RBS								
HbA1C								
Cholesterol								
Triglyceride								
HB								
Uric Acid								
Creatinine								
BUN								
GFR								
Class								

اسم جامع البيانات :

***Appendix 8**:Data collection sheet notes*

Notes	Variable
Age in years	Age(numerical)
Sex (m.f)	Sex (nominal)
HTN - (yes, no)	Hypertension(nominal)
CAD - (yes, no)	Coronary Artery Disease(nominal)
DM - (yes, no)	Diabetes Mellitus(nominal)
Dyslipidemia	Dyslipidemia (nominal)
Height	Height (numerical)
Weight	Weight (numerical)
BMI	Body Mass Index (numerical)
SBP in mm/Hg	Systolic Blood Pressure(numerical)
DBP in mm/Hg	Diastolic Blood Pressure(numerical)
Smoking – (yes, no)	Smoking (Nominal)
RBS in mgs/dl	Blood Glucose Random(numerical)
HbA1C	Glycosylated Hemoglobin, Type A1C
Cholesterol	Cholesterol (numerical)
Triglyceride	Triglyceride (numerical)
Hb in gms	Hemoglobin(numerical)
Uric Acid	Uric Acid ((numerical)
S. Crea in mgs/dl	Serum Creatinine(numerical)
BU in mgs/dl	Blood Urea(numerical)
GFR	Glomerular filtration rate (numerical)
Class - (ckd, notckd)	Class (nominal)

ملخص الدراسة

مقدمة: اصبح مرض الكلى المزمن مشكلة صحية عامة عالمية ، حيث يعاني 8-10٪ من السكان البالغين من شكل من أشكال تلف الكلى ، ويموت الملايين كل عام قبل الأوان بسبب المضاعفات المتعلقة بمرض الكلى المزمن. لايوجد في فلسطين بيانات أو سجل واضح حول انتشار وعوامل الخطر لأمراض الكلى المزمنة. الهدف من هذه الدراسة هو تقييم مدى انتشار وعوامل الخطر لمرض الكلى المزمن في عيادات الرعاية الصحية الأولية في الخليل.

منهجية الدراسة: تم إجراء مراجعة رجعية غير تدخلية لدراسة السجلات الطبية لملف المريض من كانون الثاني 2019 إلى كانون الثاني 2020 عيادات الرعاية الصحية الأولية في الخليل. شملت المجموعة المستهدفة الأشخاص الذين تبلغ أعمارهم 15 عامًا فأكثر ، الذين كانوا يعيشون في مدينة الخليل ويزورون العيادات المزمنة للعام السابق على الأقل بفاصل ثقة 95٪ وهامش خطأ 4٪ ، وكان حجم العينة 587 مريضًا وبشكل عشوائي تم اختيارهم من بين أربع مديريات.

النتائج: من بين 587 ملف مريض تمت مراجعته ، كان 69٪ من الإناث ، وكان متوسط أعمارهم 61.52 ± 11.86 سنة ، ومتوسط معدل الترشيح الكبيبي الخاص بهم 75.54 ± 24.22 ، وأكثر من ربع العينة كان لديهم مرض الكلى المزمن 18.5٪ ، 5.9٪ ، 2.0٪ ، و 0.3٪ تتطابق مع مرض كلوي خفيف ، متوسط ، شديد ، ونهائي (الداء الكلوي بمراحله الأخيرة) ، على التوالي. كان جنس الإناث ، والشيخوخة ، وداء السكري (DM) ، وارتفاع ضغط الدم (HTN) ، وعسر شحميات الدم ، وأمراض الشريان التاجي (CAD) من عوامل الخطر لتطور CKD.

الخلاصة: أشارت هذه الدراسة إلى ارتفاع معدل انتشار مرض الكلى المزمن بين المرضى الذين يعانون من أمراض مزمنة ، ويرتبط تطور مرض الكلى المزمن بالعديد من العوامل السريرية والديموغرافية ، لذلك ،

يجب توجيه الجهد التعاوني لأصحاب المصلحة إلى المزيد من المراقبة والتقييم المتكرر لـ CKD لتحديد وحل CKD وعبئه.