THE BURDEN OF FIBROMYALGIA IN END-STAGE KIDNEY DISEASE PATIENTS UNDERGOING MAINTENANCE HAEMODIALYSIS – A MULTICENTRE STUDY

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MBChB. (UON)

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I, **Dr. Jeanette Jepleting Yego,** do declare that this dissertation is my original work and has not been submitted for academic or career pursuits in any other institution.

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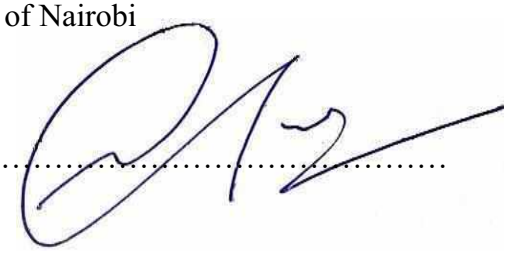
Signed: ……  Date: 13/10/2021

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LIST OF ABBREVIATIONS AND ACRONYMS

ACR- American College of Rheumatology

CCC- Comprehensive Care Clinic

CKD- Chronic Kidney Disease

CNS- Central Nervous System

CSF- Cerebrospinal Fluid

CSS- Central Sensitization Syndrome

CWP- Chronic widespread pain

DM- Diabetes Mellitus

EEG- Electroencephalography

ESKD- End Stage Kidney Disease

FDA- Food and Drug Administration

FIQ- Fibromyalgia Impact Questionnaire

FIQR- Revised Fibromyalgia Impact Questionnaire

FM- Fibromyalgia

fMRI- Functional Magnetic Resonance Imaging

FMS- Fibromyalgia syndrome

GN- Glomerulonephritis

HCV- Hepatitis C Virus

HD- Haemodialysis

HIV- Human immunodeficiency virus

IBS- Irritable Bowel Syndrome

KNH- Kenyatta National Hospital

NCDs- Non communicable diseases

NH- Nairobi Hospital

NSAIDs- Non-steroidal anti-inflammatory drugs

OA- Osteoarthritis

OCD- Obsessive Compulsive Disorder

PKC- Parkland's kidney center

PTH- Parathyroid hormone

PTSD- Post-traumatic stress disorder

QoL- Quality of Life

RA- Rheumatoid Arthritis

RLS- Restless Leg Syndrome

RMDs- Rheumatic and musculoskeletal disorders

SF-36- 36 Item short form health survey questionnaire

SLE- Systemic Lupus Erythematosus

SSS- Symptom severity scale

T2DM- Type 2 Diabetes Mellitus

UA- Uric Acid

U.K.- United Kingdom

U.S.A.- United States of America

UoN- University of Nairobi

ABSTRACT

Background: Fibromyalgia (FM) is a disease seen in rheumatology and is getting increasingly acknowledged. It presents with chronic widespread pain and specific tender points on clinical examination. The cause is unknown but its aetiopathogenesis is multifactorial. It has several associated symptoms which include fatigue, sleep disorders and depression. These symptoms may remarkably affect the quality of life of affected individuals. The burden of chronic kidney disease (CKD) is increasing in our set up due to an increase in non-communicable diseases (NCDs) such as diabetes and hypertension. The prevalence of fibromyalgia in end stage kidney disease (ESKD) patients undergoing maintenance haemodialysis (HD) in our setting is not known**.**

Objective: The aim of this study was to determine the burden of fibromyalgia in patients with end stage kidney disease patients undergoing maintenance hemodialysis.

Materials and Methods: This was a multicenter cross-sectional study that was done at the renal units in Kenyatta National Hospital (KNH), Nairobi Hospital (NH) and the Parkland's Kidney Center (PKC). The study participants were adults undergoing maintenance hemodialysis and a total of 167 patients were studied. Proportionate random sampling was done to recruit patients from each centre. A written informed consent was obtained. A study proforma that included demographic characteristics and clinical details were administered to patients coming in for maintenance haemodialysis. The diagnosis of fibromyalgia was established using the 1990 American College of Rheumatology criteria. The revised Fibromyalgia Impact Questionnaire (FIQR) was administered to the group of patients with fibromyalgia to evaluate severity of the disease. Quality of life was determined by administering the 36-item short form health survey.

Data from the study proforma were assigned unique codes. After data cleaning and validation, data analysis was performed using SPSS version 25.0 with the help of a statistician. Categorical data of the study population such as gender, marital status and level of education are summarized into proportions. Continuous variables such as age, duration of dialysis in months and frequency of dialysis per week are summarized into means, medians and standard deviations.

The prevalence of fibromyalgia is presented as a percentage in each center. The severity of fibromyalgia is presented as a proportion in each class (mild, moderate and severe). The quality of life is expressed as a proportion of those with poor quality of life (an average score of less

than 50%) in individuals with ESKD undergoing maintenance hemodialysis. Statistical differences between QoL in patients with and without fibromyalgia was assessed using the Student t-test. Logistic regression analysis was applied to estimate the probability of being in good health. A P value of ≤0.05 was considered significant for all statistical tests.

Results: A total of 167 patients were recruited into the study. The prevalence of fibromyalgia in ESKD patients undergoing haemodialysis in the three centres was 18.0% (n=30). The mean age of these patients was 53.8 with a female preponderance of 66.7% (n=20). The median duration of dialysis was 22 months, and patients with fibromyalgia had dialysed 12 months longer than those without fibromyalgia. A majority of the patients had hypertension and diabetes as the underlying aetiology for development of ESKD. There was however no association between fibromyalgia and underlying aetiology or frequency of dialysis per week. The mean FIQR score was 50.3. The majority of patients diagnosed with fibromyalgia had moderate severity of symptoms. The patients diagnosed with fibromyalgia were six times more likely to have a poorer quality of life than those without fibromyalgia and this was statistically significant ($p<0.001$).

Conclusion: In our study the prevalence of fibromyalgia in CKD was found to be 18%. This is higher than the baseline population prevalence of 1%. Majority of the fibromyalgia patients had mild to moderately severe disease. Patients with fibromyalgia in ESKD on haemodialysis are six times more likely to have a poorer quality of life than those without fibromyalgia in ESKD on haemodialysis.

1.0 CHAPTER ONE: INTRODUCTION

Fibromyalgia syndrome (FMS) is a disorder encountered in rheumatology that presents with chronic widespread pain (CWP) and increased sensitivity to pressure. The pain is usually accompanied by other central nervous system (CNS) symptoms that include fatigue, anxiety, headache and sleep disorders, in which all causes have been excluded. These factors have substantial effects on the quality of life of affected individuals. Clinical exam is accompanied by enhanced tenderness at tendon and muscle insertion sites, known as tender points [(1)].

Fibromyalgia (FM) was previously known as "fibrositis", a term developed in 1904 by Sir William Gowers on the assumption that the muscular pain was inflammatory in nature [(2)]. He also closely related the pain with associated features that include sleep disorders and fatigue. This assumption was later disputed and Dr. P.K Hench came up with the term Fibromyalgia in 1976, and it remains in use to date [(3)].

In 1990, a criterion for diagnosing of FMS was developed by the American College of Rheumatology (ACR) [(4)] based on a modification of a 1977 description by Smythe and Moldofsky [(5).]

FMS is a condition with clearly defined clinical entities but whose aetiology is unknown. It has several underlying pathophysiological mechanisms.

FMS has a preponderance to affect females more than males and tends to affect the older population more than younger individuals [(6)]. FMS has a relapsing and remitting pattern of disease, with an increase in prevalence with increasing age.

Fibromyalgia is hypothesized to be an interplay of hereditary and environmental factors. Postulated environmental triggers are infectious agents such as Human Immunodeficiency Virus (HIV), Lyme's disease and Hepatitis C virus [(7)].

Studies have shown that the central nervous system (CNS) mediates an increase in sensory input in fibromyalgia, and this is noted to be associated with central sensitization [(8)].

The burden of end stage kidney disease (ESKD) in our set up is high with most of these patients depending on long-term haemodialysis (HD). It is approximated that more than 750 million people in the world are affected by kidney disease [(9)], and over 2 million people are on haemodialysis for ESKD [(10)].

Musculoskeletal (MS) disorders have been shown to be incessant disorders of renal disease, are multifactorial and a lot of findings suggest the risk of these disorders intensify with duration on haemodialysis [(11)]. These musculoskeletal disorders are more common in patients on chronic

HD and negatively impact on quality of life. They include spondyloarthropathies, amyloid deposition and osteonecrosis [12].

Pain is the commonest complaint reported by ESKD patients on hemodialysis and there is paucity of data on specific causes including FM [13]. This can be distressing to patients and it requires that adequate assessment and management of the pain is done if successful therapy is to be achieved.

The overall prevalence of FM in the general population is 2-14% [6, 13], while data in our local set-up has shown that the overall prevalence is 1% [14]. Studies in the past in United States of America, Turkey, Iran, Brazil and Egypt have shown 3.9%–51% prevalence in hemodialysis patients [15-20,21]. In the Brazil study done by Couto et al, where a total of 311 patients were studied, the prevalence of fibromyalgia was noted to be 3.9% and its presence contributed to a worse quality of life [18].

Prevalence of FM in chronic HD patients in our set-up is unknown. The CWP and associated fatigue sleep issues and anxiety seen in FMS remarkably affects the quality of life of those with FM. It is therefore important to identify FMS in this group of patients with a goal of improving overall holistic management.

2.0 CHAPTER TWO: LITERATURE REVIEW

2.1 Definition of Fibromyalgia

Fibromyalgia is a common rheumatic condition encountered in clinical practice.

Based on the ACR 1990 diagnostic criteria [4], fibromyalgia is defined as a history of widespread pain for > 3 months and is based on:

a) Pain in 4 quadrants; On the left and right side of the body, Above and below the waist

b) Pain along the axial skeleton (cervical vertebrae or anterior chest or thoracolumbar vertebrae)

c) Tenderness (pain that is elicited on physical exam in more than 11 out of 18 specific tender points on the body)

The above diagnostic criteria were initially developed for research and it had limitations in that it omitted associated symptoms [22].

In trying to mitigate this, in a diagnostic criterion published in 2010/2011, the ACR did a multicenter study to try and establish practical ways of diagnosing FM. However, this criterion diverted away from the core tenet of pain that describes fibromyalgia and also did not have explicit designated areas for pain assessment [23].

In 2016, there was a revision to the 2010/2011 diagnostic criteria for FMS with just the addition of generalized pain in 4 out of 5 regions to the criteria [24].

Despite the current revisions, the 2010/2011 and 2016 criteria have not been validated for use in tertiary hospitals. The 1990 ACR diagnostic criteria has been the most accepted and established criterion for use in all clinical settings as it has a sensitivity of 88.4% and a specificity of 81.1% [4].

2.2 Epidemiology of Fibromyalgia

The incidence of FM correlates with age and sex. It has a higher prevalence in females, and incidence rises with age, peaking at middle-age (50-59) and reduces in older individuals (80 years and above) [25]. In Wichita Kansas, research found the overall incidence of FM to be 2%. It was established that it was more prevalent in women and the prevalence increased with age (40 years and above) [6]. In Europe, a survey in 5 countries based on the 1990 ACR diagnostic criteria [4], the prevalence of FM was found to be 2.9% to 14% in rheumatology outpatient clinics [13].

In Norway, a population-based sample of females falling in the ages 20-49 was reviewed for 5 and half years to determine the prevalence of FM in this population. In the females who did

not have any musculoskeletal pain at the start of the study, the prevalence was found to be at 3.2%, and 25% in those females who reported pain at the inception of the research. The risks for developing FM were identified as: pain for more than 6 years, uneducated individuals, depression and presence of ≥ 4 symptoms linked to FM such as abnormalities in bowel function, sleep disturbances, tingling and subjective swelling of limbs [26].

Dokwe *et al*, established the prevalence of FM at about 11% in patients attending the medical outpatient and rheumatology clinics in Kenyatta National Hospital (KNH) [14].

Mumo *et al*, in 2013 found the prevalence of FM in adult HIV patients attending the outpatient clinic at KNH to be 17.9% [27].

Umar *et al*, in 2017 found the prevalence of FMS among diabetics attending the diabetic outpatient clinic at KNH to be 27.9%, with a higher female preponderance at 80% [28].

A study done in the United States demonstrated that the relatives of families with a higher burden of FM were likely to be diagnosed with mood disorders especially major depression or bipolar disorder. This coaggregation of FM with associated disorders may imply a genetic mechanism to FM [29].

2.3 Aetiology and Pathophysiology of Fibromyalgia

The definite cause of FM is unspecified, but is believed to be interplay of hereditary factors and environmental factors. The pathophysiologic hallmark is central sensitization, whereby these patients tend to have an exaggerated pain response to stimuli [30]. Individuals with FM were previously thought to have certain distinct tender points which formed part of the 1990 ACR diagnostic criteria [4]. This notion has now been disputed in newer studies that show patients diagnosed with FMS have tenderness in almost every part of the body [31].

Studies have shown that these patients are noted to have abnormal sleep patterns. Electroencephalographic (EEG) pattern abnormalities have been observed some of which include intrusion of alpha waves into slow delta waves [32].

Studies done on the cerebrospinal fluid (CSF) of patients diagnosed to have FM found that the levels of norepinephrine and serotonin were reduced [33]. Conversely, the levels of substance P were found to be 2-3 times more than in normal subjects. Substance P is an amine involved in sensitization of neurons to the effects of excitatory neurotransmitters by virtue of it being a neuromodulator [34].

The levels of glutamate in the parts of the brain involved in conveying of pain signals were found to be elevated in individuals with FM. Glutamate is the principle excitatory neurotransmitter in the nervous system. Functional Magnetic Resonance Imaging (fMRI) is

being used as a diagnostic instrument in resource rich settings to diagnose FM. It has been found to give useful information on how various stimuli are perceived as pain in these individuals. fMRI has also been helpful in ascertaining how other CNS symptoms impact pain perception in individuals with FM [35].

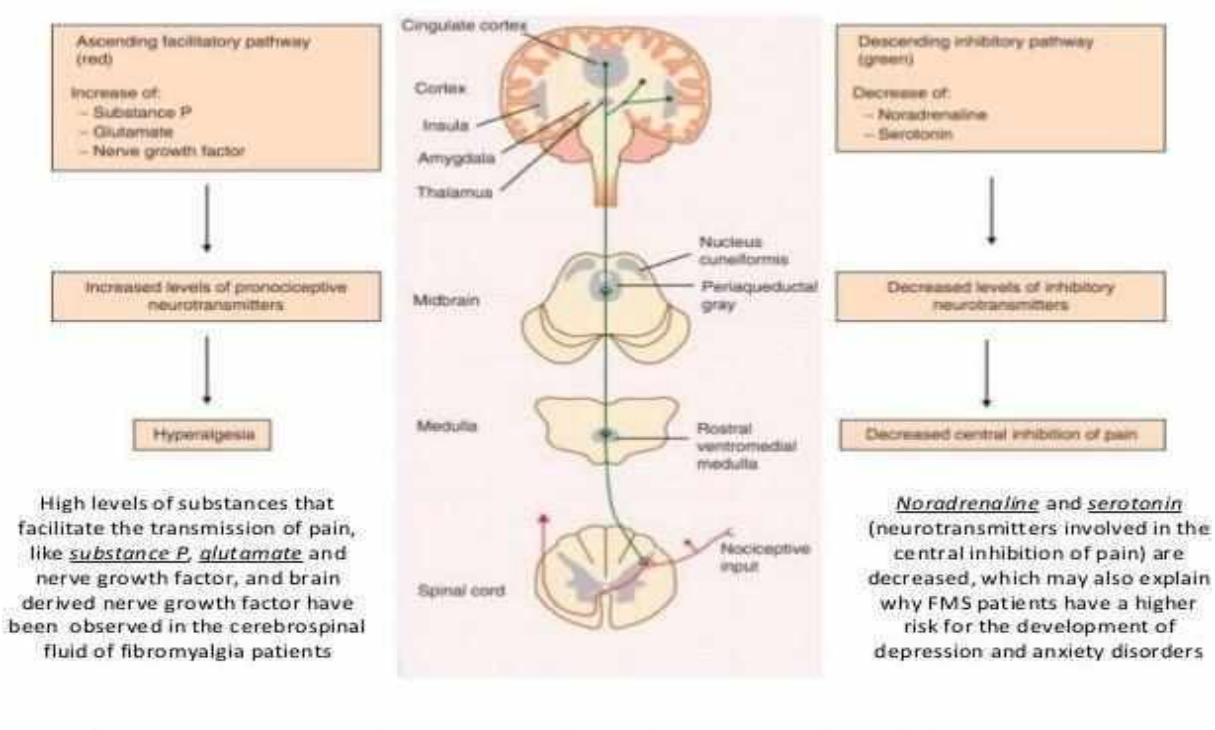

Figure 1: Pathophysiological mechanisms in Fibromyalgia [36]

2.3.1 Risk Factors and Co-Morbidities Associated with Fibromyalgia

Several risk factors and comorbid conditions are suggested to be involved in the origin of FMS, as no exact cause has been identified. Rather than FM being a single entity, many studies done have shown that fibromyalgia is in fact a disorder that presents with chronic widespread pain and other symptomatology such as anxiety and sleep disturbances. Patients who suffer from fibromyalgia usually have a history of chronic generalized pain, and correlated CNS complaints that include mood disorders, fatigue, anxiety and sleep disorders [37].

Infections such as viral hepatitis, Lyme disease and HIV, have been linked to the pathogenesis of FMS. [7].

Studies done have shown that individuals who suffered physical trauma from road traffic accidents, especially those who sustained C-spine injuries, later developed FM [38].

Psychological stress such as a major traumatic event in an individual's lifetime or after deployment to war, is also suggested to be a risk factor in pathogenesis of FM [39].

Individuals who suffer from FMS also have a family history of long-standing pain. Studies have shown that 1st degree relatives of patients with FMS have 8 times the risk of developing chronic pain syndromes [40]. Though females are more affected by FM than men, there is paucity of data to suggest that sex hormones contribute to the risk of developing FM.

In secondary FM, rheumatologic conditions such as rheumatoid arthritis (RA), osteoarthritis (OA) and systemic lupus erythematosus (SLE) have been linked to FMS [14], [41]. These autoimmune conditions are known to predispose to chronic kidney disease. Patients on haemodialysis also develop other rheumatologic conditions as a result of renal osteodystrophy. These conditions include spondyloarthropathies, osteonecrosis and amyloid deposition in tissues including the joints, which may predispose to secondary FM [12].

Psychiatric disorders shown to have an association with fibromyalgia include major depression, anxiety, post-traumatic stress disorder (PTSD) and obsessive-compulsive disorder (OCD) [42].

Commonly recognized somatic disorders associated with FMS are chronic pelvic pain syndrome, irritable bowel syndrome (IBS), interstitial cystitis and temporo-mandibular joint (TMJ) disorders [43], [44], [45]

2.4 Diagnosis of Fibromyalgia

Diagnosis of FM can be complex because it is mainly a clinical diagnosis, yet identifying this debilitating condition is key to its successful management. The diagnosis of FM is according to the 1990 ACR diagnostic criteria which includes [4]:

a) **Chronic widespread pain for 3 months or more**. Widespread pain being pain in 4 quadrants i.e. the left & right side of the body, above & below the waist and axial skeletal pain (cervical vertebrae or anterior chest or thoracolumbar vertebrae)
b) **Tenderness (pain elicited on physical examination of ≥11 of 18 tender point sites on the body).** This is achieved by the clinician applying enough pressure to cause blanching of the thumb i.e. approximately 4kgs.

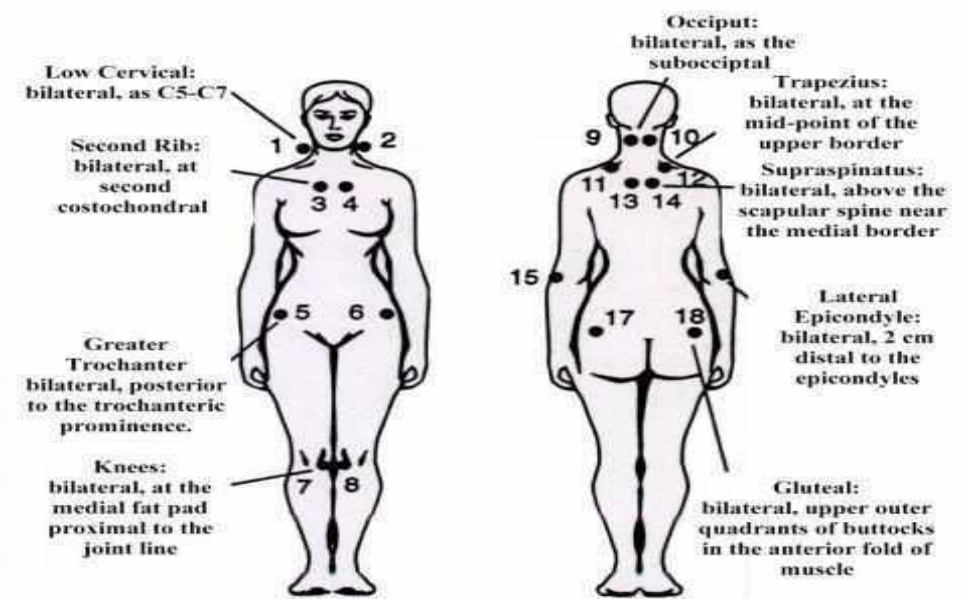

Figure 2: Tender points in Fibromyalgia [4]

The severity of fibromyalgia in patients is assessed using the revised fibromyalgia impact questionnaire (FIQR). This is a validated questionnaire recommended for assessing function and quality of life in patients in whom a diagnosis of FM has been made [46]. The FIQR has 3 sections:

i. function
ii. overall impact
iii. symptoms

2.4.1 Scoring System for FIQR [46]

Step 1. The total scores for each of the three sections is calculated

Step 2.

a) **Function domain** total (0-90) is divided by 3 (maximum limit of 30)
b) **Overall impact domain** total (0-20) remains as it is
c) **Symptom domain** total (0-100) is divided by 2 (maximum limit of 50)

Step 3. Add the three resulting domain totals (a, b and c) to obtain the total score (range 0-100).

Disease severity states in fibromyalgia are then categorized as:

i. Mild 0-42
ii. Moderate 43-59
iii. Severe 60-74
iv. Very severe 75-100

2.5 Renal Manifestations of Rheumatologic Conditions

Most rheumatologic conditions are inflammatory autoimmune diseases that primarily affect the soft tissues and joints, but can also have organ involvement such as the kidneys. The disease modifying drugs and anti-inflammatory analgesics used to treat these conditions predispose to kidney injury and further aggravate the situation.

Said *et al* [47] in 2016 carried out a prospective study carried in KNH to determine the prevalence of CKD in rheumatoid arthritis patients. The prevalence was determined to be at 27.5%.

In a prospective study carried out on of 235 subjects to determine the cause and clinical progression of renal disease in early rheumatoid arthritis, 17% had isolated hematuria at entry, 7.2 % developed persistent proteinuria during the study period (42 months) and 6% had developed elevated serum creatinine. The cause was found to be mostly drug related and isolated hematuria was noted to be an indication of disease activity [48].

Helin *et al.* [49] carried out a retrospective study in 1995 on 110 renal biopsies of RA patients. The number one histopathologic diagnosis was mesangial glomerulonephritis (GN) with 40 of the subjects having it. It was followed by amyloidosis that was found in 33 subjects, 19 of the subjects had membranous GN, 4 subjects had focal proliferative GN, 3 had minimal change nephropathy and 1 subject was found to have acute interstitial nephritis. The patients who had nephrotic syndrome, most were found to have amyloidosis on renal biopsy.

In a population based cohort study carried out in Finland, concurrent renal disease in rheumatoid arthritis had a strong association with increased mortality rates [50].

Lupus nephritis is a frequent manifestation of SLE and accounts for about half of the patients with SLE. Individuals diagnosed with SLE may also suffer from thrombotic microangiopathy due to underlying antiphospholipid antibody syndrome. The histopathologic characteristics of lupus nephritis are a spectrum ranging from mild immune complex disease to diffuse proliferative glomerulonephritis according to the International Society of Nephrology (ISN)/Renal Pathology Society (RPS) classification [51].

Other rheumatic conditions that affect the kidneys include spondyloarthritis with a study showing that up to 35% with ankylosing spondylitis had deranged serum creatinine [52]. Scleroderma is another rheumatic condition with the classical renal manifestation presenting as scleroderma renal crisis. The renal crisis presents with malignant hypertension and acute kidney injury.

Conditions such as sarcoidosis, anti-neutrophil cytoplasmic antibody-associated vasculitis and panarteriitis nodosa are other rheumatic autoimmune conditions that can be complicated with kidney disease. Rheumatologists therefore more often than not work together with nephrologists in the management of these patients.

2.6 Chronic Kidney Disease and Musculoskeletal Manifestations

Metabolic bone disease is a common manifestation in chronic kidney disease (CKD) and manifests as skeletal or extraskeletal disease including blood vessels. Dysregulation in calcium and phosphate metabolism begins early in CKD and progresses with declining renal function. In renal failure, the kidneys are not able to sufficiently clear phosphorous and there is impaired activation of calcidiol. This results in hypocalcemia and hyperphosphatemia with resultant secondary hyperparathyroidism. Secondary hyperparathyroidism exerts two significant effects on the body i.e. bone mineral loss with resultant osteoporosis and extraskeletal calcification. Chondrocalcinosis which is an example of extraskeletal calcification, can lead to development of osteoarthritis in patients with CKD or on HD.

Pseudogout and gout are also common in patients with CKD. Pseudogout is as a result of extraosseous calcification with deposition of calcium pyrophosphate crystals in joints, whereas gout is as a result of hyperuricemia with deposition of uric acid crystals within joint tissue. Hyperuricemia develops due to impaired renal clearance of uric acid.

Amyloidosis is common in patients with CKD on HD. The amyloid composed predominantly of Beta 2-microglobulin protein, is deposited in joints and soft tissues such as ligaments and tendons resulting in bone cysts, tendon deposits and erosive arthritis. This is complicated by attendant joint pain and stiffness. With the current use of high-flux dialysers, this occurrence is now significantly reduced.

2.7 End-Stage Kidney Disease and Fibromyalgia

Chronic kidney disease (CKD) is a global health burden, and it negatively impacts on the health economy. An observational meta-analysis done by Nathan et al. in 2016, determined that the global prevalence of kidney disease stands at about 11-13%, with majority being at stage 3, with a prevalence of 0.1% for end-stage renal disease (ESKD) [53].

Based on the Global Burden of Disease Study done in 2015, kidney disease was placed at position 12 as a frequent cause of death, which translated to 1.1 million deaths globally. The mortality from chronic kidney disease has increased by 31.7% over ten years [9]. CKD is now

known to be an independent determinant to the development of cardiovascular disease further adding to its burden.

In Africa, CKD has been on a tangential rise due to a rise in NCDs such as diabetes mellitus and hypertension that are attributable to obesity and reduced physical activity. Although these are diseases associated with the affluent in society and are more common in urban areas, it is now becoming a public health concern in middle and low-income countries.

In Kenya, Mwenda *et al*. [54] run a cross-sectional study of inpatients in 2018 at a teaching and referral hospital in Kenya and determined the prevalence of CKD to be at 38.6%. Out of these patients, 47.5% who were the majority were in stage 1 and 2 of CKD.

In a cohort study undertaken by Yuceturk *et al*. [15] published in the Nephrology Dialysis transplantation journal in 2005, the prevalence of FM in patients undergoing HD and its relationship with clinical and laboratory parameters was looked at. In this study, a cohort of 122 patients on chronic HD and with diffuse pain for 3 months or more were studied. Each subject was also assessed for tender points. Diffuse pain was described as pain in 4 quadrants of the body including the axial skeleton (neck and back). The prevalence of FM in this cohort was noted to be at 7.4%. The patients on HD with definite FMS had higher Fibromyalgia Impact Questionnaire (FIQ) scores, than the group on HD without FMS ($p<0.01$). Noteworthy, FMS augments functional disability in these patients with negative impacts on quality of life (QoL). The study also noted that females were predominantly affected and no laboratory parameters were linked with FM.

Samimagham *et al*. [16] carried out a study in 2014 on the prevalence of fibromyalgia in two hospitals located in Tehran and Iran. It was a cross-sectional study of 148 patients, both male and female, undergoing maintenance haemodialysis, and aged over 16 years with no collagen vascular disease, liver disease or malignancies. The prevalence of FMS was found to be at 12.2%, with the demographics between the patients with and without FM having no statistical significance.

Abdel *et al.* [17] in a 2013 study, undertook to ascertain the role of Hepatitis C virus (HCV) infection in the occurrence of FMS in chronic HD patients. It included a cohort of 75 Egyptian patients with and without HCV on chronic HD and normal patients with HCV infection. The conclusion was that the incidence of FMS in the group infected with HCV on chronic HD was higher at 16%. The incidence of FMS in the group without HCV on chronic HD was found to be at 8% and the incidence in normal subjects with HCV infection was found to be at 4%.

Musculoskeletal pain is common in patients undergoing haemodialysis and it is usually as a result of CKD-mineral bone disease. The longer the duration on HD, the more the increase in

these complications. This leads to development of conditions such as osteonecrosis and osteoporosis due to secondary hyperparathyroidism, and gout from the resulting hyperuricemia which all have a negative impact on physical functionality. Secondary fibromyalgia may then subsequently develop in the background of these rheumatologic conditions.

A study done by Claudio *et al.* in 2008 looked at prevalence of fibromyalgia and its effect on quality of life on a haemodialysed population in Brazil. The prevalence of FM was found to be 3.9% of the 311 subjects studied and no association was found between FMS and secondary hypeparathyroidism. However, haemodialysis was associated with poorer quality of life [(18)].

A cross-sectional prospective clinical study done by Koca *et al,* determined the prevalence of FMS in 135 patients with chronic renal failure. They also determined the link with sex, age, HD, and laboratory findings. The prevalence of FM was found to be 25.7% in the group undergoing HD and 18.4% in the predialysis group. This indicates that the longer the period of CRF, the higher the prevalence of FM. In this study females were more affected than males, i.e. 55.8% to 45.2%. Systemic disorders such as an inflammatory state were found to be associated with development of FM [(19)].

In Turkey, a cross-sectional case control study done by Berber *et al.* sought to establish the prevalence of FM in CKD. Two hundred and eighty-nine patients were included in the study. The overall prevalence was found to be at 15.9%. The rate of FM was found to be at 9.4% in the HD group, 17.6% in those undergoing continuous ambulatory peritoneal dialysis and 19.3% in the predialysis group. More females were affected and the duration of CKD between the predialysis group and those on HD was not statistically significant, i.e. 2.8 to 3.3 years [(20)].

Central sensitization syndrome (CCS) is key in the pathophysiology of FMS and it has a wide range of symptomatology including widespread pain, sleep disorders such as insomnia and restless leg syndrome (RLS), anxiety, depression and poor memory among others. Restless leg syndrome has a high prevalence in ESKD patients and is closely linked to FMS. A study published in 2009 in the journal of European Neurology on prevalence of restless leg syndrome in females with FMS. It was carried out on a cohort of 332 females diagnosed to have FMS aged between 20-60 years at a rehab facility in Sweden. The prevalence of RLS in FMS was found to be at 64% [(55)].

In 2018, noting that the incidence of rheumatic and musculoskeletal diseases (RMDs) increases with time on dialysis, an Egyptian study was done to establish the frequency of in patients with renal failure on regular dialysis [(21)]. It was a cohort study. A group of 49 patients were recruited for the study, and were assessed by complete history taking and physical examination. FMS

was found to be the most prevalent RMD in this group at 51%. FMS was diagnosed in these patients using the 2010 ACR diagnostic criteria (14).

	Sample Size	Method	Prevalence	Country
Yuceturk *et al.*(15)	122	FIQR	7.4%	United states of America
Samimagham *et al.*(16)	148	FIQR	12.2%	Iran
Abdel *et al.*(17)	75	1990 ACR criteria for FM	8%	Egypt
Couto *et al.*(18)	311	1990 ACR criteria for FM	3.9%	Brazil
Koca *et al.* (19)	135	FIQR	25.7%	Turkey
Berber *et al.* (20)	289	FIQR	15.9%	Turkey
Haroon *et al.*(21)	49	2010 ACR Criteria for FM	51%	Egypt

Table 1: Prevalence of Fibromyalgia among hemodialysis patients

2.8 Impact of Fibromyalgia on Quality of Life

FM has remarkably adverse ramifications on the physical and psychosocial well-being of individuals that are affected. These patients were in a poorer health state because of factors such as lack of sleep, anxiety and mood disturbances. A study in carried out in Spain on women who had FM, concluded that most of these patients had their physical well-being significantly affected and this was made worse by the lack of physical fitness and obesity [(56)].

It also has a negative economic impact to the patient and society at large. This is due to the attendant pain and associated comorbidities that results in patients having to attend clinics more frequently and having more analgesic prescriptions. A survey carried out in the United States (U.S.A) showed that patients with FM spent 3 times more on healthcare than those without the condition [(57)]. There are indirect costs on the economy as well. Individuals with FM miss work a lot on several days of the week meaning there is a loss of productivity [(58)]. A large meta-analysis study done in the United Kingdom (UK) established that patients with fibromyalgia have increased mortality [(59)].

2.8.1 Assessment of Quality of Life

There are various tools that have been validated to assess patients' quality of life in clinical and research areas. The SF-36 questionnaire is widely validated for measuring health-related quality of life [(60).]

It is a multipurpose tool and has been used in surveys as well as comparing the burden of diseases in specific groups of populations. The 36 questions on the SF-36 has 8 sections as

pertains to mental and physical health. They include physical capability, physical role, pain, general well-being, energy levels, social well-being, emotional role, and psychological well-being

The weighted sums of the 8 scaled tallies are directly converted to 0-100 with 0 being the lowest score and 100 being the maximum score per scale. A lower score is a predictor of more disability [61]. A score of more or less than 50 represents a better or worse QoL respectively [62].

2.9 Management of Fibromyalgia Syndrome

FMS if not properly diagnosed may be mistaken for somatoform disorders. Therefore, for successful management of FMS, a multidisciplinary approach is required as it has variable symptoms. Treatment of FMS is personalized to each patient depending on their severity of symptoms and comorbidities. Modalities of treatment can be pharmacologic and non-pharmacologic. Drugs approved for use in FM include analgesics (local and systemic) and antidepressants like tricyclic antidepressants, selective serotonin reuptake inhibitors and mono amine oxidase inhibitors. It is however paramount to bear in mind that opioids are not recommended in the treatment of FM as it can worsen the condition and lead to dependency.

Since CCS is key to the pathophysiology of FMS, most drugs used in its treatment are centrally acting drugs together with the non-pharmacologic therapy.

The Unites States Food and Drug Administration (FDA) in 2007 approved the use of Pregabalin, Duloxetine and Milnacipran for pharmacologic therapy of FMS [63].

The non-pharmacologic modalities include exercise, patient education, physiotherapy and nutritional modifications in diet, were shown to improve overall quality of life [64].

Exercise and cognitive behavioral therapy are two modalities that have been studied and did show improvement in severity of FMS in patients, when used together with pharmacologic therapy [65].

2.10 Problem Statement

The psychological and social impact of fibromyalgia is felt all over the world, more so in patients with other chronic diseases such as CKD. According to Couto *et al.,* the burden of fibromyalgia with CKD affects the patients, their families and society at large [18].

Patients with fibromyalgia may experience significant chronic widespread pain as a result of their condition therefore hindering them from progressing economically and socially [56]. The psychosocial factors related to fibromyalgia greatly impact quality of life. It also contributes to psychiatric co-morbidities such as depression and anxiety [36].

This study will help us determine the prevalence and severity of fibromyalgia in ESKD patients undergoing haemodialysis and its effects on quality of life.

2.11 Study Justification

Chronic kidney disease poses a significant public health concern. CKD, among many non-communicable diseases (NCDs) is a great burden especially in low- and middle-income countries whose economies grapple with the cost of managing the disease. CKD is an important cause of mortality worldwide with a ranking of 12 in the Global Burden of Disease study [9]. Nathan et al. [53] in 2016 determined that the global prevalence of kidney disease stands at about 11-13%. Mwenda et al. [54] determined the prevalence of CKD in Kenya to be at 38.6% in a subgroup of patients. Rheumatologic and musculoskeletal disorders (RMDs) are the most frequent symptoms patients undergoing maintenance haemodialysis present with [21]. There is limited information on the origin of RMDs in HD patients. RMDs in these groups of patients are multifactorial with FM being one of them. FM has significant morbidity and the associated symptoms of fatigue sleep disorders, anxiety, and mood disorders can negatively impact the quality of life in these patients.

FM can impact on the adequacy of dialysis if patients cannot complete dialysis sessions or may fail to attend to dialysis sessions due to attendant pain and fatigue. Collectively, these can result in lowered productivity of an individual with a loss to the economy. In our setting, there is insufficient data with regards to the burden of fibromyalgia in patients with CKD undergoing maintenance HD. This is the first known study in Kenya that will look at the incidence of FM in patients undergoing HD and the impact on quality of life.

Most causes of RMDs such as osteoporosis, gout, osteonecrosis, spondyloarthropathies and chondrocalcification can be detected by laboratory or imaging modalities. FMS cannot be diagnosed using these modalities as it is a clinical diagnosis. This can potentially make its diagnosis and management overlooked which can result in debilitating morbidity to the patient. This study will establish the prevalence of FM in HD patients and will create awareness on the burden of FM in these individuals.

This is with the aim of ensuring that HD patients with CWP are screened for FM and proper holistic management is instituted to improve overall quality of life (QoL). When present, FM significantly impairs their quality of life. Early identification and treatment of fibromyalgia in ESKD patients is associated with better quality of life. Fibromyalgia in end stage renal disease patients has not been studied in our set up and this study will help inform its burden in ESKD patients in our set up.

2.12 Research Question

What is the burden of fibromyalgia in patients with end stage kidney disease undergoing hemodialysis and its effects on quality on life at the Kenyatta National Hospital, Nairobi Hospital and Parkland's Kidney center?

2.13 Broad Objective

To determine the magnitude of fibromyalgia and its effects on quality of life in patients with end-stage kidney disease undergoing maintenance hemodialysis at KNH, NH and PKC.

2.14 Primary Objectives

i. To determine the prevalence of fibromyalgia in patients with end stage kidney diseaseundergoing maintenance hemodialysis

ii. To determine the severity of fibromyalgia in the study patients based on the FIQR

iii. To determine the quality of life using the 36-item short form health survey in patients with end stage kidney disease undergoing maintenance hemodialysis

2.15 Secondary Objectives

i. To compare the quality of life in patients with and without fibromyalgia

3.0 CHAPTER THREE: METHODOLOGY

3.1 Study Methodology

3.1.1 Study Design

Cross-sectional descriptive study

3.1.2 Study Setting

This study was conducted at the renal units in Kenyatta National Hospital, Nairobi Hospital and the Parkland's kidney center over approximately 3 months. Kenyatta National Hospital is a National referral hospital located in the Capital city of Kenya, Nairobi. It also serves as the teaching hospital for University of Nairobi-School of medicine. There are about 110 patients with ESKD dialysing at the renal unit in Kenyatta National Hospital in a week. The renal unit at Nairobi Hospital has a total of 100 patients dialysing per week with a maximum of about 30 patients in a day.

The Parkland's Kidney center is a private outpatient dialyses center that dialyses a total of 70 patient's in a week.

3.1.3 Study Population

Ambulatory adult patients with end-stage kidney disease undergoing maintenance hemodialysis at the renal unit of the three centers were recruited.

3.1.4 Case Definitions

ESKD: Chronic kidney disease (CKD) stage 5: individuals with an estimated glomerular filtration rate < 15 mL/minute/1.73 m^2 body surface area, or those requiring long-term dialysis regardless of glomerular filtration rate [66].

Fibromyalgia: Chronic diffuse pain i.e pain lasting >3months, in the left & right side of the body and above & below the waist (including the axial skeleton). In addition, presence of 11/18 tender points on physical exam [4]

3.1.5 Inclusion Criteria

i. Patients older than 18 years of age
ii. Patients receiving dialysis for more than 3 months
iii. Patients who were conscious and oriented in time, place and person
iv. Patients who could give written/informed consent

3.1.6 Exclusion Criteria

i. Patients with multiple trauma around areas of tender point examination or with conditions that would present with pain at joints
ii. Patients with above knee amputations

3.2 Sample Size

The sample size was determined using the Fischer's formula for prevalence studies. The following formula was used:

$$N = \frac{Z^2 * p\,(1-p)}{d^2}$$

Where:
n- Sample size
Z- 1.96 (95% confidence interval)
p – The estimated prevalence of Fibromyalgia in a study done by Samimagham et al was found to be 12.2% in ESKD patients undergoing haemodialysis [16].
d – Margin of error (precision error) +/- 5%

Sample size = 165

3.3 Sampling Method

Proportionate random sampling procedure was used to recruit patients into this study. The number of participants from each hospital was determined by the number of patients dialysing per week relative to the total number from all three centres dialysing per week, in relation to the desired sample size. Thus, the total number of patients dialysing per week from the three centres was 280. This means for KNH the number required is 110/280 x 165, which gives approximately 65 patients. The same calculation applied to Nairobi hospital and PKC gave 59 patients and 41 respectively. After proportional sampling was done, patients were randomly selected as they underwent hemodialysis at the renal units in the three centres until the desired sample size was achieved.

3.3.1 Recruitment and Consenting Procedure

Eligible adult ambulatory patients with ESKD on chronic hemodialysis at the renal units at Kenyatta National Hospital, Nairobi Hospital and Parkland's Kidney Center were recruited daily (Monday to Sunday) over a three-month period by the principal investigator and research assistants. Patient recruitment was done before or after dialysis until the desired sample size was attained. The medical records and clinical history as per the file of the selected patients was analyzed to eliminate those with any exclusion criteria. The objective of the study was described to the eligible participants after which a written or informed consent was obtained from those who agreed to participate in the study. Patients who declined to participate were excluded.

3.4 Data Collection Procedure

3.4.1 Clinical Methods

A study proforma was used to collect data on the demographic variables including age, sex, presence of other comorbidities such as, HIV, Hepatitis B, T2DM, SLE and rheumatoid arthritis, duration of dialysis in months, and the frequency of dialysis each week. The principal investigator was responsible for making the diagnosis of FM in all patients undergoing HD and evaluation of tender points using the 1990 ACR diagnostic criteria, after training by a consultant rheumatologist. A focused physical exam was done to demonstrate the number of tender points. A sum of 18 fixed points was examined for tenderness by digital palpation. Enough force to cause blanching of examiner's finger was applied at each point, approximately 4kgs. The tender points examined were;

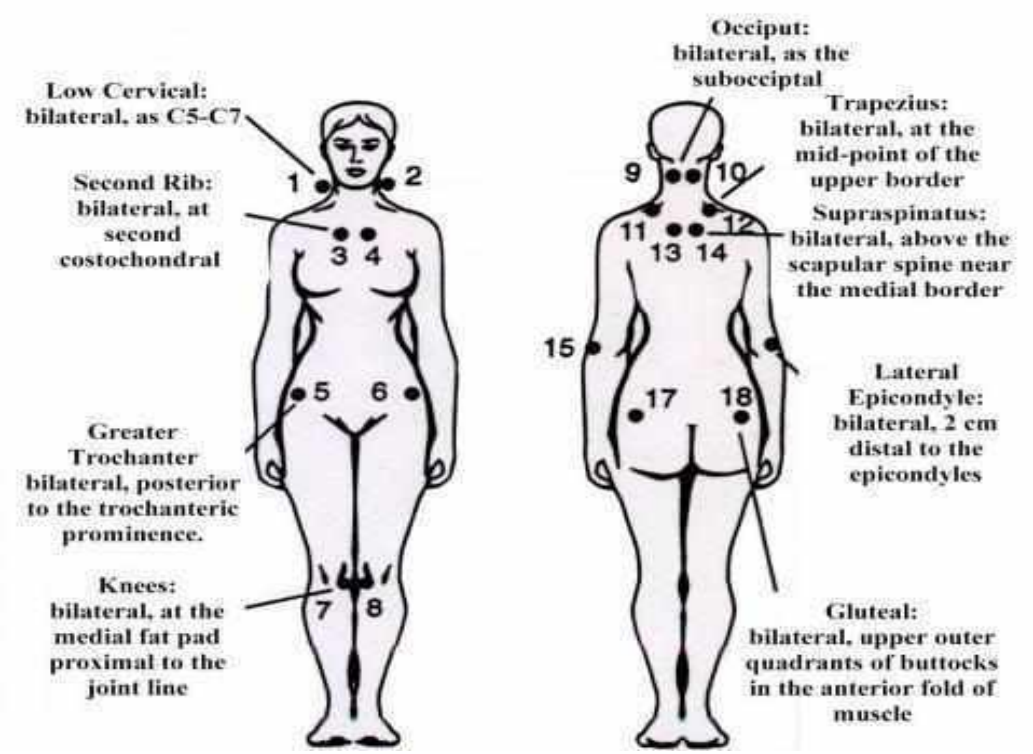

Figure 3: Tender points for evaluation [4]

Those patients who had pain in 11 or more of the 18 points were diagnosed to have FM, based on the ACR 1990 criteria. Severity of fibromyalgia in the patients with FM was then determined by using the FIQR and was self-administered. The SF-36 questionnaire was administered to determine the quality of life in all patients included in the study. Both the questionnaires were self-administered without any assistance from the principal investigator. All questionnaires were then collected from the study participants.

3.5 Data Collection Instruments

a) A study proforma

b) The 1990 ACR diagnostic criteria

c) Revised fibromyalgia impact questionnaire

d) Short Form 36 Health Survey questionnaire

3.6 Study Variables

3.6.1 Independent Variables

i. Age in years was determined from the date of birth of the patient as at time of evaluation

ii. Sex reported as male or female

iii. Comorbidities which include hypertension, Type 2 diabetes, rheumatoid arthritis, systemic lupus erythematosus, documented HIV infection or documented viral hepatitis (Hepatitis B/C) and cardiovascular disease.

iv. Duration of dialysis in months from the month the patient initially commenced dialysis till the month of the study date

v. Frequency of dialysis in a week as reported by the patient in the last one month

vi. SF-36 Health survey score

3.6.2 Dependent Variables

i. The prevalence of fibromyalgia

ii. The quality on life of fibromyalgia in ESKD patients on maintenance haemodialysis

3.6.3 Outcomes

i. The presence or absence of fibromyalgia

ii. The severity of fibromyalgia in patients diagnosed to have FM, based on the revised fibromyalgia impact questionnaire.

Disease severity states in fibromyalgia are categorized as:

i. Mild 0-42

ii. Moderate 43-59

iii. Severe 60-74

iv. Very severe 75-100

iii. The quality of life in hemodialysis patients with and without FM determined by the short form health survey questionnaire.

Quality of life is categorized as:

- Poor quality of life; a mean score < 50%
- Good quality of life; a mean score ≥ 50%

3.7 Flowchart for Patient Recruitment

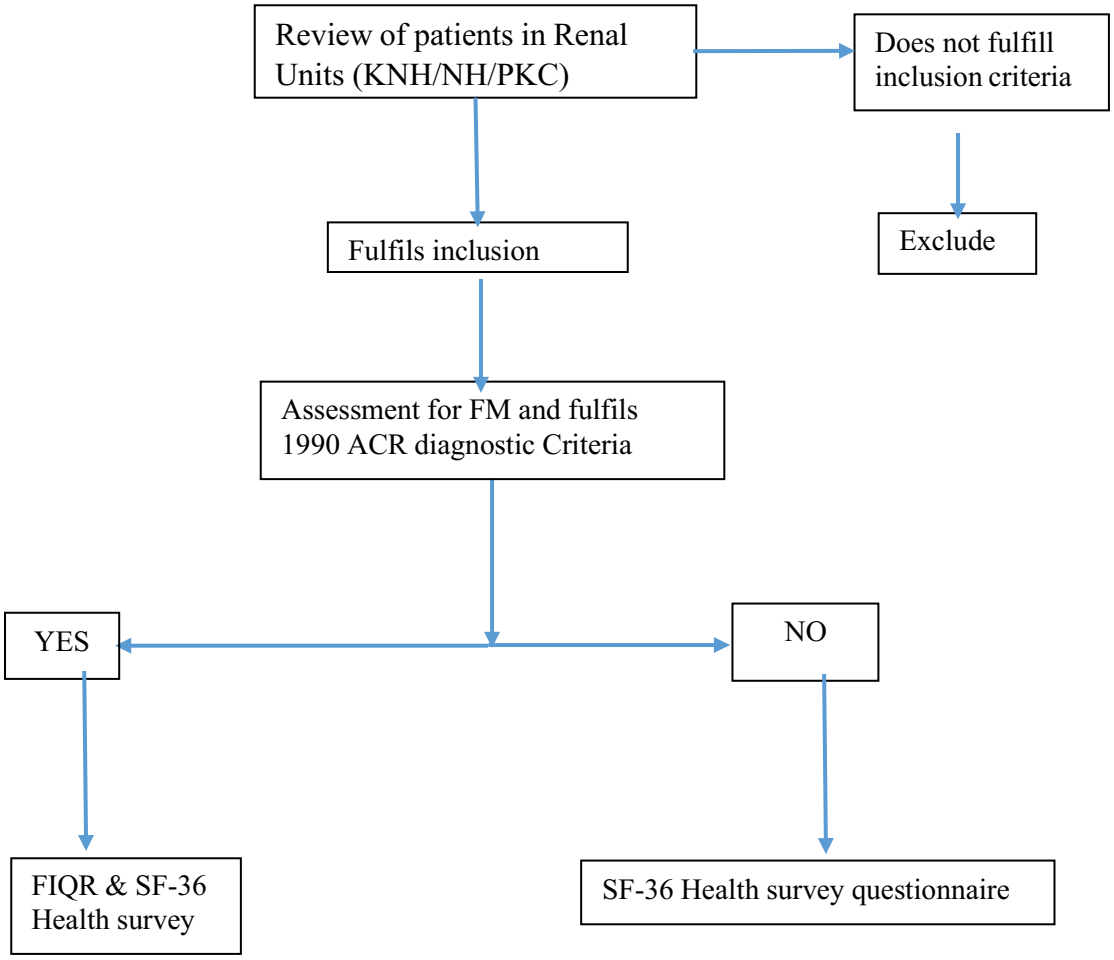

Figure 4: Flow Chart showing Patient Recruitment

3.8 Quality Assurance

Training of research assistants, who were two clinical officers with diplomas in clinical medicine, on the objective of the study were done prior to data collection. The PI assisted by research assistants was responsible for collecting data. Validated questionnaires were translated into Kiswahili for ease of the patients and were utilized.

3.9 Data Management and Analysis Methods

Data from the study proforma was assigned unique codes. They were then entered and managed in a password protected Microsoft Access 2016 database. After data cleaning and validation, data analysis was performed using SPSS version 25.0 with the help of a statistician. Categorical data of the study population such as gender, marital status and level of education was summarized into proportions. Continuous variables such as age, duration of dialysis in months

and frequency of dialysis per week were summarized into means, medians and standard deviations.

The prevalence of fibromyalgia was presented as a percentage in each center. The severity of fibromyalgia was presented as a proportion in each class (mild, moderate and severe). The quality of life was expressed as a proportion of those with poor quality of life (an average score of less than 50%) in individuals with ESKD undergoing maintenance hemodialysis. Statistical differences between QoL in patients with and without fibromyalgia were assessed using the Student t-test. Logistic regression analysis was applied to estimate the probability of being in good health. A P value of ≤ 0.05 was considered significant for all statistical tests.

3.10 Ethical Consideration

The study was carried out after approval by the Department of Clinical Medicine and Therapeutics, University of Nairobi, the Kenyatta National Hospital/UON research and Ethics committee, the Nairobi Hospital ethics committee and with permission from the Parklands Kidney Centre administration. The patients were informed about the study. They were given a detailed explanation on the nature of the study and the questionnaires needed to be filled. Patients who gave informed consent were recruited into the study. There was no coercion of patients. There was no discrimination against any patient who declined to participate.

Confidentiality was strictly maintained and all data gathered was securely stored and only revealed to relevant authorities upon a need-to-know basis. The renal unit doctor and senior house officers were informed about the patients diagnosed with fibromyalgia so that the primary rheumatologist could treat the condition. All measures to prevent transmission of Covid-19 to researchers or patients were ensured. This included use of protective personal equipment by the researchers at all times, maintaining social distance between the patients and researchers and frequent hand washing.

4.0 CHAPTER FOUR: RESULTS

Between January and March 2021 proportionate random sampling of patients on maintenance haemodialysis in three centres, i.e., KNH, TNH and PKC was done until the desired sample size was reached. A total of 192 participants were screened for eligibility, 76 from KNH, 70 from TNH and 46 from PKC. Of the 192 patients on haemodialysis, 10 did not meet the inclusion criteria and 15 were excluded from the study as they declined participation. A total of 167 patients were enrolled into the study (65 from Kenyatta National Hospital, 59 from Nairobi Hospital each, and 43 from Parkland's Kidney Center). The flow chart of the recruitment process is shown below.

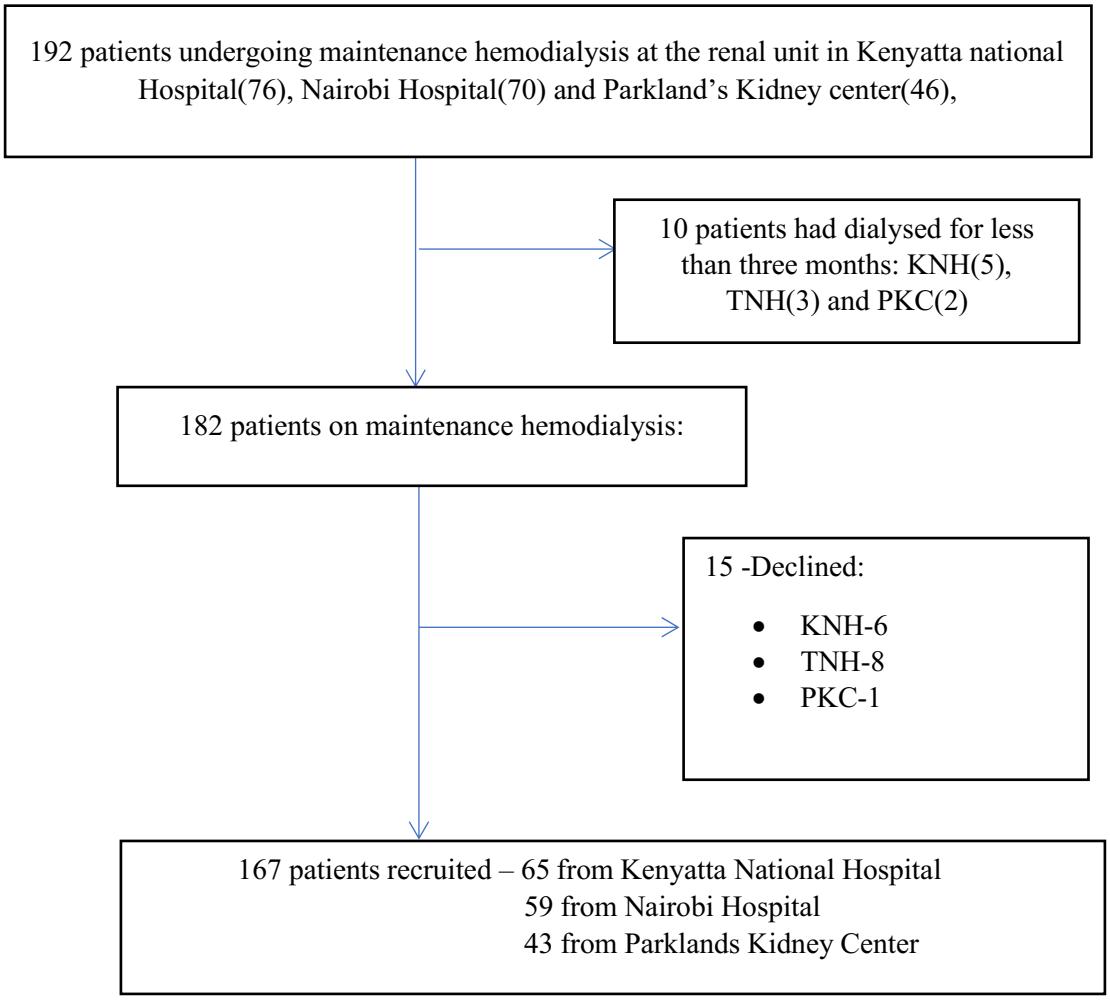

Figure 5: Recruitment Flow Chart

4.1 Socio-Demographic and Clinical Characteristics

4.1.1 Socio-Demographic Characteristics

A study proforma was used to collect data on the demographic and clinical variables including age, sex, aetiology of ESKD e.g., hypertension, duration of dialysis in months, and the frequency of dialysis each week. The mean age of those enrolled was 53.8 years (SD 17.9) with a range of 18-95 years. There were 88 (52.7%) males with a male to female ratio of 1:0.9. A total of 141 (84.4%) study participants had post primary education. 119 (71.3%) participants were married. A summary of the sociodemographic characteristics is illustrated in Table 2.

Table 2:Socio demographic characteristics of the study subjects

Variable	All Frequency (%) n=167	KNH Frequency (%) n=65	TNH Frequency (%) n=59	PKC Frequency (%) n=43
Age in years				
• Mean (SD)	53.8 (17.9)	46.3 (15.4)	56.2 (16.7)	63.6 (18.2)
• Median (IQR)	53.0 (39.5-68.0)	44.0 (32.0-56.5)	51.5(36.8-61.4)	64.5(53.2-76.7)
• Min - Max	18 - 95	18 - 76	19 - 95	42 - 93
Age groups				
<20	3 (1.8%)	2 (3.1%)	1 (1.7%)	-
20 – 30	14 (8.4%)	6 (9.2%)	6 (10.2%)	2 (4.7%)
31 – 40	29 (17.4%)	22 (33.8%)	5 (8.5%)	2 (4.7%)
41 – 50	28 (16.7%)	12 (18.5%)	10 (17.0%)	6 (14.0%)
51 – 60	29 (17.4%)	13 (20.0%)	14 (23.7%)	2 (4.7%)
61 – 70	27 (16.2%)	8 (12.3%)	10 (17.0%)	9 (20.9%)
>70	37 (22.1%)	2 (3.1%)	13 (22.0%)	22 (51.1%)
Gender				
• Male	87 (52.1%)	42 (64.6%)	23 (39.0%)	22 (51.2%)
• Female	80 (47.9%)	23 (35.3%)	36 (61.0%)	21 (48.8%)
Marital Status				
• Single-Unmarried	28 (16.7%)	16 (24.6%)	11 (18.6%)	1 (2.3%)
• Separated/Divorced	7 (4.2%)	4 (6.2%)	1 (1.7%)	2 (4.7%)
• Married	119 (71.3%)	45 (69.2%)	42 (71.2%)	32 (74.4%)
• Widowed	13 (7.8%)	-	5 (8.5%)	8 (18.6%)
Education Level				
• None	2 (1.2%)	-	1 (1.7%)	1 (2.3%)
• Primary	24 (14.4%)	19 (29.2%)	1 (1.7%)	4 (9.3%)
• Secondary	62 (37.1%)	30 (46.1%)	16 (27.1%)	16 (37.2%)
• Tertiary	79 (47.3%)	16 (24.6%)	41 (69.5%)	22 (51.1%)

4.1.2 Clinical Characteristics

The underlying aetiology for ESKD, 89 (55.7%) had hypertension only, 4 (2.4%) had diabetes only, 60 (35.9%) had coexisting diabetes and hypertension, 4 (2.4%) had lupus nephritis, 1 had HIV-associated nephropathy, while 9 (5.4%) had no aetiology established. The duration on dialysis, 46(27.5%) had dialysed for less than one year, 111(66.5%) had dialysed for between one and five years, 8(4.8%) had dialysed for between five and ten years and 2(1.2%) had dialysed for more than ten years. The frequency of dialysis per week, 134 (80.2%) were undergoing dialysis twice a week and 33(19.8%) were undergoing dialysis thrice a week. Table 3 demonstrates the underlying aetiologies, duration of dialysis and frequency of dialysis per week for the study subjects.

Table 3: Clinical Characteristics

Aetiology	**All frequency (%) n=167**
Hypertension (Essential)	89 (53.3%)
Diabetes Mellitus	4 (2.4%)
Hypertension and Diabetes	60 (35.9%)
Lupus Nephritis	4 (2.4%)
HIV-Associated Nephropathy	1 (0.6%)
None	9 (5.4%)
Duration on dialysis in years	
<1	46 (27.5%)
1-5	111 (66.5%)
6-10	8 (4.8%)
>10	2 (1.2%)
Frequency of dialysis per week	
2	134 (80.2%)
3	33 (19.8%)

NB: The group with hypertension as an aetiology may include a number of patients with hypertension due to chronic glomerulonephritis.

4.2 Prevalence of fibromyalgia among Hemodialysis Patients

The prevalence of fibromyalgia in patients with end-stage renal disease on maintenance hemodialysis was 18.0% (95% CI 12.9 – 24.5). The diagnosis of fibromyalgia was made as having 11 out of 18 tender points by digital palpation and this was based on the 1990 ACR criteria. Thirty patients of the 167 were diagnosed to have fibromyalgia, and are not known to have been previously diagnosed with fibromyalgia. The prevalence of fibromyalgia by center was Kenyatta National Hospital 23.1% (95% CI 14.5 – 34.6), Parkland's Kidney Center 18.6% (95% CI 9.7 – 32.6) and Nairobi Hospital 11.9% (95% CI 5.9 – 22.5). The difference in

prevalence between the three centres was not statistically significant (p=0.264). Figure 6 below represents the overall prevalence of Fibromyalgia and by each center.

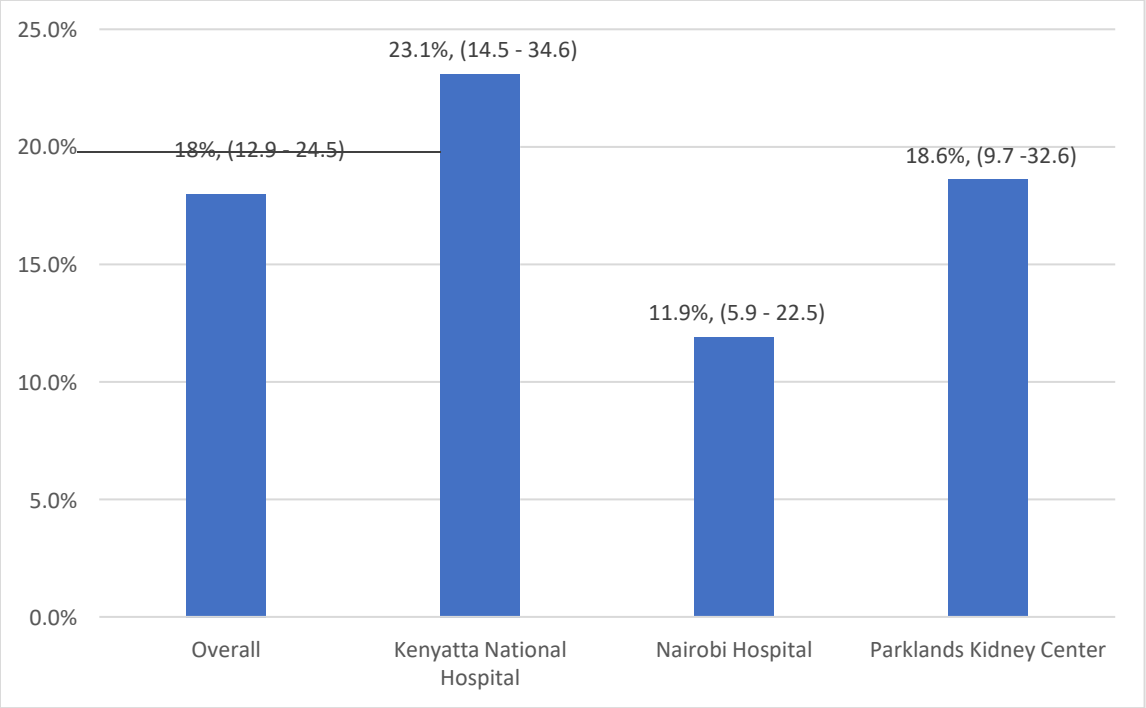

Figure 6: Prevalence of Fibromyalgia amongst the study participants

4.3 Severity of Fibromyalgia

The thirty patients were assessed for severity of their fibromyalgia using the FIQR questionnaire.

4.3.1 TOTAL FIQR SCORES

The average FIQR score for the 30 patients with fibromyalgia was 50.3(SD 16.3). For the 3 domains that were assessed in the questionnaire, the overall scores for function, overall impact and symptoms were 16.9, 11.4 and 22.8 respectively.

Table 4: FIQR DOMAINS SCORES

	Mean Scores	SD
Function Subtotal	16.9	8.3
Impact subtotal	11.4	3.8
Symptom subtotal	22.8	8.4
Total	50.3	16.3

The mean tender FIQR score for the thirty patients with fibromyalgia was 50.3(SD 16.3), with the median being 47.8 (IQR 44.6-62.4). Among 30 study subjects with fibromyalgia, 7 (23.3%) had mild symptoms, 14 (46.7%) had moderate symptoms, 6 (20.0%) had severe symptoms, and 3 (10.0%) had very severe symptoms. Table 5 below demonstrates the severity of fibromyalgia.

Table 5: Severity of fibromyalgia

	Frequency (%)	Median (IQR)
Mild (0-42)	7 (23.3%)	28.5 (23.1 – 32.0)
Moderate (43-59)	14 (46.7%)	47.6 (46.0 – 52.0)
Severe (60-74))	6 (20.0%)	63.5 (62.4 – 66.0)
Very severe (75-100)	3 (10.0%)	76.2 (75.6 – 76.9)

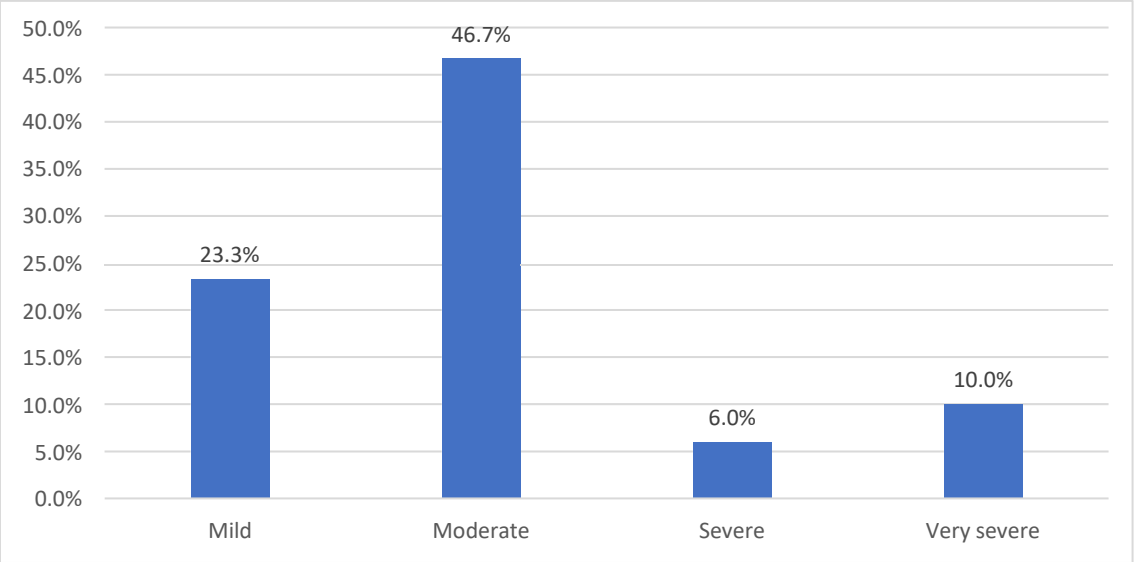

Figure 7: Percentage distribution of the Patients with Fibromyalgia according to the severity in the study subjects

4.4 Socio-demographic and Clinical Characteristics of Patients with and without Fibromyalgia

There was no statistical significance between the sociodemographic and clinical characteristics of the study subjects with and without fibromyalgia except for gender and duration of dialysis. Those with fibromyalgia had a median of 30 (IQR 36.0) months duration of dialysis while those without had 18.0 (IQR 27.0) months, a difference of 12 months, which was statistically significant (p=0.040). Females were two times more likely to be affected more than males, and this showed statistical significance (OR, 2.6: 95% CI,1.1-5.9). There was no statistically significant association between underlying aetiologies and fibromyalgia (p=0.083). Univariate comparisons of the sociodemographic, clinical, duration of dialysis and frequency of dialysis in a week of study participants with and without fibromyalgia are illustrated in Table 5 below.

Table 6: Socio-demographic and clinical characteristics of study subjects with and without Fibromyalgia

Variable	All n=167 frequency (%)	Patients with Fibromyalgia n=30 frequency (%)	Patients without Fibromyalgia n= 137 frequency (%)	OR (95% CI)	P value
Age strata					
Mean (SD)	53.8 (17.9)	55.7 (18.4)	62.9 (17.6)		
Median (IQR)	53.0 (39.5-68.0)	54.2(38.6-72.1)	60.5(47.5-73.0)		
<20	3 (1.8%)	0 (0.0)	3 (2.2)	-	-
20 – 30	14 (8.4%)	1 (3.3)	13 (9.5)	0.2 (0.03-2.1)	0.239
31 – 40	29 (17.4%)	4 (13.2)	25 (18.2)	0.5 (0.1-1.8)	0.291
41 – 50	28 (16.8%)	8 (26.7)	20 (14.6)	1.2 (0.4-3.8)	0.700
51 – 60	29 (17.4%)	2 (6.7)	27 (19.7)	0.2 (0.05-1.2)	0.076
61 – 70	27 (16.2%)	6 (20.0)	21 (15.3)	0.9 (0.3-2.9)	0.845
>70	37 (22.2%)	9 (30.0)	28 (20.4)	1.0	
Sex					
• Male	87 (52.1%)	10 (33.3)	77 (56.2)	1.0	
• Female	80 (47.9%)	20 (66.7)	60 (43.8)	2.6 (1.1-5.9)	**0.023**
Aetiology					
Hypertension	89 (53.3%)	12 (40.0)	77 (56.2)	1.0	
Diabetes Mellitus	4 (2.4%)	2 (6.7)	2 (1.5)	6.4 (0.8-50.0)	0.076
Hypertension and Diabetes	60 (35.9%)	13 (43.4)	47 (34.3)	1.8 (0.7-4.2)	0.193

Lupus Nephritis	4 (2.4%)	1 (3.3)	3 (2.2)	2.1 (0.2-22.2)	0.525
HIV-Associated Nephropathy	1 (0.6%)	1 (3.3)	0 (0.0)	-	-
None	9(5.4)	1(3.3)	8(5.8)	0.8(0.1-7.0)	0.842
Median duration of Hemodialysis in months (IQR)	22.0 (10.0-36.0)	30.0 (16.0-48.0)	18.0 (9.0-36.0)	2.3 (1.02-5.4)	**0.040**
Median weekly hemodialysis (IQR)	2.0 (2.0-2.0)	2.0 (2.0-2.0)	2.0 (2.0-2.0)	0.8 (0.3-2.2)	0.638

4.5 Quality of Life in Patients with End-Stage Renal Disease Undergoing Maintenance Hemodialysis

The average quality of life scores of the 167 patients was 82.2(SD 20.4). Among the 167 study participants, 95(56.9%) had scores more than 60, 44(26.3%) had scores between 40-60 and 28(16.8%) had scores of less than 40.

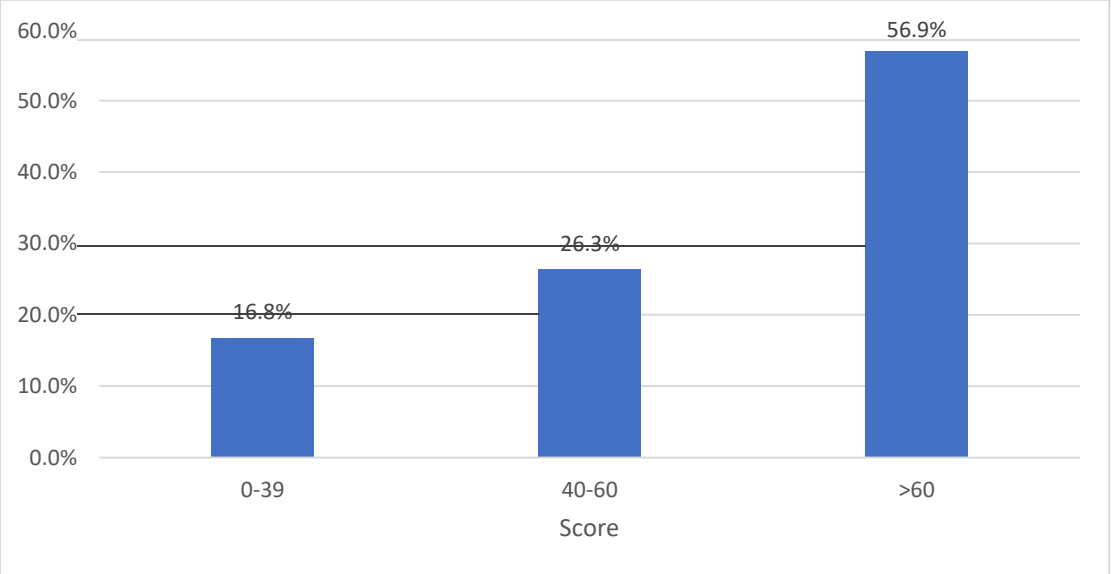

Figure 8: Percentage distribution of the Patients according to the Quality of life scores in the study subjects

Of the 167 patients enrolled into the study, 44 had a poor quality of life (26.3%). Among the 30 study subjects with fibromyalgia, 18 (60.0%) had a poor quality of life. Study subjects with fibromyalgia were six times likely to have a poor quality of life as compared to those without the syndrome, and this was statistically significant (Odds ratio, 6.4; 95% CI, 2.7 to 14.9; $p<0.001$). Table 5 summarizes the quality of life in the study subjects.

Table 7: Quality of life in patients with and without Fibromyalgia

Fibromyalgia	Quality of Life		Odds Ratio (95% CI)	p-value
	Poor	Good		
Yes	18 (60.0)	12 (40.0)	6.4 (2.7 – 14.9)	<0.001
No	26 (19.0)	111 (81.0)		

5.0 CHAPTER FIVE: DISCUSSION

In this study we evaluated the association between end stage kidney disease, fibromyalgia and quality of life. Rheumatologic conditions are common in chronic kidney disease patients, and majority of hemodialysis patients are affected by various types of musculoskeletal disorders, including but not limited to fibromyalgia [21]. This study has provided further insights into the prevalence of fibromyalgia in patients on dialysis in our set-up. Our study established the prevalence of fibromyalgia among CKD patients on maintenance haemodialysis to be 18%, and it seems to be higher than other similar studies done ranging from 3.9%-12.2% [15,16,20]. A study done by Yuceturk *et al*. in the USA noted the prevalence of fibromyalgia in CKD patients to be 7.4% [15], a study carried out in Iran by Samimagham *et al.* noted the prevalence to be 12.2% [16], and another study done in Turkey by Berber *et al.* found the prevalence to be 15.9% [20]. These differences could be due to the contrast in population. Our study was largely carried out among black Africans, whilst the previous studies were carried out among a largely Caucasian population in the American study, and an Arabic populace in the Iranian and Turkish studies. Wolfe *et al*. in a random sample of 3006 adults revealed FM prevalence rates of 3.4% in women and 0.5% in men [6]. In accord with the literature, we found that FM was more frequent in females, with rates of 66.7% (20 out of 30) in women and 33.3% (10 out of 30) in men. Similarly, in a review article by Oyoo *et al.* published in the African Journal of Rheumatology, where they sought to look at the epidemiology and gender-based differences of fibromyalgia in Africa, it was noted that fibromyalgia is prevalent in middle aged females with variabilities in disease presentation [24]. The above mentioned study by Wolfe *et al.* also established that incidence of FM increases with age, and noted that the highest rates are seen in those aged 60 to 79 years. They found a 2% prevalence rate of FM in individuals aged 30–39 years, whereas the rate in the group aged 70–79 years was 7.4% [6]. In accordance with literature, most of the patients with FM (16 of the 30) in our study were older than 60 years of age. The mean age of the thirty HD patients with definite FM was not significantly different from that of the one hundred and thirty-seven HD patients without fibromyalgia ($P = 0.35$). From our study, there was no statistical correlation between incidence of FM and marital status, educational background, underlying aetiology or number of dialysis sessions in a week.

Rheumatic disorders are usual in renal disease, and data indicates that the risk of such complications increases with time on HD [21]. Most other studies did not find a correlation linking duration of dialysis and incidence of fibromyalgia [15] [16] [18] [20]. As detailed above, in our study, a positive correlation linking duration of dialysis and rates of FM was established.

Subjects with FM had dialysed for a median of 12 months longer and this was statistically significant (P=0.04).

Our study established that the largest number of our patients had moderate severity of fibromyalgia with a mean of 50.3(SD 16.3). In the Iranian study by Samimagham *et al.,* majority of patients had mild severity of fibromyalgia with a mean of 39.05 (SD 23.35) [16]. This was lower in comparison to our set up. The variabilities in proportions could be due to differences in clinical characteristics such as mean duration of dialysis. In the Iranian study group, mean period of dialysis was established to be 27.9 (SD 57.1) [16], while our mean was 34(SD 55.7). The incidence and severity of fibromyalgia is known to increase with duration on dialysis [19,21]. which could be a reason for the higher severity in our set up is higher.

In Turkey, Koca *et al.* established that a large number of patients had severe fibromyalgia with a mean FIQR score of 66.2(SD 15.01) [19]. This difference could be elucidated by variations in the age. In the Turkish study, the mean age was higher at 59.5(SD 13.1), while ours had a mean of 53.8(SD 17.1), and from studies incidence and severity of fibromyalgia is known to increase with age [6]. Similarly, as mentioned above, prolonged period of dialysis predisposes to increased severity of FM [21]. For this study, only 6% of patients had dialysed longer than 5 years, while the in the study by Koca *et al.* 48.6% of patients had dialysed for longer than 5 years.

In comparison to local data, a similar prevalence study by Mumo *et al*. published in the African journal of rheumatology, found the prevalence of fibromyalgia in HIV patients to be 17.9% [22], and this was similar to the prevalence in our study. In yet another local prevalence study done by Dokwe *et al.* in the medical outpatient clinics, the prevalence of fibromyalgia was found to be 13% [14]. A study carried out by Umar *et al.* at the diabetic outpatient clinics in KNH found the prevalence to be 27.9% [23]. It is noted in our study, that diabetes contributed to the largest group of patients with CKD, with the percentage of diabetics with fibromyalgia being 15.6%. This difference in prevalence could be explained by different study approaches and differences in age. The study by Umar *et al*. correlated hemoglobin A1c (HbA1c) to the incidence of FM, which our study did not as this was beyond the scope of our study. The mean age of patients in our study was 53.8, which was less than the study by Umar *et al.* whose mean age was 59.9.

Poor QoL was present in 26.3% of patients with ESKD on maintenance haemodialysis. In a study done in Nepal, it was reported that 80% of study participants had a poor QoL, which is greater than our study, this could be explained use of different tools. The Nepal study uses the World Health Organization Quality of Life questionnaire while we used the SF-36 Health

survey questionnaire [25]. In a study by Kamau E. *et al,* it was also established that patients on haemodialysis had a poor QoL with reported lower mean physical composite summary and mental composite summary scores [26].

A strong association between fibromyalgia and quality of life was noted in this study. It was established that FM negatively affected quality of life in patients with ESKD on HD as compared to those without FM (OR 6.4 (95% CI; 2.7 – 14.9)), and this was statistically significant [P <0.005]. Our study established that higher FIQR scores were linked to worse QoL. This is in line with findings in other studies, exemplified by a study done by Couto *et al.* who established that patients with fibromyalgia on maintenance haemodialysis had worse quality of life than their counterparts without fibromyalgia [18].

Similarly, in a study by Samimagham *et al.* carried out in Iran, fibromyalgia in patients on haemodialysis was strongly associated with sleep interferences and depression even after adjustment for age, sex and period of dialysis. These patients had higher FIQR scores and worse quality of life [16].

A study done by Yuceturk *et al.* reported that fibromyalgia in ESKD patients on HD had a remarkable association with poorer health related QoL. This study also established that females with higher FIQR scores were predisposed to worse QoL [15].

5.1 Conclusion

In our study the prevalence of fibromyalgia in CKD was found to be 18%. This is higher than the baseline population prevalence of 1%. Majority of the fibromyalgia patients had mild to moderately severe disease. Patients with fibromyalgia in ESKD on haemodialysis are six times more likely to have a poorer quality of life than those without fibromyalgia in ESKD on haemodialysis.

5.2 Recommendation

a) Screening for fibromyalgia as standard care among patients on hemodialysis to make an early diagnosis.
b) Prompt treatment of fibromyalgia by a multidisciplinary team once a diagnosis is made, so as to prevent progression of the severity. This will lead to overall improvement of function and thus an improvement in quality of life.
c) Further studies should be carried out to look at the psychosocial and economic effects of fibromyalgia in the general population.

5.3 Study Strengths

a) This study is first of its kind to look at the prevalence and severity of fibromyalgia in end stage kidney disease patients on haemodialysis.
b) It was a multicenter study.

5.4 Study Limitations

a) There was recall bias as the study participants were filling the questionnaire without assistance from the principal investigator.

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APPENDICES

Appendix I: Study Proforma

Patient's study number ☐

PART A Sociodemographic Characteristics

Age _____ Years

Sex M_____ F_____

Marital status

a) Single ____

b) Married _____

c) Separated ____

d) Divorced ___

Level of education

a) None

b) Primary

c) Secondary

d) Tertiary

Part B Co-Morbidities

Are you hypertensive? Yes____ No_____

Are you diabetic? Yes____ No_____

Do you have an autoimmune disorder i.e. rheumatoid arthritis, systemic lupus erythematosus or osteoarthritis? Yes No ____ ____

Part C Drug History

Are you currently on any medications? Yes_____ No___

If yes please name them _____

Part D Causes of End Stage Renal Disease

Hypertension ☐

Diabetes ☐

Hypertension and diabetes ☐

Chronic glomerulonephritis ☐

Autoimmune disorders like SLE ☐

Part E Dialysis History

Duration of dialysis in months _____

Frequency of dialysis in a week _____

Appendix II: The 1990 American College of Rheumatology Diagnostic Criteria

Is tenderness present in the following areas (tick where appropriate)

- ☐ Occiput: Bilateral, at the suboccipital muscle insertions.
- ☐ Low cervical: bilateral, at the anterior aspects of the intertransverse spaces at C5-C7.
- ☐ Trapezius: bilateral, at the midpoint of the upper border.
- ☐ Supraspinatus: bilateral, at origins, above the scapula spine near the medial border.
- ☐ Second rib: bilateral, at the second costochondral junctions, just lateral to the junctions on upper surfaces.
- ☐ Lateral epicondyle: bilateral, 2 cm distal to the epicondyles.
- ☐ Gluteal: bilateral, in upper outer quadrants of buttocks in anterior fold of muscle.
- ☐ Greater trochanter: bilateral, posterior to the trochanteric prominence.
- ☐ Knee: bilateral, at the medial fat pad proximal to the joint line

Total number of tender points ☐

9. Fits criteria for fibromyalgia?

☐ Yes No ☐

If yes, proceed to FIQR; If no, proceed to SF-36 Health survey questionnaire.

Appendix III: Revised Fibromyalgia Impact Questionnaire

Patient's study number: ☐

Directions: For each question, place an X in the box that best indicates how much your fibromyalgia made it difficult to do each of the following activities during the last 7 days

Brush or comb your hair

No difficulty ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐☐ Very difficult

Walk continuously for 20 minutes

No difficulty ☐ ☐ ☐ ☐ ☐☐ ☐ ☐ ☐ ☐ ☐ Very difficult

Prepare a homemade meal

No difficulty ☐☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very difficult

Vacuum, scrub or sweep floors

No difficulty ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very difficult

Lift and carry a bag full of groceries

No difficulty ☐☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very difficult

Climb one flight of stairs

No difficulty ☐☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very difficult

Change bed sheets

No difficulty ☐☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very difficult

Sit in a chair for 45 minutes

No difficulty ☐☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very difficult

Go shopping for groceries

No difficulty ☐☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very difficult

Function subtotal ☐

(*For internal use only*)

Directions: For each question, check the one box that best describes the overall impact of your fibromyalgia over the last 7 days.

Fibromyalgia prevented me from accomplishing goals for the week

Never ☐☐☐☐☐☐☐☐☐☐☐ Always

I was completely overwhelmed by my fibromyalgia symptoms

Never ☐☐☐☐☐☐☐☐☐☐☐ Always

Overall impact subtotal ☐

(*For internal use only*)

Directions: For each of the following 10 questions, select the best box that best indicates the intensity of your fibromyalgia symptoms over the past 7 days

Please rate your level of pain

No pain ☐☐☐☐☐☐☐☐☐☐☐ Unbearable pain

Please rate your level of energy

Lots of energy ☐☐☐☐☐☐☐☐☐☐☐ No energy

Please rate your level of stiffness

No stiffness ☐☐☐☐☐☐☐☐☐☐☐ Severe stiffness

Please rate the quality of your sleep

Awoke well rested ☐☐☐☐☐☐☐☐☐☐☐ Awoke very tired

Please rate your level of depression

No depression ☐☐☐☐☐☐☐☐☐☐☐ Very depressed

Please rate your level of memory problems

Good memory ☐☐☐☐☐☐☐☐☐☐☐ Very poor memory

Please rate your level of anxiety

Not anxious ☐☐☐☐☐☐☐☐☐☐☐☐☐ Very anxious

Please rate your level of tenderness to touch

No tenderness ☐☐☐☐☐☐☐☐☐☐☐ Very tender

Please rate your level of balance problems

No Imbalance ☐☐☐☐☐☐☐☐☐☐☐ Severe imbalance

Please rate your level of sensitivity to loud noises, bright lights, odours and cold

No sensitivity ☐☐☐☐☐☐☐☐☐☐☐ Extreme sensitivity

Symptom subtotal ☐

(For internal use)

FIQR TOTAL SCORE ☐

Scoring System for the FIQR

Step 1. Each of the three domains (function, overall, and symptoms) are scored on a scale of 0 to 10. The 11 boxes represent the numbers 0 to 10 from left to right.

Step 2. a.The sum of the function domain *(0-90) is divided by 3* (upper limit 30)
b The sum of the overall impact domain(0-20) is divided by one (0-20)
cThe sum of the symptom domain *(0-100)is divided* by 2 (upper limit 50)

Step 3. Add the three resulting domain scores (a, b and c) to obtain the total score of the **FIQR** (range 0 -100)

Appendix IV: Short Form 36 Health Survey

Choose one option for each questionnaire item

1) In general, would you say your health is

   Excellent

   Very good

   Good

   Fair

   Poor

2) Compared to one year ago, how would you rate your health in general now?

   Much better now than one year ago

   Somewhat better now than one year ago

   About the same

   Somewhat worse now than one year ago

   Much worse now than one year ago

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so how much

	Yes limited a lot	Yes limited a little	No, not limited at all
3) Vigorous activities such as running, lifting heavy objects, participating in strenuous sports			
4) Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling			
5) Lifting or carrying groceries			

6) Climbing several flights of stairs

7) Climbing one flight of stairs

8) Bending, kneeling or stooping

9) Walking more than a mile

10) Walking several blocks

11) Walking one block

12) Bathing or dressing yourself

Physical Health Problems

During the past four weeks have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

13) Cut down the amount of time you spent or other activities?	Yes	No
14) Accomplished less than you would like?	Yes	No
15) Were limited in the kind of work or other activities?	Yes	No
16) Had difficulty performing the work or other activities?	Yes	No

Emotional Health Problems

During the past four weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)

17) Cut down the amount of time you spent on work or other activities? Yes No
18) Accomplished less than you would like? Yes No
19) Didn't do work or other activities as carefully as usual? Yes No

Social Activities

20) Emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?
Not at all Slightly Moderately Severe Very severe

PAIN

21) How much bodily pain have you had during the past four weeks?
None Very mild Mild Moderate Severe Very severe

22) During the past four weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?
Not at all A little bit Moderately Quite a bit extremely

Energy and Emotions

These questions are about how you feel and how things have been with you during the last four weeks. For each question please give the answer that comes closest to the way you have been feeling.

23) Did you feel full of pep?

All the time

Most of the time

A good bit of the time

Some of the time

A little bit of the time

None of the time

24) Have you been a very nervous person?

All the time

Most of the time

A good bit of the time

Some of the time

A little bit of the time

None of the time

25) Have you felt so down in the dumps that nothing could cheer you up?

All the time

Most of the time

A good bit of the time

Some of the time

A little bit of the time

None of the time

26) Have you felt calm and peaceful?

All the time

Most of the time

A good bit of the time

Some of the time

A little bit of the time

None of the time

27) Did you have a lot of energy?

All the time
Most of the time
A good bit of the time
Some of the time
A little bit of the time
None of the time

28) Have you felt downhearted and blue?

All the time

Most of the time

A good bit of the time

Some of the time

A little bit of the time

None of the time

29) Did you feel worn out?

All the time

Most of the time

A good bit of the time

Some of the time

A little bit of the time

None of the time

30) Have you been a happy person?

All the time

Most of the time

A good bit of the time

Some of the time

A little bit of the time

None of the time

31) Did you feel tired?

All the time

Most of the time

A good bit of the time

Some of the time

A little bit of the time

None of the time

Social Activities

32) During the past four weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives)?

All the time

Most of the time

A good bit of the time

Some of the time

A little bit of the time

None of the time

General Health

How true or false is each of the following statements for you?

33) I seem to get sick a little easier than other people

Definitely true _____

Mostly true

Don't know

Mostly false

Definitely false ____

34) I am as healthy as anybody I know

Definitely true

Mostly true

Don't know

Mostly false

Definitely false

35) I expect my health to get worse

Definitely true

Mostly true

Don't know

Mostly false

Definitely false

36) My health is excellent

Definitely true

Mostly true

Don't know

Mostly false

Definitely false

Appendix V: Case Definitions

Fibromyalgia- Chronic widespread pain + 11/18 tender points.

Fibromyalgia related symptoms- Fatigue, morning stiffness, depression, memory problems, balance problems, and increased sensitivity to the environment.

Fatigue- decreased energy or increased need to rest that is disproportionate to any recent change in activity.

Insomnia – presence of unrefreshed sleep, easily arousable, difficulty in falling asleep at night associated with daytime impairment at least 3 times per week for the past one month.

Morning stiffness – stiffness of joints lasting more than an hour in the morning.

Depression – Persistent sadness or low mood and/or marked interest or loss of pleasure

Anxiety- Excessive worry about a number of events or activities; the worry is pervasive and difficult to control

Comorbidities: Presence of one or more additional conditions occurring along with ESRD.

Duration of dialysis – Period of time the patient has been on dialysis since diagnosis of ESRD.

Appendix VI: Kipimo Cha Dalili Ya Ugonjwa Unaodhuru Misuli, Mifupa Na Viungo

Nambari ya msajili: ☐☐☐☐☐☐

Mwelekezo: Kwa kila swali tafadhali weka X kwa jibu na hisia iliyo karibu na jinsi ulivyohisi au unayohisi na huu ugonjwa unaodhuru misuli, mifupa na viungo, ulifanya iwe ngumu kufanya kila moja ya shughuli zifuatazo katika siku 7 zilizopita.

Kuchana nywele zako

Hakuna ugumu ☐☐☐☐☐☐☐☐☐☐☐☐ Ngumu sana

Tembea kuendelea kwa dakika 20

Hakuna ugumu ☐☐☐☐☐☐☐☐☐☐☐☐ Ngumu sana

Kuandaa chakula cha nyumbani

Hakuna ugumu ☐☐☐☐☐☐☐☐☐☐☐☐ Ngumu sana

Kuosha au kufagia sakafu

Hakuna ugumu ☐☐☐☐☐☐☐☐☐☐☐☐ Ngumu sana

Kuinua na kubeba begi la mboga

Hakuna ugumu ☐☐☐☐☐☐☐☐☐☐☐☐ Ngumu sana

Kupanda kitalu kimoja

Hakuna ugumu ☐☐☐☐☐☐☐☐☐☐☐☐ Ngumu sana

Badilisha shuka za kitanda

Hakuna ugumu ☐☐☐☐☐☐☐☐☐☐☐☐ Ngumu sana

Kukaa katika kiti kwa dakika 45

Hakuna ugumu ☐☐☐☐☐☐☐☐☐☐☐☐ Ngumu sana

Kwenda ununuzi wa mboga

Hakuna ngumu ☐☐☐☐☐☐☐☐☐☐☐☐ Ngumu sana

Jumla ☐☐☐

(*For internal use only*)

Mwelekezo: Kwa kila swali tafadhali jibu na hisia iliyo karibu na jinsi ulivyohisi au unayohisi na

athari ya jumla ya ugonjwa unaodhuru misuli, mifupa na viungo katika siku 7 zilizopita.

Ugonjwa unaodhuru misuli, mifupa na viungo ilinizuia kutimiza malengo yangu ya wiki.

Kamwe ☐☐☐☐☐☐☐☐☐☐☐ Kila mara

Nilizidiwa kabisa na dalili zangu

Kamwe ☐☐☐☐☐☐☐☐☐☐☐ Kila mara

Jumla ☐

(*For internal use only*)

Mwelekezo : Kwa kila swali tafadhali jibu na hisia iliyo karibu na jinsi ulivyohisi au unayohisi na

kiwango cha dalili ya ugonjwa unaodhuru misuli, mifupa na viungo katika siku 7 zilizopita.

Tafadhali pima kiwango cha maumivu yako

Hakuna maumivu ☐☐☐☐☐☐☐☐☐☐☐ Maumivu yasiyoweza kuhimili

Tafadhali pima kiwango chako cha nishati

Nishati nyingi ☐☐☐☐☐☐☐☐☐☐☐ Hakuna nishati

Tafadhali pima kiwango chako cha ugumu

Hakuna ugumu ☐☐☐☐☐☐☐☐☐☐☐ Ugumu mkali

Tafadhali pima ubora wako wa kulala

Kuamka vizuri ☐☐☐☐☐☐☐☐☐☐☐ Kuamka nimechoka

Tafadhali pima kiwango chako cha unyogovu

Hakuna unyogovu ☐☐☐☐☐ ☐☐☐☐☐☐ Unyogovu sana

Tafadhali pima kiwango chako cha kumbukumbu

Kumbukumbu nzuri ☐☐☐☐☐☐☐☐☐☐ Kumbukumbu mbaya sana

Tafadhali pima kiwango chako cha wasiwasi

Sina wasiwasi ☐☐☐☐☐ ☐☐☐☐☐☐ Wasiwasi mingi

Tafadhali pima kiwango chako cha uchungu unaposhikwa

Hakuna uchungu ☐☐☐☐☐☐☐☐☐☐ Uchungu mwingi

Tafadhali pima kiwango chako cha matatizo na urari

Hakuna matatizo na urari ☐☐☐☐☐☐☐☐☐☐ Matatizo kubwa na urari

Tafadhali pima kiwango chako cha usikivu kwa kelele nyingi, taa mkali, harufu na baridi

Hakuna usikivu ☐☐☐☐☐☐☐☐☐☐ Usikivu mwingi

Jumla la dalili ☐

(For internal use)

Jumla ya Alama ya FIQR ☐

Appendix VII: Dodosa ya 36 Item Short Form Health Survey

Tafadhali yajibu maswali 36 yafuatayo ya utafiti wa afya kwa ukamilifu uaminifu na bila usumbufu

AFYA KWA UJUMLA

1) Kwa ujumla ungeweza kusema afya yako ni
   Bora Zaidi
   Nzuri sana
   Nzuri
   Nzuri kiasi
   Mbaya

2) Ukilinganisha na mwaka uliopita, unaweza kusemaafya yako kwa ujumla iko vipi?
   Bora Zaidi sasa kuliko mwaka uliopita
   Nzuri Zaidi sasa kuliko mwaka uliopita
   Karibu sawa na mwaka uliopita
   Mbaya kiasi sasa kuliko mwaka uliopita
   Mbaya Zaidi sasa kuliko mwaka uliopita

Mapungufu ya Shughuli

Yafua ni shughuli ambazo unaweza kufanya kwa siku ya kawaida. Je, afya yako huathiri shughuli hizi? Kama inaa ni kwa njia ipi?

3) Shughuli kubwa kama kukimbia, kuinua vitu nzito, kushiriki katika michezo zenye nguvu?
   Ndio, imepungua sana
   Ndio, imepungua kidogo
   La haijapungua hata kidogo
4) Shughuli za wastani kama kusongeza meza, kusukuma utupu safi bowling au kucheza golf?
   Ndio, imepungua sana
   Ndio,imepungua kidogo
   La haijapungua hata kidogo

5) Kuinua au kubeba vyakula
   Ndio, imepungua sana
   Ndio,imepungua kidogo
   La haijapungua hata kidogo

6) Kupanda ngazi kadhaa
   Ndio, imepungua sana
   Ndio,imepungua kidogo
   La haijapungua hata kidogo

7) Kupanda ngazi kidogo
   Ndio, imepungua sana
   Ndio,imepungua kidogo
   La haijapungua hata kidogo

8) Kuinama, kupiga magoti au kusitisha
   Ndio, imepungua sana
   Ndio,imepungua kidogo
   La haijapungua hata kidogo

9) Kutembea zaidi ya maili moja
   Ndio, imepungua sana
   Ndio,imepungua kidogo
   La haijapungua hata kidogo

10) Kutembea vitalu kadhaa
   Ndio, imepungua sana
   Ndio,imepungua kidogo
   La haijapungua hata kidogo

11) Kutembea kitalu kimoja
   Ndio, imepungua sana
   Ndio,imepungua kidogo
   La haijapungua hata kidogo

12) Kuoga au kuvaa mwenyewe

Ndio, imepungua sana

Ndio,imepungua kidogo

La haijapungua hata kidogo

Matatizo ya Afya ya Kimwili

Katika wiki nne zilizopita je umekua na shida zifuatazo na kazi yako au shughuli zako za mara kwa mara za siku kwa sababu ya afya yako ya kimwili?

13) Kupunguza muda uliotumia kwenye kazi na shughuli zingine

Ndio Hapana

14) Kukamilisha mambo chini ya vile ungependa

Ndio Hapana

15) Kupunguza aina ya kazi au shughuli zingine

Ndio Hapana

16) Kuwa na ugumu wa kufanya kazi au shughuli zingine (kwa mfano ilichukua juhudi ziada)

Ndio Hapana

Matatizo ya Afya ya Kihisia

Katika wiki nne zilizopita, je, umekua na shida zifuatazo na kazi yako au shughuli zako za mara kwa mara kwa sababu ya shida kihisia (kama vile huzuni au wasiwasi)?

17) Kupunguza muda uliotumia kwenye kazi au shughuli zingine

Ndio Hapana

18) Kukamilisha kazi chini ya vile ungependa

Ndio Hapana

19) Kutofanya kazi au shughuli zingine kwa makini kama kawaida

Ndio Hapana

Shughuli za Kijamii

20) Je shida za kihisia zimeingia katika shughuli zako za kawaida kama kijamii na familia, marafiki, majirani au vikundi?

Hapana

Kidigo

Kwa kawaida

Kwa kiasi kidogo

Kwa kiasi kikubwa

Uchungu

21) Je, umekua na uchungu wa kimwili wa kiwango kipi kwa wiki nne zilizopita?

Hakuna

Kidogo sana

Kidogo

Wastani

Kali

Kali sana

22) Katika wiki nne zilizopita, maumivu yaliingilia katika kazi yako ya kawaida kwa kiasi gani? (ni pamoja na kazi zote nje ya nyumba pamoja na kazi za nyumba)?

Hapana kabisa

Kidogo

Wastani

Kiasi kidogo

Kiasi kikubwa

Nishati na Hisai

Maswali yafuatayo ni kuhusu jinsi unavyohisi na jinsi mambo yamekwa na wewe wiki nne zilizopita. Kwa kila swali tafadhali jibu na hisia iliyo karibu na jinsi ulivyohisi au unayohisi.

23) Je ulijiskia ukiwa na furaha Zaidi?

Kila wakati

Mara nyingi

Muda kidogo

Wakati mwingine

Muda kidogo sana wa wakati

Hakuna wakati

24) Je, umekuwa mtu mwenye hofu?

Kila wakati

Mara nyingi

Muda kidogo

Wakati mwingine

Muda kidogo sana wa wakati

Hakuna wakati

25) Je umejiskia ukiwa na huzuni kwamba hakuna chochote kile kilichoweza kukufurahisha?

Kila wakati

Mara nyingi

Muda kidogo

Wakati mwingine

Muda kidogo sana wa wakati

Hakuna wakati

26) Je umejiskia mtulivu na mwenye amani?

Kila wakati

Mara nyingi

Muda kidogo

Wakati mwingine

Muda kidogo sana wa wakati

Hakuna wakati

27) Je umekua na jitihada nyingi?

Kila wakati

Mara nyingi

Muda kidogo

Wakati mwingine

Muda kidogo sana wa wakati

Hakuna wakati

28) Je umejiskia kuwa umevunjika moyo?

Kila wakati

Mara nyingi

Muda kidogo

Wakati mwingine

Muda kidogo sana wa wakati

Hakuna wakati

29) Je umejiskia mzee?

Kila wakati

Mara nyingi

Muda kidogo

Wakati mwingine

Muda kidogo sana wa wakati

Hakuna wakati

30) Je umekua mtu mwenye furaha?

Kila wakati

Mara nyingi

Muda kidogo

Wakati mwingine

Muda kidogo sana wa wakati

Hakuna wakati

31) Je umejiskia mchovu?

Kila wakati

Mara nyingi

Muda kidogo

Wakati mwingine

Muda kidogo sana wa wakati

Hakuna wakati

Shughuli za Kijamii

32) Kwamuda wa wiki nne zilizopita ni kiasi gani cha muda wa afya yako ya kimwili au matatizo ya kihisia yamepatei kuingihwa na shughuli zako za kijamii(kama vile kuwatembelea marafiki, ndugu)

Kila wakati

Mara nyingi

Wakati mwingine

Muda kidogo sana wa wakati

Hakuna wakati

Afya Ya Jumla

Jinsi ya kweli au uongo ni kila moja ya kauli zifuatazo kwako

33) Ninaonekana kuwa mgonjwa kwa urahisi Zaidi kuliko watu wengine

Hakika kweli

Zaidi ya ukweli

Sijui

Zaidi ya uongo

Hakiki uongo

34) Nina afya kama mtu yeyote ninayemjua

Hakika kweli

Zaidi ya ukweli

Sijui

Zaidi ya uongo

Hakiki uongo

35) Natarajia afya yangu kuwa mbaya Zaidi

Hakika kweli

Zaidi ya ukweli

Sijui

Zaidi ya uongo

Hakiki uongo

36) Afya yangu ni bora zaidi

Hakika kweli

Zaidi ya ukweli

Sijui

Zaidi ya uongo

Hakiki uongo

Appendix VIII: Informed Consent Form

Introduction

My name is Dr. Jeanette Yego, a 2nd year resident in Masters in Medicine Internal Medicine programme. I am conducting a study on the prevalence and clinical characteristics of fibromyalgia in end-stage kidney disease patients (ESKD) undergoing haemodialysis at the renalunits of KNH, Nairobi Hospital and Parklands Kidney Centre. I would like to invite you to participate in this study.

Type of Research Intervention

After enrollment into the study, information about your disease including cause of renal failure, and duration on dialysis will be noted and filled into the questionnaire. You will then be asked about the presence of pain in your body after which a physical examination will be done to establish the diagnosis. You will also be asked about other symptoms associated with this condition e.g. sleep disturbance, fatigue, joint stiffness. You will then be referred to a rheumatologist who will confirm the diagnosis after which you will be followed up in the rheumatology clinic for further management.

Participation in the Study

Participation in this study is voluntary and you can withdraw at any time. Refusal to participate in the study or withdrawal from the study will not result in any penalty or loss of rights to which you might otherwise be entitled. I assure you that any information you give will remain confidential. You can ask any question regarding this study now or at any time during the study.

Duration

The research will take place over 3 month duration; however each participant will only be enrolled once.

Risks and Benefits

While participating in this study, you will not be exposed to any risks and neither will you incur any added costs. There will be no financial benefits accorded to you if you choose to participate. The benefits of being included in the study is that you will help in ascertaining the presence of fibromyalgia in those patients with ESRD undergoing hemodialysis leading to improved care and quality of life when this condition is managed.

Participant's Declaration

Just as an indication that you have agreed to participate in this study, kindly sign below:

I,..... hereby consent to take part in the study being carried out by Dr. Yego, the nature of which has been explained to me. I have understood the purpose of the study and my questions have been answered satisfactorily.

Date:…… Signature:……

Contact of the Investigator

If you have any questions about this study, feel free to contact the persons below now or at anytime:

Dr Jeanette Yego- 0721126867

Lead Supervisors

Prof G Oyoo and Prof S.O McLigeyo,

The University of Nairobi, P.O. Box 30197-00100

Secretary, UON/KNH-ERC,

P.O. Box 20723- 00202,

KNH, Nairobi.

Tel:020 726300-9 EXT 44355

Email: uonknh_erc@uonbi.ac.ke

Kuhusu Idhini

Mimi ni Daktari Jeanette Yego, mwanafunzi katika chuo kikuu cha Nairobi. Ninatarajia kufanya utafiti kuhusu ugonjwa unaodhuru misuli, mifupa na viungo kwa wale wanaoathiriwa na ugonjwa wa figo wa hatua ya mwisho wanaosafishwa damu.

Sababu Za Kufanya Utafiti

Utafiti huu utasaidia kujua idadi yawatu wanaoathiriwa na ugonjwa huu.

Manufaa ya Kuhusika

Manufaa ya utafiti huu ni kueleleza vile wagonjwa huathirika katika maisha yao ya kawaida. Mapendekezo ya utafiti huu yatasaidia kuboresha huduma wanazozipata wagonjwa hawa hasa wanapogunduliwa kuwa na uchungu katika viuongo vitakavyo angaliwa.

Madhara ya Kuhusika

Hakuna madhara yatakayotokana na kuhusika katika utafiti huu.

Idhini Kwa Kuhusika

Kuhusika kwako katika utafiti huu ni kwa hiari yako. Unaweza kujiondoa kwa utafiti wakati wowote kabla au baada ya utafiti kuanza. Matibabu yanayostahili yatapewa kwa watu wote na wale watakaokataa kuhusika hawatabaguliwa kwa njia yoyote.

Cheti Cha Idhini

Kabla sijakuhusisha katika utafiti wangu, naomba utie sahihi katika fomu ya idhini iliyopo hapo chini. Fomu hii ya idhini haitahusishwa na majibu yako.

Kauli ya ridhaa: Nimesoma habari hapo juu na nimepata majibu ya maswali yoyote.

Tarehe:.....

Sahihi ya mgonjwa:.....

Tarehe:.....

Sahihi ya mkuu wa uchunguzi:.....

MAWASILIANO

Mkuu wa Uchunguzi

Dr Jeanette Yego- 0721126867

Msimamizi wa Uchunguzi

Prof G Oyoo na Prof S.O McLigeyo:The University of Nairobi, P.O. Box 30197-00100

Secretary, UON/KNH-ERC,

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KNH, Nairobi.

Tel:020-726300-9 EXT 44355

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Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/445

8th December 2020

Dr. Yego Jeanette Jepleting
Reg. No.H58/11176/2018
Dept. of Clinical Medicine and Therapeutics
School of Medicine
College of Health Sciences
University of Nairobi

Dear Dr. Yego

RESEARCH PROPOSAL – PREVALENCE OF FIBROMYALGIA IN END-STAGE RENAL DISEASE PATIENTS UNDERGOING MAINTENANCE HEAMODIALYSIS AND ITS EFFECTS ON QUALITY OF LIFE – MULTICENTRE STUDY (P424/08/2020)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and **approved** your above research proposal. The approval period is 8th December 2020 –7th December 2021.

This approval is subject to compliance with the following requirements:

a. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
c. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
d. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
e. Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
f. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*)
g. Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

For more details consult the KNH- UoN ERC website http://www.erc.uonbi.ac.ke

Yours sincerely,

PROF. M. L. CHINDIA
SECRETARY, KNH-UoN ERC

c.c. The Principal, College of Health Sciences, UoN
The Senior Director, CS, KNH
The Chairperson, KNH- UoN ERC
The Assistant Director, Health Information Dept, KNH
The Dean, School of Medicine, UoN
The Chair, Dept. of Clinical Medicine and Therapeutics, UoN
Supervisors: Prof. G.O. Oyoo. Dept.of Clinical Medicine and Therapeutics, UoN
Prof. S.O. McLigeyo, Dept of Clinical Medicine and Therapeutics, UoN

UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES

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