PATTERNS OF ADMISSION OF KIDNEY DISEASES AT JIMMA UNIVERSITY SPECIALIZED HOSPITAL,SOUTH WEST, ETHIOPIA:SIX MONTH SURVEY

By

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I. Abstract

Background:acute kidney injury is sudden deterioration of renal function associated with a markedly increased risk of death in hospitalized individuals .At least 6% of the adult population in the United States has CKD at stages 1 and 2 and 4.5% have stages 3 and 4 CKD.Thepattern of kidneydiseases in Ethiopia and in particular in Jimma are lacking.

Objective To assess patterns of kidney diseases admission andtreatment outcome at JUSH medical wards from February 2015-July 2015.

Methods and participants:a prospective cross sectionalstudy was conducted forpatients admitted with kidney diseases from February 1, 2015 to July 30,2015. Data was collected by patient interview and medical record review using structured questionnaire containing sociodemographic characteristics, clinicalfeatures, and specific laboratory investigations. Data was obtained from 97 patients admitted with various kidney diseases and was analyzed using SPSS version 20.00 stastical software. Descriptive statistics were used for most of the variables and linear regression was done. A P-value of<0.05 was considered stastically significant.

Result:from 97 patients admitted with kidney diseases 52(53.6%) were males. The mean age was 43+ 17. At admission 40% of them have high blood pressure. 36(37.1%), 28(28.9%), 23(23.7%), and 10(10.3 %%) of them have acute, chronic kidney diseases, acute on chronic kidney diseases and acute pyelonephritis respectively. Anemia was found in 75% of patients admitted with kidney diseases. The outcome of treatment of patients was improved in 75.3% and10.3% dead. The average hospital stay was 8+ 5.4 days.

Conclusion and recommendation:9.4% of admissionwas due to kidney diseases and majority of them (62.6%) were having CKDwith or without acute insult and anemia was found among the commonest complication. Having early screening and treatment of hypertension and diabetes should be done to prevent the high morbidity and mortality of kidney disease. Admission serum creatinine was found an independent predictor of mortality among patients admitted with kidney disease in this hospital.

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III. List of abbreviations

ACEI - Angiotensin Converting Enzyme Inhibitor ARF/AKI- Acute Renal Failure/ Acute Kidney Injury

BMI - Body Mass Index BP - Blood Pressure

BUN - Blood Urea Nitrogen CD - Chronic Disease

CKD - Chronic Kidney DiseasesCVD- Cardiovascular Diseases

CVA - Cost vertebral Angle ESRD - End-Stage Renal Disease

GFR- Glomerular Filtration Rate HIV - Human Immunodeficiency Virus

HPF - High Power Field JUSH - Jimma University Specialized Hospital

NHANES- National Health and Nutrition Examination Survey NSAIDS - Non-Steroidal Anti-Inflammatory Drugs

PR - Pulse RateRBC - Red Blood Cells

SLE - Systemic Lupus Nephritis

TIN - Tubulointertitial Nephritis

U/A- Urine Analysis

WBC - White Blood Cells

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Chapter 1 introduction

1.1. Background information

10% of the population worldwide is affected by chronic kidney disease (CKD), and millions die each year because they do not have access to affordable treatment (1). One in three American adults are currently at risk for developing kidney disease.26 million American adults have kidney disease and most don't know it (2).High blood pressure and diabetes are the two leading causes of kidney disease. Major risk factors for kidney disease include diabetes, high blood pressure, family history of kidney failure and being age 60 or older(2). Additional risk factors include kidney stones, smoking, obesity and cardiovascular disease. Those at risk should have simple blood and urine tests to check if their kidneys are working properly. Kidney disease is the 9th leading cause of death in the United States (2). In 2013, more than 47,000 Americans died from kidney disease. Once the kidneys fail, dialysis or a kidney transplant is required (2). Approximately 450,000 Americans are on dialysis and approximately 185,000 live with a functioning kidney transplant. Of more than 123,000 Americans currently on the waiting list for a lifesaving organ transplant, over 101,000 need a kidney. Fewer than 17,000 people receive one each year.Every day, 12 people die waiting for a kidney (2).

Chronic kidney disease (CKD) encompasses a spectrum of different pathophysiologic processes associated with abnormal kidney function and a progressive decline in glomerular filtration rate (GFR)(3). The five most frequent causes of CKD, cumulatively accounting for greater than 90% of the CKD disease burden worldwide are in order of frequency Diabetic glomerular disease Glomerulonephritis, Hypertensive nephropathy, Autosomal dominant polycystic kidney disease and Other cystic and tubulointerstitial nephritis(4). The relative contribution of each category varies among different geographic regions (4).

Acute kidney injury (AKI), previously known as acute renal failure is characterized by the sudden impairment of kidney function resulting in the retention of nitrogenous and other waste products normally cleared by the kidneys. AKI is not a single

disease but, rather, a designation for a heterogeneous group of conditions that share common diagnostic features: specifically, an increase in the blood urea nitrogen (BUN) concentration or an increase in the plasma or serum creatinine concentration often associated with a reduction in urine volume(5). AKI can range in severity from asymptomatic and transient changes in laboratory parameters of glomerular filtration rate (GFR), to overwhelming and rapidly fatal derangements in effective circulating volume regulation and electrolyte and acid-base composition of the plasma. AKI complicates 5–7% of acute care hospital admissions and up to 30% of admissions to the intensive care unit (6). AKI is also a major medical complication in the developing world, particularly in the setting of diarrheal illnesses, infectious diseases like malaria and leptospirosis, and natural disasters such as earthquakes(7). AKI is associated with a markedly increased risk of death in hospitalized individuals, particularly in those admitted to the ICU where in-hospital mortality rates may exceed 50 % (8). The causes of AKI have traditionally been divided into three broad categories: prerenal azotemia, intrinsic renal parenchymal disease, and postrenal obstruction (9).

The overall prevalence of CKD from the 21 medium-quality and high-quality studies done in sub-Saharan Africa was 13·9 %.(10) one prospective study done in 203 Ghana tertiary hospital shows that chronic glomerulonephritis (33%), hypertension (21.2%) and diabetes mellitus (22.2%) were found to be the leading causes of CKD. Common complications of CKD at presentation included anemia (86.7%), pulmonary edema (31%), high blood pressure (55%), and infection. (11)Chronic kidney disease affects mainly young adults aged 20–50 years in sub-Saharan Africa and is primarily due to hypertension and glomerular diseases, unlike developed countries where chronic kidney disease presents in middle-aged and elderly patients and is predominantly due to diabetes mellitus and hypertension.(12)

The prevalence of diabetic nephropathy is estimated to be 14%–16% in South Africa, 23.8% in Zambia, 12.4% in Egypt, 9%in Sudan, and 6.1% in Ethiopia (13). 60.4% of the 190 patients treated by hemodialysis CKD patients at saint Paulo's hospital had prior history of diabetes mellitus.(14) from a study done in southern Ethiopia shows CKD is present in no less than 18% of

diabetics attending the hospital, but it is usually undiagnosed. A significant number of diabetics have renal insufficiency corresponding to stages 2–3 CKD despite normal creatinine levels(15)

1.2Statement of problem

The incidence rate of acute kidney injury (AKI) around the world is not well known. Recent studies in the United States (18,19) and Spain (20) have shown incidences varying between an average of 23.8 cases per 1000 discharges ; with an 11% yearly increase between 1992 and 2001, to an increase from 61 to 288 per 100,000 population between 1988 and 2002 . More recently, Ali.reported a high incidence of 1811 cases of AKI per million populations during 2003. The relatively wide disparity in reported incidence rates and the increasing frequency of the condition raise concerns as to the real magnitude of the problem. In addition to a real increase in worldwide incidence, large differences in the definition of AKI and case mix likely underlie such differences. (21)

This study is intended to study the magnitude and distribution of kidney diseases which can help to show prevalence of the diseases which is not studied in this Jimma area.

Chronic kidney disease (CKD) is a world-wide public health problem associated with adverse outcomes of kidney failure, cardiovascular disease (CVD), and premature death. It has been estimated that more than 500 million individuals globally have CKD, defined by either kidney damage or glomerular filtration rate (GFR) < 60 ml/min/1.73 m2 for ≥ 3 months, regardless of the cause. Diabetes is a major public health problem around the world, estimated to affect more than 371 million people in 2012 and 382 million in 2013 which is increasing rampantly, and is the leading cause of end stage renal disease (ESRD) in both developed and emerging nations.(20)

Africa is thus facing the ‘‘double burden’’ of disease; of the already existing infectious diseases such as HIV/AIDS, TB and malaria and, with marked increase in noncommunicable diseases, such as cancer, diabetes, and hypertension. (20)

Chapter 2

2.1Literature review

Acute renal failure (ARF) is characterized by azotemia that progresses over several hours or days, with or without oliguria. Prerenal ARF, caused by under perfusion of an otherwise normal kidney, accounted for 21% of cases of ARF in a multicenter study in Madrid.Postrenal ARF, caused by obstruction of the urinary tract, accounted for 10% of cases in the Madrid study.Once prerenal and postrenal causes are ruled out, intrinsic renal failure is likely. Intrinsic ARF, caused by disease of the renal parenchyma, accounted for 69% of cases in the Madrid study. Acute tubular necrosis (ATN), the most common type of intrinsic ARF, accounted for 45% of all cases of ARF.The mortality rate in severe ARF is almost 50%, depending on the type of ARF and comorbidities of the patient. In the Madrid study, patients with ATN had a mortality rate of 60%, whereas those with prerenal or postrenal disease had a 35% mortality rate (21).

According to the estimate of national chronic kidney diseases of 2014 more than 10% of adults in the United States—more than 20 million people may have CKD, of varying levels of seriousness.The chance of having CKD increase with age; it increases after age 50 years and is most common among adults older than 70 years.Adults with diabetes or high blood pressure, or both have a higher risk of developing CKD than those without these diseases. Approximately 1of 3 adults with diabetes and 1 of 5 adults with high blood pressure has CKD. Other risk factors for CKD include cardiovascular disease, obesity, high cholesterol, lupus, and a family history of CKD. The risk of developing CKD also increases with age, as these risk factors are more common at older age. Men with CKD are 50% more likely than women to have kidney failure. According to the United States Renal Data System; new Cases of Kidney Failure by Primary Diagnosis by 2011 was caused by diabetes mellitus (44%), hypertension (28%) others (23%) and unknown (5%). (21)

The incidence of ESRD is increasing, with a doublingin the number of patients treated for ESRD seen inEurope, the United States, and Australia over the past decade. Consistent with this trend, the burden of renal disease is likely to escalate as both the age of the population and the prevalence of diabetes are projected to increase dramatically. The pattern of disease burden in the 21st century has significantly shifted towards chronic diseases (NCDs) [23]. Population aging and lifestyle-modifiable risk factors, accompanied by a decline in early-life infectious diseases, have resulted in the emergence of NCDs as a major global health threat [24]. Both morbidity and mortality of NCDs are rising, escalated by the increasing prevalence of pandemic health problems such as diabetes mellitus (DM) , cardiovascular disease (CVD) and chronic kidney diseases. The expected increase in the burden of NCDs is likely to have profound socioeconomic and public health consequences, especially in developing countries [25].NCDs are often considered to be a health problem endemic to the developed world, but the etiological link between infectious diseases and NCDs and the global rise of DM, CVD, and nondiabetic chronic renal diseases have made NCDs a primary health burden in developing countries [26]. Advances in medical innovation, focus on nutritional health, economic improvement, and urbanization have resulted in a major surge in life expectancy and improvement in quality of life. These advances are countered by increased exposure to risk factors associated with NCDs, such as unhealthy diets and lack of physical activity [27].Among NCDs, chronic kidney disease (CKD) is of particular significance and contributes heavily to the global CVD and end-stage renal disease (ESRD) [28,29]. CKD ultimately progresses to ESRD, the rate of which is dependent on coexisting pathologies and risk factors. Jungers found that the incidence of de novo CVD events in a non-ESRD cohort of CKD patients was 41% in men and 19% in women over a 10-year span. As documented by Foley et al. [31], the prevalence of CVD in ESRD and end-stage CKD patients increases to 74%. CKD is a burden not just for renal replacement therapy (RRT) demands but also for overall population health. Currently, CKD is the 12th highest cause of death and 17th highest cause of disability worldwide [31]. However, the rapid surge in diabetes and hypertension (HT), both of which are predicted to drive epidemics in CKD and CVD, will dramatically escalate this burden. CKD is expected to be a profound 21st century medical challenge [32].As the global health paradigm shifts towards non-communicable diseases (NCD), the current development aid

for health focus on infectious diseases is no longer a sustainable approach in developing countries. The impact of NCD is overwhelming and there is a dire need for a greater alignment of funding with the burden of NCDs. Coordinated and integrated action to target the growing prevalence of NCDs will become essential in 21st century global public health policy. (32)

CKD is a complex and progressive condition [33] that arises from both non communicablediseases and infectious diseases, such as malaria, schistosomiasis, HIV, and hepatitis B [34, 35]. The use of herbal nephrotoxic medications also contributes to CKD [36]. Studies suggest that CKD may be a risk multiplier for infectious disease-associated mortality primarily in developing countries, which face comparatively higher infectious disease burdens [36]. However, infectious sources of CKD are still less common than chronic sources of CKD, especially in developing nations, where the many significant risk factors associated with kidney disease, such as HT, DM, dyslipidemia, and obesity, are becoming increasingly prevalent. It is characterized by 5 stagesof irreversible and impaired renal function, with the progression of renal function deterioration leading to ESRD, which is life-threatening without proper RRT intervention [37]. Stages 1 and 2 of CKD (covert CKD), as defined by the level of kidney function, are often asymptomatic and diagnosed by the presence of micro- and macroalbuminuria, which are markers for diffuse vascular damage and microinflammation associated with cardiokidney damage [28]. Overt CKD diagnosis is often a result of routine screening practices and generally targeted at high-risk patients (38).

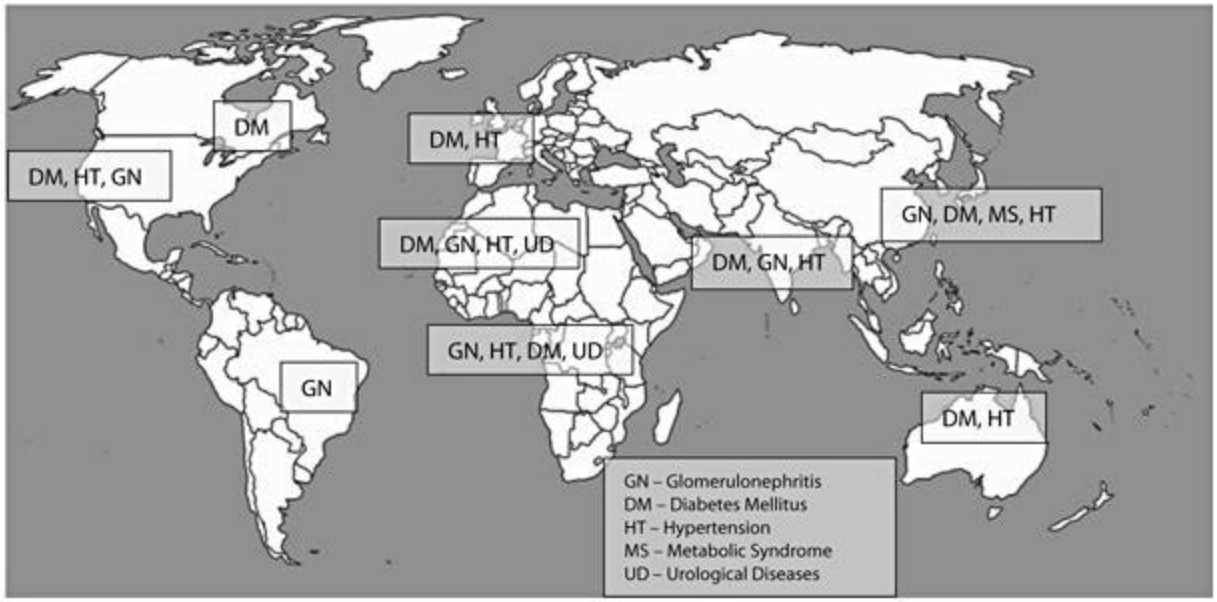

Fig. 1. Distribution of the main pathologies contributing to CKD across the world(taken from National Health and Nutrition Examination Survey (NHANES)from 1988-1994

Patients suffering from reduced kidney function, most often as a result of DM or HT, represent a global population that is highly vulnerable to CKD and ESRD and at great risk for many other CDs such as CVD [21,32]. The AusDiab study [33] showed that the prevalence of CKD markers in the Australian population was 12.1% – a result similar to that of the NHANES III study findings of 11% in the United States [25]. Studies in China suggest that between 12.1 [20] and 13% [21] of the population have evidence of CKD and kidney damage markers. The profound impact of CKD on CDs and cardiovascular morbidity makes it especially important in the context of global disease, specifically in developing countries that have a mounting incidence of CKD-associated risk factors [39, 40].

Generally, the disease pattern shifts from infectious to chronic conditions as a country becomes more ‘developed’ [41]. However, in many of the poorest nations, the epidemiological shift to CDs as the major cause of morbidity and mortality is increasingly evident in spite of low overall indicators of development. Sixty percent of the 58 million deaths in 2005 were attributed to CDs, with 4 out of 5 deaths globally occurring in low- and middle-income countries (LMICs) [42]. By 2030, it is expected that 3 out of the 4 leading causes of death will be due to chronic conditions, indicating an alarming health burden [17]. Due to the escalating prevalence of CD risk factors, many developing countries now simultaneously bear the burden of both chronic and infectious diseases [43].

Currently, CVD and DM make up the largest contribution to the global CD burden. Developing countries such as India and China are major reservoirs for these CDs, with their incidence rising rapidly [44]. In China, between 1986 and 1999, age-specific death rates from circulatory diseases increased from 200 to 300% in those aged 35–44 years [45]. Ischemic heart disease and stroke mortality predictions between 1990 and 2020 include more than 100% increases in Latin America, the Middle East, and sub-Saharan Africa [46]. It is expected that the number of individuals with HT will increase from 972 million to 1.56 billion people by 2025. In 2000, the incidence of diabetes was estimated to be 171 million and WHO predictions expect this to increase to 366 million by 2030 [23]; 298 million of these individuals will be in developing countries [47].

India, with the highest incidences of diabetes and HT in the world, is likely to face a catastrophic CKD/ESRD burden, with 25–40% of its population at risk [48]. Current estimates of CKD and ESRD in South Asia are approximately 800 and 100–200 per million people, respectively [49]. In China, the prevalence of CKD has been estimated to be 2–3% of the population or 10–15 million individuals [50].

The increase in CKD and its progression to end-stage renal failure worldwide are mainly a result of the rising global diabetes and HT pandemics [23,24]. The Demand Project, led by Parving. [48], tested 31,470 diabetics across 34 countries, and showed

that 49% of the subjects had microalbuminuria, a key CKD/ESRD marker. The 2000 AusDiab study showed that 25.4% of Australian individuals with HT and diabetes had microalbuminuria [51].

The progression of CKD to ESRD and its treatment depend heavily on the level of affluence of the country. Because of earlier stage mortality, LMICs have relatively low incidence rates of ESRD (150 per million people), as opposed to countries in North America and Europe [51]. Ninety percent of the 1.8 million people alive due to RRT reside in high-income countries [52]. Studies show that the incidence of ESRD has doubled in Europe and the USA over the past decade [53]. However, due to the rapid increase of several contributing risk factors, the number of ESRD patients in developing countries is expected to double to 2.1 million between 2001 and 2010 [54].

A survey across 10 Asian countries showed that the most common cause of ESRD in 9 out of 10 countries was diabetic nephropathy [55]. Diabetic nephropathy develops in 1 out of 3 diabetics worldwide, and is considered the leading cause of ESRD [55]. The remaining 66% of patients, mostly in developing countries, die from CVD prior to reaching ESRD, which contributes heavily to the burden of CVD (>30% of the global CD burden) [55]. However, estimated burdens of CKD in developing countries, most of which lack national renal disease registries, are often highly conservative representations of the overall national health burdens [56]. LMICs are not equipped to handle widespread screening for CKD, and surveillance studies are often limited to high-risk populations [58]. Furthermore, limited access to healthcare, lack of awareness, and limited capacity of health workers for CKD detection and prevention suggest that those in the lowest socioeconomic brackets are often unaware of any risk factors for CKD such as HT and DM. In Nepal, 47% of 1,243 subjects were newly diagnosed with HT [58].

However, ESRD management in LMICs is too expensive, and healthcare resources and budgets are unable to meet the burden of treatment. These high costs and lack of access to RRT are why less than 10% of patients in developing countries receive RRT [59].

Thus, an emphasis on prevention planning and early detection of CKD on a long-term basis is the only practical and cost-effective solution for developing countries that cannot afford the burden of expensive treatment associated with CDs. Individual level interventions can be done through the screening of (high-risk) people and providing multidrug regimens of aspirin, ACE inhibitors, statin, calcium channel or β-blockers for early treatment [60].

Currently, screening for CKD is accepted practice only in patients with HT or diabetes (61,62)Studies in developed countries on the cost-effectiveness of tertiary prevention of CKD by treatment of HT, albuminuria, and use of renin-angiotensin system inhibitors have shown that early intervention appears to be more cost-effective than late intervention [63].

From July 1998 to July 1999, 45 cases of acute renal failure were treated at Bir Hospital, Kathmandu Nepal. Out of which 24 were male and 21 were female. Age ranged from 11 months to 84 years with mean age being 35 years and 9 cases were below 10 years. Four cases with pre-renal azotemia and twenty five cases of acute tubular necrosis (ATN) accounted for 64% of all cases. These were due to gastroenteritis 10, sepsis 6, post-surgical 1, trauma 1 and obstetrical complications 5. Multiple hornet stings were responsible for acute renal failure in 3 cases, acute urate nephropathy in 1 case and miscellaneous causes in 2 cases. Glomerulonephritis / vasculitis accounted for 17.7%, acute interstitial nephritis 4.4%, hemolytic uremic syndrome (HUS) 6.6%, and post renal azotemia in 6.6% of all cases. Mean serum creatinine was 8 mg/dl, mean blood urea 190 mg/dl. Eight cases were treated only conservatively, eighteen received hemodialysis, fourteen received peritoneal dialysis, three received both and two refused for dialysis. Average duration of hospital stay was 13.6 days. Out of the forty-five cases twenty-nine recovered normal renal function, ten expired, two recovered partially, two progressed to chronic renal failure and two left against medical advice. Overall mortality was 22.2%.Common causes of acute renal failure in this area was gastroenteritis (22%) and sepsis (20%). HUS was exclusively seen in children following bacillary dysentery.

One hundred and twenty patients were admitted to college of medical sciences and hospital, Sattur ,Dharwad, State-Karnataka, India, fulfilled the criteria of acute kidney injury . Most of the patients 43.3% were in 31-50 years and 56.6% were males. Comorbidity was seen in41(34.2%) patients were diabetes was most common 43.9%. ARF had developed complicating medical andsurgical conditions in 74 (61.6%) and 35 (29.2%) patients respectively. The etiology of ARF was multifactorial and included; sepsis 51.3%, hypotension (33.7%), volume depletion (18.9%). Multiple organ dysfunctions notedin 55% of cases and dialysis was required in 51.6% patients. Mortality occurred in 28.3% of patients. MODSand sepsis were found to be significant adverse prognostic factors. AKI was seen in 4.2% of cases in this hospital admission.(66)

A retrospectively data of all cases of AKI who were treated at Dar El Shefa Hospital, Cairo, Egypt, from January 2006 to January 2007 were collected. 51 cases of AKI during the study period were (29 males and 22 females). Their age ranged from 19 to 81 years with a mean of 48 years. Pre-renal azotemia and acute renal tubular necrosis (ATN) accounted for 53% of all cases. These were due to cardiovascular disease in ten patients, sepsis in six patients, obstetrical complications in five patients, post-surgical in four patients, trauma in one patient and gastroenteritis in one patient. Contrast induced nephrotoxicity was responsible for AKI in eight cases (15.7%), glomerulonephritis/vasculitis in eight (15.7%), obstructive uropathy in five (9.8%) acute interstitial nephritis in two (3.9%), and acute urate nephropathy in one (2%). Thirty cases were treated conservatively, nineteen received hemodialysis, and two receivedperitoneal dialysis. Average duration of hospital stay was 11.7 days. Out of the fifty one cases, thirty-three recovered normal renal function (64.7%), eleven expired, five progressed to chronic kidney disease and two were lost follow up. Overall mortality was 21.5 %.(56)

Using the World Kidney Day platform, Sumailiscreened >15,000 adults in Kinshasa, Democratic Republic of Congo, and reported that hypertension, proteinuria, obesity, and diabetes were present in 40%, 12%, 13% and 8% of the screened

population, respectively. They also found the overall prevalence of CKD (stages 1–5) was 12.4% (95% CI 11.0–15.1%), with 2% having stage 1 CKD, 2.4% having stage 2 CKD, 7.8% having stage 3 CKD, and 0.2% having stage 5 CKD.(76)

The causes and clinical course of 136 cases of acute renal failure (ARF) consecutively treated in the Renal Unit of TikurAnbessa Hospital, Addis Ababa, Ethiopia, between January 1989 and December 1992 was described. There were 106 women and 30 men with mean age of 26.9 +/- 7.2 and 40.7 +/- 14.9 years respectively. Septic abortion is still the leading cause of ARF (71 patients) followed by falciparum malaria (29 patients) and nephrotoxic agents (12 patients). One-hundred-seventeen patients (86%) required dialysis. The overall case fatality rate was 33.8%, with similar mortality rates in septic abortion (36.6%) and falciparum malaria infection (37.9%), but a much lower rate (16.7%) in acute renal failure secondary to nephrotoxic agents. Septicemia and pneumonia were leading causes of death. . Non-oliguric ARF was seen in 33.8% of cases and was found commonly in patients with malaria (75.9%) or in nephrotoxin-induced ARF (83.8%). Mean duration of oliguria was 18.9 +/- 11 days. Compared to the previous report from the same center, this larger series identified important clinical settings other than septic abortion which predispose to ARF. As renal function tests are not performed routinely in many Ethiopian hospitals and as many patients have non-oliguric ARF, cases may be being missed. Measures to prevent septic abortion and malaria, and the judicious use of nephrotoxic agents, may decrease the incidence of ARF (77)

Study done on 214 patients in Butajira hospital by 2013, the estimated prevalence of CKD, defined by eGFR<60 ml/min/1.73 m2, in this study was 23.8% (CI 95%= 17.5% - 29.9%) when defined by according to the Cockcroft-Gault equation. By stages, the prevalence was 22.9% with stage 3 (15.0% stage 3A and 7.9% stage 3B) and 0.9% with stage 4 byCockcroft-Gault equation .By age group, CKD prevalence was significantly higher among participants >60 years old than ≤ 60 years old: 64.3% vs. 17.7% (p <0.001) according to Cockcroft-Gault equations. CKD prevalence was higher in females than males: and 31.9%

vs. 7.0% by Cockcroft-Gault (P = 0.018). Family history of kidney disease, present in 18.7% of participants, was associated with a higher prevalence of CKD than its absence: 42.5% vs. 12.6% by MDRD (P<0.001), and 55.0% vs. 16.7% by C-G (P<0.001). Furthermore, obesity that was reported in 14.5% of participants was associated with a high prevalence of CKD compared with lack of obesity: 45.2% vs. 20.2% by Cockcroft-Gault(p=0.003)(77)

In a cross sectional study involving over 2000 patients in Addis Ababa, the prevalence of diabetes mellitus was 6.5% and 6.6% among men and women respectively. Renal diseases accounted for 1.2-6 % of adult hospital medical admissions in reports from various parts of the country. Diseases of the genitourinary system were 5th in rank among the 10 leading causes of outpatient visits (4.45% of visits) in 2006/7. According to the latest WHO data published in April 2011, kidney disease deaths in Ethiopia reached 12,038 or 1.47% of total deaths (77).

2.2Significance of the study

This study shows the magnitude of kidney disease in this specific area and help in planninglarge scale public health intervention.

Health care managers can use it for resource allocation depending on the results obtained

It will also be helpful as secondary source for larger scale study in the country

The findings of the result reveal clinical presentation, risk factors associated with any sort of kidney diseases and patterns of admission which help for clinicians for early diagnosis.

Chapter 3 Objectives

3.1 General objective

To assess patterns of kidney diseases based on function andtreatment outcome on patients admitted to JUSH medical wards.

3.2 Specific objective

1. To determine patterns of kidney disease admissions at JUSH February 2015 – July 2015
2. To assess treatment outcome to kidney diseases at JUSH February 2015 – July 2015

Chapter 4 METHODS

4.1 Study setting

The study was conducted in JIMMA UNIVERSITY specialized hospital Jimma zone, oromia regional state with estimated population of 2,486,155. (66). The JUSH is the only referral and teaching hospital, serving south west of Ethiopia with an estimated catchingpopulation of over 15 million. The hospital has a total of 9 service delivering major units with over 500 beds, over 1000 staffs serving around admission 20,000 annual admissions and over 150,000 outpatientsservice. The study was conducted from February2015 – July 2015 in medical wards of the hospital.

4.2 study Design

Hospital based crossectional study was employed.

4. 3 selection of participants

Participants were patients admitted with kidney diseases

4.4 Study participants

Ageof 15 years and above who were admitted to medical wards with the following kidney diseases

- Acute kidney injury
- Chronic kidney diseases
- Any form of glomerulonephritis/ glomerulopathy
- Any form of tubule interstitial nephritis
- Pyelonephritis

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4.5 Inclusion and exclusion criteria

The inclusion criteria for the study wasage 15 and above who were admitted to medical ward with diagnosis of kidney diseases and who were willing to participate after consent or were admitted wither other medical illness and found to have kidney disease are included in the study.

The exclusion criteria: those who wereterminally ill, those who were not voluntary and patients with lower urinary tract infections admitted with other medical illness other than kidney disease.

4.6 sample size and sampling procedure

Sampling technique

All kidney diseases related admission to JUSH medical wards over the study period were included in the study

4.7 variables of the study

Dependent variable

- Different categories of kidney diseases , discharge outcome

Independent variables:

I. sociodemographic variables :

Age, sex, income, literacy status of the patient, occupation, history of kidney disease,

II. Previous medical history

III. Risk factors for kidney diseases

IV. Treatment provided

4.8 operational definitions

Acute renal failure- when the patient had decrease urine output, that is UOP< 400ml/day or serial creatinine rise > 0.3mg/dl or drop after start of treatment in 24hrs and had normal kidney function prior to the illness if having measured serum creatinine

Chronic kidney diseases– was considered when there was (1) persistent glomerular filtration rate <60 ml/min/1.73 m^2 for ≧3 months with or without protein urea or (2) kidney damage manifested by serum creatinine elevation for ≧3 months with or without decreased glomerular filtration rate or patient had body swelling or decrease urine amount lasting 3 months excluding other cause of body swelling and evidence of kidney injury like elevation in serum creatinine + shrunken bilateral kidneys or increase kidney size in the presence of known risk factor causing enlargement of kidney disease(like DM,HIV) and/ or decrease urine amount and/or proteinuria lasting 3 months.

Acute on chronic kidney diseases: when acute kidney injury occurred on known or patients who had chronic kidney diseases showing more than 0.3 mg/dl serum creatinine variability in 24 hours and patient had medical record showing renal ultrasound of shrunken kidneys and have concomitant acute insult like volume loss or infection leading to creatinine rise or unstable serum creatinine upon admission.

Glomerulonephritis: when hematuria and /or proteinuria + RBC casts and/or clinical picture of renal injury like body swelling and could be asymptomatic in the presence of known risk factor for glomerular injury like high blood pressure and proteinuria and/or RBC cast or gross hematuria and/or having body swelling starting from the face in the presence of proteinuria or RBC cast or decrease urine amount or deranged serum creatinine.

Gross hematuria- Redish discoloration of urine

Hematuria- when there was 3 or more RBCs in urine

Presence Proteinuria- when there was any degree of protein in urine bydipstick

Massive proteinuria- when proteinuria of+3 on dipstick occurs

History of kidney disease: when patient report history of body swelling or had confirmed kidney disease by health care provider or has follow up with medical record at hand.

Pyelonephritis when a patient have flank pain, fever, and WBC cast in urine or WBC in urine of >=5WBC/HPF in males and >= 10WBC/HPF in unspun urine females or leukocytosis with or without lower urinary tract infection.

Tubulointerstitial nephritis whenpatient took drug causing tubular injury or develop drug allergy with renal function derangement, electrolyte and acid base disturbance or had peripheral blood eosinophilia or clinical pictures with fever, rash in the setting of drug induced kidney injury.

Drug use: The use ACEI, NSAID and Aminoglycosides before noticing of current kidney problem

Previous Medical history

Previous heart failure history

Diabetes mellitus

Hypertension

Presence of objective hypertension when systolic or diastolic blood pressure measured become >= 140/90 mmgh

GFR estimation by Cock-Croft Gaultequation was determined by:

$$\text{GFR} = \frac{[(140-Age)*weight\ in\ kg]}{(72*serum\ creatinine\ in\frac{mg}{dl})}$$

Multiply by 0.85 for a woman

Duration of stay in ward: Period from admission to discharge of patient

Anemiadefinedby hemoglobin (Hb) <13.0 g/dL for men and Hb<12.0 g/dL for women.

Prerenal AKI:renal injury that occurs due to inadequate renal plasma flow and intraglomerular hydrostatic pressure to support normal glomerular filtration. The presence of hypovolemia decreased cardiac output, and medications that interfere with renal autoregulatory responses such as nonsteroidal anti-inflammatory drugs (NSAIDs) and inhibitors of angiotensin II.

Intrarenal AKI:diagnosedafter exclusion of prerenal and postrenal causes and show deranged renal function like rise serum creatine and signs of body swelling starting from face and/or and possible cause of renal injury identified

Postrenal AKI: renal injury due to obstruction distal to the kidney leading to drop in GFR or rise of serum creatinine by 0.3 mg/dl or have associated renal u/s showing obstruction to renal out flow tract or hydronephrosis.

Shrunken kidney:when size of both kidneyswas < 8.5 cm by renal ultrasound byradiologist

Treatment outcome:

Improved: when patient serum creatinine drops from the initial value on admission by more than 0.3mg/dl and patients body swelling decreases or become free of body swelling.

Same: when the renal creatinine clearance remains within 0.3mg/dl of admission value.

Referred: when patient need dialysis and sent to centers delivering the service

Current smoker: Adults who have smoked 100 cigarettes in their lifetime and currently smoke cigarettes every day or some days

4.9 Data collection procedures (instrument, personnel, data quality control)

Before data collection data collectors were trained about how data collection, procedure to follow and how to fill each question by the principal investigator. Patient history and physical exam was taken by interview at admissionand laboratory data relevant to the study and kidney disease were taken at admission and repeat renal function after 24 hours and patient is followed until discharge and necessary data from chart are reviewed.Data was collected from each study subject using structured questionnaire attached at end of this document.

Data collectors (2) were medical doctors who have the experience in giving service for medical patients(year I &II residents one each), the quality of data was maintained by updatingthe data collectors of about the objective of study, specific questions and methods of collecting relevant data included by principal investigator.

The first 10 participants was pretested to assess the data collection instrument on answering the objective of the study ; its cultural appropriateness and was not included in the study.

The principal investigator had supervised the data collection process.

Data quality assurance: - the quality of data was maintained by updating the data collectors of about the objective of study, specific questions and methods of collecting relevant data included by principal investigator

4.10 Data processing and analysis

Data was checked for completeness, consistency and entered into and analyzed using SPSS version 20. Percentages and proportions were calculated to demonstrate trends of admission and risk factors associated with kidney diseases.

Tables and graphs were used to illustrate the distribution and amount of occurrence of the dependent and independent variables.

4.11Ethical consideration

The purpose of the study was explained to all study participants and written informed consent wasobtained. Questionnaires were kept secure and confidential. A written ethical clearance was obtained from JUSH ethical clearance committee.

Chapter 5. Results

5.1 Socio-demographic characteristics

The study comprised of 97 clinically diagnosed kidney diseases admitted to medical wards during the study period. Fifty-three (53%)of them were males and 52.6% were rural residents. The mean age of the study participants was 43± 17 and 51% were younger than 40 years. Regarding to educational status 52% wereilliterate and 3% attend tertiary education. Only 43% of participants were farmers.

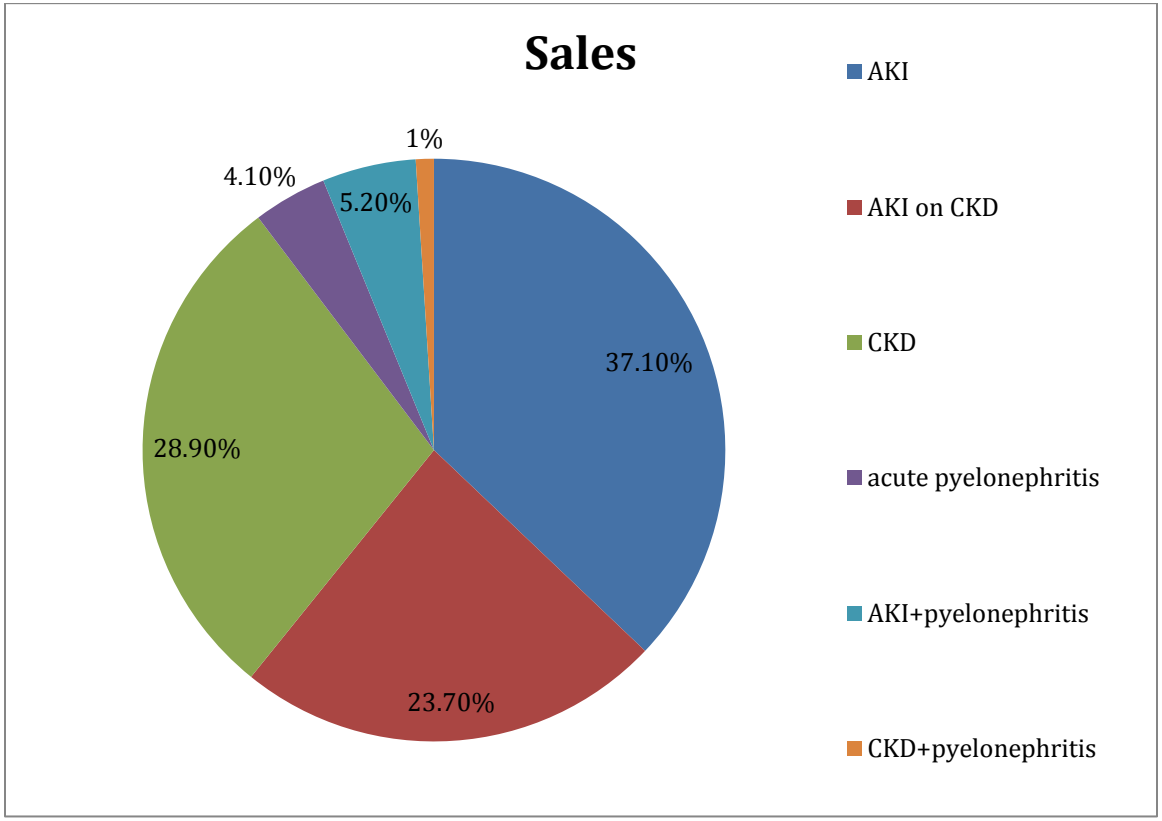
Table 1. Socio-demographic characteristics of kidney disease patients admitted to JUSH, February, 2015 to July, 2015

Sociodemographic characteristics of patient	category	frequency	Percentage (%)
Age of patient	<19	3	3.1
	20-29	18	18.6
	30-39	29	29.9
	40-49	12	12.4
	50-59	12	12.4
	>=60	23	23.7
Sex	Male	52	53.6
	female	45	46.4
Educational status	illiterate	52	53.6
	informal	17	17.5
	primary	15	15.5
	secondary	10	10.3

	tertiary	3	3.1
Marital status	single	16	16.5
	divorced	6	6.2
	married	60	61.9
	widowed	15	15.5
address	Urban	46	47.4
	Rural	51	52.6
Occupational status	farmer	42	43.3
	merchant	15	15.5
	governmentem ployee	10	10.3
	day laborer	6	6.2
	housewife	13	13.4
	other	11	11.4

From the 97 patients 37.1%, 28.9%, 23.7%, and 10.3 %% was having acute, chronic kidney diseases, acute on chronic kidney diseases and acute pyelonephritis respectively. 71.6% of participants had intrarenal injury. Diabetes mellitusand pyelonephritis was found in10.3% and 10.3% of cases each.

Pie chart 1. Shows pattern of admission of kidney diseases at JUSH from February 2015-July 2015



From the97 study participants; 68 of them had a component of acute kidney injury and 76.4% of them had intrarenal kidney injury.

5.2. Clinical characteristics

Major presenting symptoms were body swelling (59.8%), flank pain in 54.6%, decrease urine amount (60.8%), Redish discoloration of urine (22.7%). Common risk factors/comorbidities identified were hypertension and diabetes detected in 39(40.2%) and 15 (15.5%) of cases respectively. Anemia was found in 68(70.1%) of patients. Among Participants, 52(53.6%) had proteinuria, 10(10.3%) RBC cast, 18(18.6%) WBC cast, 46(47.4%) increased urine WBC for both sex; 9.3% were previous smoker. The total white cell count was increased in 35(36.1%) and decreased in 3(3.1%) of patients. Only 13.4% of the participants had BMI>25with the rate of obesity of only 1% and 28.9% were found to be underweight

Table 2. Clinical characteristics of kidney patients admitted to JUSH from February, 2015 toJuly 2015

Clinical characteristics		frequency	Percentage (%)
Body swelling yes		58	59.8
No		39	40.2
Decreases urine outputyes		59	60.8
	No	38	39.2
Redish urine	Yes	22	22.7
	No	75	77.3
History of drug intake	NSAIDS(prn)	11	11
	ACEI	4	4
	Aminoglycosides	0	0
	Other	0	0
Flank pain	Yes	53	54.6
	No	44	45.4
Smoking	Yes	9	9.3

	No	88	90.7
Hypertension	Hypertensive	39	40.2
	Prehypertension	56	59.7
	Normotensive	2	2.1
Body mass index	<18.5	28	28.9
	18.5-24.9	56	57.7
	25-29.9	12	12.4
	30-34.9	0	0.0
	35-39.9	1	1.0
Diabetic	Yes	15	10.3
	No	82	89.7
Presence of proteinuria	Yes	52	53.6
	No	45	46.4
Urine WBC	Normal	51	52.6
	Increased	46	47.4
Presence of WBC cast in urine	Yes	18	18.6
	No	79	81.4

Presence of RBC cast in urine	Yes No	10 87	10.3 89.7
Serum WBC count	Normal Elevated Decreased	59 35 3	60.8 36.1 3.1
Presence of hematuria	Yes no	58 39	56.7 43.3

From patients diagnosed with chronic kidney diseases wasfound 13(44.8%) in stage 5, 8(27.5%)in stage 4, 7(24.1%) in stage 3, 1(3.4%) in stage1 and there was no case in stage 0 and stage 2.

Table 3.Show estimated GFR of chronic kidney diseases patients admitted at JUSH from February 2015- July 2015

Estimated GFR of patients(ml/min/1.73m2)		Frequency	Percentage (%)
Stage 0	>90 and no proteinuria	0	0
Stage 1	>90 + proteinuria	1	3.4
Stage 2	60-90	0	0
Stage3	30-59	7	24.1
Stage 4	15-29	8	27.5
Stage 5	<15	13	44.8
Total		29	100

The treatment delivered include diuretics in (40%) ,fluid resuscitation(21.6%), anti-hypertension(28.9%),antibiotics(28.9%) , blood transfusion(4.1%) and insulin(10.5%). The outcome of treatment of patients was improved in 75.3%, same 8.2%, death10.3% and referred 6.2% at discharge. The average hospital stay was 8± 5.4 days.

Table 4.Treatmentoutcome of admitted kidney diseases patients from February 2015-July 2015

Treatment outcome of patients	frequency	percentage
Improved	73	75.3
Same	8	8.2
Dead	10	10.3
Referred	6	6.2
total	97	100

When outcome of patients were seen at discharge after dichotomized to death and alive, the mortality has shown increased with lower GFR level (OR 0.874,95% CI 0.791,p=0.008) and higher admission creatinine level(OR 1.236,95%CI1.075-1.42,p=0.003 and creatinine after 24 hours of admission (OR 1.279, 95%CI 1.090 -1.502, p=0.003). It was found that only admission serum creatinine was found to be independent predictor of mortality (AOR =1.257; 95% CI =1.047-1.509, P=0.014).

Chapter 6 Discussion

Kidney diseases admission is common in this study area. From the total 1029 patients admitted to medical wards to JUSH in the study period; kidney disease accounts for 9.4%.From these kidney disease admissions acute kidney injury accounts for 37.1% and CKD for 29%.

From these 97 kidney diseases; 29% were having chronic kidney disease which is higher than study done at Butajira in 2013 which was 23.8%. high blood pressure was found in 40% of kidney disease and diabetes mellitus in 15.5% in this study compared to study done in Congo in 2009 diabetes mellitus was found in 39% of chronic kidney disease while hypertension was found comparable to this study which was around 44%. This may show that hypertension is the major cause chronic kidney disease in our set up compared to the western population where diabetes mellitus predominate. Anemia was found in 70.1% of participants; which can be explained by patients seek medical service in late stage as this study show patients with chronic kidney disease; come to hospital at stages three and above accounting for 99% and the low body mass index found in significant number of patients may increase it.The study shows that anemia is one major morbidity with kidney disease but did not increase hospital mortality with (p-value 0.869; 95 CI)which is decreased by treatment delivered ,availability of blood bank in the hospital but due to the small numberof participants may limit this generalization.

The pattern of acute kidney injury in this study shows high Intrarenal. Intrarenal was the leading cause followed by prerenal and post renal each accounting for 72.6%, 22%and 5.4% which was comparable to the Madrid study on acute kidney injury which was 69%, 21% and 10%, respectively. Among 136 patients admitted with acute kidney injury at TikurAnbesa referral hospital sepsis was the leading cause were case fatality was 33.8% which is very high compared to this study (10%) where multiple organ failure found to be leading cause of death which could be explained this study did not involve nonmedical patients like septic abortion which is leading cause of death in the fore more study. This high intrarenalacute kidney injury

frequency could be due to high frequency of patients with hypertension found in 40% of patients and the study did not include cases admitted to nonmedical ward which is one of limitation of this study.

From all study participants admitted to the hospital with kidney diseases were discharged73(75.3%) improved, 8(8.2%) same, 10(10.3%) dead and 6(6.1%) referred to dialysis centers. From the total 10 deaths in this study; 7 were having chronic kidney disease and 3 were having acute kidney injury. The possible immediate cause of death was multiple organ failure and respiratory failure in 9(90%) and 1(10%) of deaths, respectively. All except referred patients were treated conservatively and the overall mortality was 10.3%. The adverse outcome prognostic factors found include high blood pressure,anemia, stage three and above chronic kidney disease and older age of patients; even though did not show stastical significancewith inhospital mortality. This is in line with study done in India and TikurAnbesa hospital showing multiple organ failure as immediate cause of death and septic shock in majority of cases. The average hospital stay for the patients was 8 days.

It was also found that mortality of patients admitted with kidney disease was increased with lower stage of CKD, higher admission and after 24 hour of admission serum creatinine. Admission serum creatinine was found an independent predictor of mortality among patients admitted with kidney disease in this hospital.

Conclusion

This study found that the total kidney disease admission to wards in this hospital accounts 9.4% percent of all admissions. The majority of cases was acute kidney disease and patients with chronic kidney disease seek medical service at late stages of CKD which is poor prognostic; leading to high mortality and morbidity and its treatment is demanding which need renal replacement therapy which not available in this setting. Admission serum creatinine also predicts mortality among patients with kidney disease.

Recommendation

- Early screening and treatment of hypertension and diabetes mellitus should be done to prevent or delay progression of kidney disease.
- There should be renal replacement therapy unit in this hospital due to magnitude of the problem.
- Further study should be done to assess the risk factors associated with kidney disease which is key for prevention and early screening which may decrease the morbidity and mortality of kidney diseases.

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annexs

consent form

CONSENT FORM FOR STUDY PARTICIPANTS

Jimma University College of Public Health and Medical Sciences.

A. Consent form In English

A).INFORMATION TO THE PARTICIPANT

Interview code no _____

Greeting and self-introduction and consent

Greeting: - Good morning/afternoon.

My name is _____. I am a physician working in JUSH. We are conducting a scientific research on the patterns of kidney diseases admissions. Therefore, I would like to inform you that you are one of the potential participants in this study. This study requires you to participate so that important information can be obtained regarding your health. Your participation is entirely based on your willingness and your refusal doesn't affect the service you get from us in any way. If you are willing to participate in the study, we will interview you and review your chart for some health related questions.

The information gathered will be used for writing a proposal for partial fulfillment of a specialty certificate in Internal Medicine at Jimma University. Your participation is only determined by you .Here, I want to assure you that any information obtained from you and your medical records will remain confidential indefinitely. You won`t be asked any fee during the study.

You can dropout any time during the study and also you have full right to ask us questions. If, at any time, you have questions about the study, you may contact principal investigator with (+251-912424364).

Do you want to participate in the study?

I, _____have been told of the contents of this research form and I have adequate information about the research and understood it; and I do agree to participate in this Research study.

Name of Participant …….

Signature of Participant _____ Date_____

Thank you!

Name of interviewer_____ Date_____/_____/_____

Questionnaire

Identification and sociodemographic profile

Hospital card number_____

1. Age of patient _____
2. Sex of patient Male ☐ Female ☐
3. Educational status of patient Illitera☐ Read and write ☐Primary ☐
   SecondaryDeg☐e holder ☐
4. Annual income per year----------
5. Marital status Single I☐orced Married☐/idowed ☐ ☐
6. Address Urban ☐ral ☐
7. Occupational status
   Farmer ☐erchant Gov☐mployee Daylab☐erHousewife O☐er _____ ☐

II. Medical history of kidney diseases of participant

8. Do you have body swelling yes no ☐ ☐
9. If yes to No.1 ,where did it start from

   Bilateral legs ☐e abdo☐n all at san☐time ☐

10. How many pillows you use while sleeping------
11. Do you have any history of kidney diseases? yes☐ no ☐
12. What is duration of diagnosis of kidney diseases (in months)? < 3 month☐3 months☐
13. Do you have flank pain yes no☐☐
    ☐

14. Do you have decrease in urine amount? yes no ☐

15. if yes to question 14, estimate per 24hours UOP-------ml/day

16. Any history of redish urine yes ☐ no ☐

17. Any history of smoking yes ☐ o ☐

18. If yes to question 3, how many packs year---------

19. Do you have history of hypertension yes ☐ no ☐ if yes duration of diagnosis of hypertension_____

20. If yes to Q 19 , do you take any treatment for it? If yes mention drug used----

21. Was any time told to be diabetic? yes ☐ no ☐, if yes duration in weeks----

22. Do you have any family historyof kidney diseases? yes ☐ o ☐

23. Any recent history of drug intake in last 2 weeks?

24. If yes, to question 23, mention----------

III. Physical examination

25. B/P_____ PR_____Temperature_____ RR_____

26. Weight _____height_____ BMI_____

27. Estimated GFR _____

28. Palmar or conjunctiva pallor_____ Microscopy

29. Result of urine analysis(dipstick)

Protein_____ Cells = --------WBC/HPF

Glucose_____ --------RBC/HPF

Ketone_____ If other, -----

CASTS = WBC ---- hyaline-

RBC ----- muddy brown ----

Granular cast-----

30. hemoglobin level(Hgb)_____gm/dl, WBC _____ cells/ul
31. Serum glucose level(FBS)_____ mg/dl
32. Serum creatinine (mg/dl) at admission_____-after 24 hrs_____,BUN_____
33. Serum electrolytes (meq/l) if determined K+__ Na+__ Cl-__ phosphate level____
34. U/S (size of both kidney) Normal size ☐ decreased size ☐ enlarged ☐
35. Final diagnosis----------
36. Treatment provided : Fluid resuscitation _____ antihypertensive if given any_____
    Antibiotics if given_____. Other treatment if any mention_____
37. Duration of hospital stay in days_____
38. Outcome at discharge Improved same condition ☐ dead ☐ Referred for better treatment ☐
39. If outcome is death, immediatepossible cause of death----------

Name of data collector ---------- Date ----------Signature of data collector----------

Principal investigater_____ date_____sign_____