Original paper

The Burden of Fibromyalgia in End-Stage Kidney Disease Patients Undergoing Maintenance Haemodialysis – A Multicentre Study

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Abstract

Background: Fibromyalgia (FMS) 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 (QoL) 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 haemodialysis.

Design: 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).

Methods: The study participants were adults undergoing maintenance haemodialysis 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 and clinical details was administered to patients coming in for maintenance haemodialysis. Fibromyalgia was diagnosed 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. QoL 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 was analysed using SPSS version 25.0 with the help of a statistician. Categorical data 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 QoL 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 haemodialysis. Statistical differences between QoL in patients with FMS and without FMS was analysed 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 30 (18.0%). The mean age of these patients was 53.8 with a female preponderance of 20 (66.7%). The median duration of dialysis was 22 months, and patients with fibromyalgia had dialysed 12 months longer than those without fibromyalgia. Majority of our study patients had hypertension and diabetes mellitus as the underlying aetiology for development of ESKD. There was however no relation between fibromyalgia and underlying aetiology or number of dialysis sessions per week. The mean FIQR score was 50.3. Majority of patients found to have fibromyalgia had moderate severity of symptoms. The patients found to have 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: The prevalence of FMS in ESKD patients undergoing HD was 18%, which was higher than that of the general population. The mean severity score of FMS was 50.3. Most patients were females. No difference between those with FMS and those without FMS was observed regarding age, marital status, level of education or frequency of weekly HD. Duration of dialysis was associated with higher incidence of FM. FMS was associated with worse quality of life in HD patients.

Key words: Fibromyalgia (FMS), End-Stage Kidney Disease (ESKD), Haemodialysis (HD), Quality of life (QoL)

Introduction

Fibromyalgia is a disorder encountered in rheumatology that presents with chronic general pain and increased sensitivity to pressure. The pain is typically 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 QoL of affected individuals. Clinical exam coincides with enhanced tenderness at tendon and muscle insertion sites, known as tender points (1).

Fibromyalgia (FMS) 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 linked to central sensitization (8).

The burden of End Stage Kidney Disease (ESKD) in our set up is high with most of these patients being subjected to long-term haemodialysis (HD). It is approximated that more than 750 million people world-wide are affected by kidney disease (9), and over 2 million people are on haemodialysis for ESRD (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 QoL. They include spondyloarthropathies, amyloid deposition and osteonecrosis (12).

Pain is the commonest complaint reported by ESKD patients on HD and there is paucity of data on specific causes including FMS (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 FMS 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 haemodialysis patients (15-20,21). In the Brazil study done by Couto *et al* (18), 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.

Prevalence of FMS 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 FMS. It is thus very crucial to identify FMS in this subset of patients with a goal of improving overall holistic management.

Materials and methods

This was a cross sectional study involving 167 patients aged 18 years and above on maintenance haemodialysis at the renal units of The Nairobi Hospital (NH), Kenyatta National Hospital (KNH) and Parklands Kidney Centre (PKC). The study was carried out from January 2021 to March 2021. Proportionate random sampling was used to recruit patients who met the inclusion criteria. These included patients of both sexes, above 18 years of age on maintenance haemodialysis for more than 3 months. Written informed consent were obtained from all the participants in the study. Patients were recruited daily by the principal investigator and two research assistants who are trained clinicians.

Data on the demographic variables including age, sex, presence of other comorbidities such as, human immunodeficiency virus, hepatitis B, type 2 diabetes mellitus, systemic lupus erythematosus and rheumatoid arthritis, duration of dialysis in months, and the frequency of dialysis each week.

The principal investigator (JJY) was responsible for making the diagnosis of FMS in all patients undergoing HD and evaluation of tender points using the 1990 American College of Rheumatology 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 main outcomes of the study were the presence or absence of fibromyalgia, the severity of fibromyalgia in patients diagnosed to have FMS, based on the revised fibromyalgia impact questionnaire and the

QoL in HD patients with and without FMS determined by the short form health survey questionnaire. The independent variables included: age (years), sex (male or female), education levels, completed years since initiation of dialysis and number of dialysis sessions in a week. The clinical variables included hypertension (definition based on the JNC 7 classification as either being on treatment or a systolic/diastolic blood pressure of ≥ 140/90 mmHg), diabetes (self-reported, and use of anti-diabetic drugs), lupus nephritis (diagnosed on kidney biopsy) and HIV-associated nephropathy.

SPSS version 25.0 was used to analyse cleaned data. Categorical data 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 FMS was analysed using ordinal regression analysis and presented as a proportion in each class (mild, moderate, severe and very severe). QoL 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 haemodialysis. Statistical differences between QoL in patients with FMS and without FMS were evaluated 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.

The study was approved by the Ethics and Research Committee of The Nairobi Hospital, The Kenyatta National Hospital and University of Nairobi.

Results

Respondent characteristics: One hundred and ninety-two patients were screened for eligibility. We excluded twenty five who did not meet the study criteria leaving us with 167 patients. 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. One hundred and nineteen (71.3%) participants were married (Table 1).

Table 1: Respondents characteristics

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)	1.6 (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 (years)				
<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%)

SD: Standard Deviation

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 2).

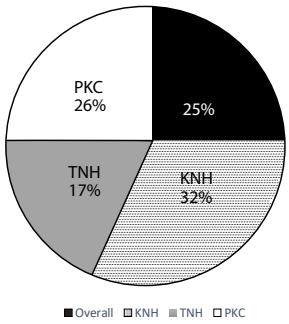
Table 2: Clinical characteristics

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

Prevalence of fibromyalgia in ESRD patients on haemodialysis: The prevalence of fibromyalgia in patients with end-stage renal disease on maintenance haemodialysis 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 1).

Figure 1: Prevalence



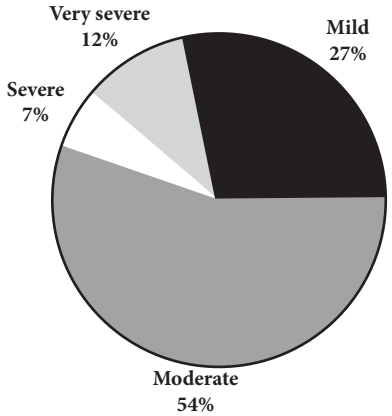
Severity of fibromyalgia among ESRD patients: The mean tender FIQR score for the thirty patients with fibromyalgia was 50.3 (SD 16.3), with the median being 47.8 (IQR 44.6-62.4). Among 30 study subjects with fibromyalgia, 7 (23.3%) had mild symptoms, 14 (46.7%) had moderate symptoms, 6 (20.0%) had severe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

Table 3: 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)

*Chi-square test of association; † Fishers test; IQR; Inter-quartile range

Figure 2: Percentage distribution of the patients with fibromyalgia according to the severity in the study subjects



Factors associated with fibromyalgia in ESRD patients on haemodialysis: There was no statistical significance between the socio-demographic 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) (Table 4).

Table 4: Associations between respondents' characteristics and prevalence of 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)	0.8 (0.2-3.4)	0.357
Median (IQR)	53.0 (39.5-68.0)	54.2(38.6-72.1)	60.5(47.5-73.0)	0.2 (0.1-2.2)	0.298
<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%)	7 (23.3)	21 (15.3)	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%)	7 (23.3)	20 (14.6)	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 haemodialysis 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 haemodialysis (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

*Chi-square test of association; † Fishers test OR: Odds Ratio CI: Confidence interval IQR: Inter-quartile range

Quality of life in patients with end-stage kidney disease undergoing maintenance haemodialysis: 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.

Forty four had a poor quality of life (26.3%). Among the 30 study patients with fibromyalgia, 18 (60.0%) had a poor quality of life. Patients with fibromyalgia were six times more presumably 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).

Table 5: 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)		

*Student t-test OR: Odds Ratio CI: Confidence interval

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 haemodialysis 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* (15) in the USA noted the prevalence of fibromyalgia in CKD patients to be 7.4%, a study carried out in Iran by Samimagham *et al* (16) noted the prevalence to be 12.2%, and another study done in Turkey by Berber *et al* (20) found the prevalence to be 15.9%. 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* (6) in a random sample of 3006 adults revealed FMS prevalence rates of 3.4% in women and 0.5% in men. In accord with the literature, we found that FMS 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 Malombe and Oyoo (24) 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.

The above mentioned study by Wolfe *et al* (6) also established that incidence of FMS 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 FMS in individuals aged 30–39 years, whereas the rate in the group aged 70–79 years was 7.4%. In accordance with literature, most of the patients with FMS (16 of the 30) in our study were older than 60 years of age. The mean age of the thirty HD patients with definite FMS 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 FMS 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 FMS was established. Subjects with FMS 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.* (16) majority of patients had mild severity of fibromyalgia with a mean of 39.05 (SD 23.35). 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.* (19) established that a large number of patients had severe fibromyalgia with a mean FIQR score of 66.2 (SD 15.01). 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 FMS (21). For this study, only 6% of patients had dialysed longer than 5 years, while in the study by Koca *et al.* (19) 48.6% of patients had dialysed for longer than 5 years.

In comparison to local data, a similar prevalence study by Malombe *et al*. (22), found the prevalence of fibromyalgia in HIV patients to be 17.9%, and this was similar to the prevalence in our study. In yet another local prevalence study done by Dokwe *et al.* (14) in the medical outpatient clinics, the prevalence of fibromyalgia was found to be 13%. A study carried out by Umar *et al.* (23) at the diabetic outpatient clinics in

KNH found the prevalence to be 27.9%. 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*. (23) correlated haemoglobin A1c (HbA1c) to the incidence of FMS, 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 years, which was less than the study by Umar *et al.* (23) whose mean age was 59.9 years.

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 by 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. *et al,* (26) it was also established that patients on haemodialysis had a poor QoL with reported lower mean physical composite summary and mental composite summary scores.

A strong association between fibromyalgia and quality of life was noted in this study. It was established that FMS negatively affected quality of life in patients with ESKD on HD as compared to those without FMS (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.* (18) who established that patients with fibromyalgia on maintenance haemodialysis had worse quality of life than their counterparts without fibromyalgia.

Similarly, in a study by Samimagham *et al.* (16) 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.

A study done by Yuceturk *et al.* (15) 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.

Conclusion

The prevalence of FMS in ESKD patients undergoing HD was 18%, which was higher than that of the general population. The mean severity score of FMS was 50.3. Most patients were females. No difference between those with FMS and those without FMS was observed regarding age, marital status, level of education or frequency of weekly HD. Duration of dialysis was associated with higher incidence of FMS. FMS was associated with worse quality of life in HD patients.

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