Original paper

Correlation between Disease Severity and Health-Related Quality of Life among Patients with Fibromyalgia Syndrome

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Abstract

Background: Fibromyalgia Syndrome is a rheumatological condition associated with more healthcare costs, higher prevalence of comorbidities, more workdays missed, poor productivity, early retirement, impaired function, and a poorer quality of life.

Objectives: To determine the correlation between disease severity and health-related quality of life among fibromyalgia syndrome patients.

Design: This was a prospective cross-sectional study.

Methods: The study enrolled patients diagnosed with fibromyalgia syndrome at the Aga Khan University Hospital Nairobi, Kenya. Those enrolled in the study were administered a Revised Fibromyalgia Impact Questionnaire to assess health-related quality of life and a 36 – Item Short Form Health Survey questionnaire to assess the quality of life. Spearman Ranks correlation was used to establish the correlation between the disease severity and health-related quality of life.

Results: There were 59 participants recruited to the study who met the eligibility criteria. Of the 59 participants, 54 (91.5%) were female. The median age of the participants was 41.0 years (Inter Quartile Range: 34.0, 50.0). The majority had mild disease severity (39%), followed by moderate disease (25.4%), severe disease (23.7%), and extreme disease (11.9%). The median Revised Fibromyalgia Impact Questionnaire score was 50 (moderate disease severity). There was a negative significant correlation between the Revised Fibromyalgia Impact Questionnaire domains, the overall Revised Fibromyalgia Impact Questionnaire score with all the 36 Item Short Form Survey subscales ($p<0.05$).

Conclusion: The study demonstrated a negative correlation between disease severity and quality of life in both the physical and mental components. This implies in managing patients with fibromyalgia syndrome, both physical and psychosocial and approaches should be adopted.

Key words: Fibromyalgia, Health-Related Quality of Life, FIQR, SF-36

Introduction

Fibromyalgia Syndrome (FMS) is characterized by chronic widespread musculoskeletal pain accompanied by fatigue, sleep, memory problems, and mood disturbances. Physical examination is characterized by tender points with tenderness demonstrated at insertions of tendons and muscles. It is more common in females and associated with increasing age. It is thought to result from abnormal processing of nociception with central sensitization resulting in a low threshold for pain. The cause is unknown but infectious agents have been implicated such as Hepatitis C (1), Human Immunodeficiency Virus (HIV) (2), and Lyme disease (3).

The American College of Rheumatology (ACR) 2016 updated criteria for diagnosis of fibromyalgia should include Widespread Pain Index (WPI) ≥ seven and Symptom Severity Score (SSS) ≥ five or WPI between four and six and SSS ≥ nine. Patients should exhibit generalized pain defined as pain present in at least four of five regions, symptoms being present at a similar level for more than three months, and that the diagnosis is valid irrespective of other diagnoses.

Little is known about the epidemiology of fibromyalgia syndrome in Kenya. Prevalence studies done elsewhere show it ranges between 0.4 to 4.4% in the general population. Branco *et al* (4) demonstrated a prevalence of 4.7% with most being female. A study done in Kansas on the prevalence of fibromyalgia in the general population found it to be 2% associated with increased age and more common in females (5). Local fibromyalgia studies done in Kenya have been done in clinical settings and not in the general population. A prevalence study done at Kenyatta National Hospital (KNH), Kenya was around 1%, 11% among those with chronic musculoskeletal pain (6), 27.9% among diabetics with chronic pain (7), and 17.9% among ambulatory HIV patients with musculoskeletal pain (8). This suggests that the prevalence is higher among those with comorbidities/chronic illnesses.

The Revised Fibromyalgia Impact Questionnaire (FIQR) was developed as a way to assess the severity of fibromyalgia syndrome. It is a validated tool that has three domains to assess function, the overall impact of the disease, and symptoms (9).

The World Health Organisation (WHO) defines the quality of life as how individuals perceive their state within the framework of their culture and value systems that includes the objectives, expectations, standards, and interests of the individual (10). Health-Related Quality of Life (HRQOL) denotes the proportion of this contributed by one's health status (10).

Local studies have not directly studied the correlation between disease severity with HRQOL indicators among FMS patients. Local prevalence studies mentioned above demonstrated the disease severity to be moderate among the population studied although the HRQOL was not measured among such patients (6). This is comparable to findings by Bennet *et al* (9) who recruited participants previously diagnosed with fibromyalgia from the general population and found a mean FIQR score of 56.6.

A Brazilian study on FMS showed a negative impact on HRQOL (11). A study done in Spain by Mas *et al* (12) showed impaired functioning and poorer HRQOL among FMS patients. A study by Tander *et al* (13) comparing the HRQOL among patients with rheumatoid arthritis and FMS showed that those with fibromyalgia had poorer HRQOL. Verbunt *et al* (14) study concluded that fibromyalgia had a high impact on HRQOL especially on mental health components (14). Lee *et al* (15) study concluded that FMS patients with higher disease severity had a poor HRQOL especially the mental components.

Concerning socio-demographic characteristics, there is a female preponderance in most FMS studies. Some studies have shown a higher prevalence in people from a rural setting, with fewer years of schooling, lower social class, the unemployed, and more common among housewives (12). However other studies showed that prevalence did not correlate to marital status, level of education, or occupation (4). A study by White *et al* (16) concluded that middle age, less education, lower household income, being divorced, and being disabled were associated with the disease. A local study demonstrated that more than half of the FMS patients were unemployed and were engaged in manual activities (6). Another local study by Umar *et al* (7) found factors such as marital status, nature of employment, and activities not to be significant in influencing the disease activity.

The primary objective of this study is to determine the correlation between disease severity and HRQOL among FMS patients in Kenya. FMS contributes significantly to the burden of diseases locally, especially those presenting with musculoskeletal pains as demonstrated by the few local prevalence studies. Currently, there is no data on the local prevalence of FMS in the general population and the figures could be an underestimation due to lack of awareness or misdiagnosis. There has been no previous study to assess the correlation between the severity of FMS and HRQOL.

Materials and methods

This was a cross-sectional, analytical study carried out at the Rheumatology Clinic, Aga Khan University Hospital Nairobi (AKUHN) between April and December 2020 among those who met the 2016 updated ACR diagnostic criteria for FMS. Ethical approval was obtained from the institutional Ethics and Review Committee at Aga Khan University Hospital Nairobi (AKUHN) where the study was being conducted. A consecutive sampling technique was utilized. Consent was obtained from the respondents or appropriate surrogates. No financial incentives or gain was used to lure participants. Confidentiality was maintained throughout the study period.

Biodata and socio-demographic characteristics of the study participants were obtained. The disease severity was assessed by the FIQR questionnaire. It has a maximum score of 100 with a higher score indicating more severe disease. Further categorization of severity is based on the scores with a score of 75 to 100 being extreme, 60 to 74 being severe, 43 to 59 being moderate and 0 to 42 being mild disease. HRQOL was the dependent variable which was assessed by a standardized generic instrument the 36- Item Short Form questionnaire (SF-36) which is composed of 36 items that are grouped in eight subscales or domains. It is a validated generic instrument that measures perceived health status in different conditions. The eight domains (subscales) of the SF-36, are scored on a scale of 0–100, with a higher score indicating a better HRQOL. It is categorized into the physical and mental domains. Sample size was calculated based on the correlation formula (17) and the minimum sample size required was 52, after allowing for a 10% attrition rate using an assumption of 0.4 correlation based on previous literature (9).

Study data were collected and managed using REDCap database (17). Continuous variables were expressed as median with interquartile ranges (IQR) whereas categorical variables were expressed as frequencies and percentages. Univariate analysis was conducted using the Kruskal Wallis test for continuous variables and using Fisher's exact test for categorical variables. Spearman Ranks correlation was calculated for the dependent versus independent variables.

Results

The study recruited 59 participants who met the eligibility criteria. Of those recruited, 5 (8.5%) were male and 54 (91.5%) were female. The median age of those recruited in the study was 41.0 years (IQR: 34.0, 50.0). Fifty seven point six percent of the participants were married, 35.6% were single and 6.8% were either divorced or widowed. Most of the participants resided in Nairobi County (79.7%). The majority, 47 (79.7%) of the participants were employed while 12 (20.3%) of the participants were unemployed. The majority (52.5%) of the participants had no comorbidities whereas 47.5% had comorbidities. The most common comorbidity identified was hypertension (8.5%). Other comorbidities identified were rheumatoid arthritis and cancers. The most common level of education was a tertiary level of education (76.3%). The median duration of symptoms from onset to diagnosis was three years (IQR: 1.0, 6.0). The median duration between diagnosis and time of the study was two years (IQR: 1.0, 3.0).

Table 1 summarizes the demographic characteristics. Table 2 demonstrates the range of diseases among the participants with comorbidities.

Table 1: Demographic characteristics

Overall characteristics		N = 59
Age (years)		41.0 [IQR: 34.0, 50.0]
Gender	Male	5 (8.5%)
	Female	54 (91.5%)
Weight (Kgs)		72.0 [IQR: 63.0, 82.9]
Marital status	Single	21 (35.6%)
	Married	34 (57.6%)
	Divorced / Widowed	4 (6.8%)
Education level	Primary	1 (1.7%)
	Secondary	13 (22.0%)
	Tertiary	45 (76.3%)
Occupation	Employed	47(79.7%)
	Unemployed	12(20.3%)
Comorbidities	Yes	28(47.5%)
	No	31(52.5%)

Table 2: Range of diseases among the participants with comorbidities

Comorbidities	Frequency No. (%)
Diabetes	1 (3.6)
Hypertension	5 (17.9)
Psychiatric illness	2 (7.1)
Cancer	2 (7.1)
Adenomyosis	1 (3.6)
Asthma	1 (3.6)
Behcet's disease	2 (7.1)
FSGS	1 (3.6)
Grave's disease	1 (3.6)
HIV	1 (3.6)
Irritable bowel syndrome	1 (3.6)
Osteoarthritis	1 (3.6)
Pituitary adenoma	1 (3.6)
Reactive arthritis	1 (3.6)
Rheumatoid Arthritis	3 (10.7)
Sjögren syndrome	1 (3.6)
SLE, Scleroderma	1 (3.6)
Stroke	1 (3.6)
Varicose veins	1 (3.6)

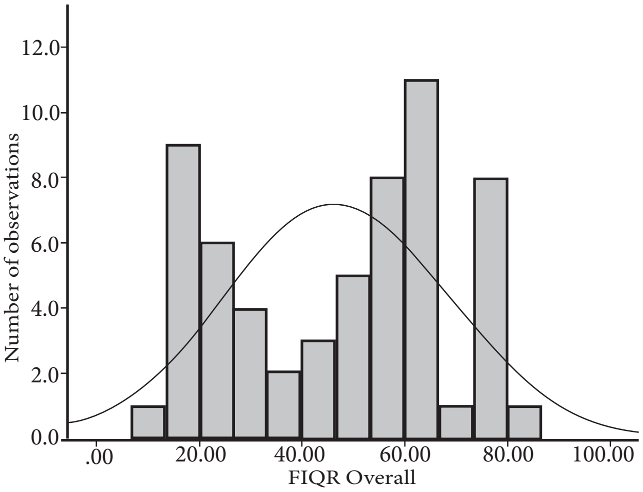
The median FIQR score among the study participants was 50.2 (IQR: 22.5, 63.0). This is in keeping with moderate fibromyalgia disease severity. FMS disease activity as measured by the FIQR score demonstrated that the majority had mild disease severity (39%), followed by moderate disease (25.4%), severe disease (23.7%), and extreme disease (11.9%).

On the FIQR domains, the median function domain score was 33.0 (IQR: 12.0, 60.0), the median overall impact domain score was 10.0 (IQR: 4.0, 15.0) and the median symptom domain score was 49.0 (IQR: 30.0, 67.0). Table 3 demonstrates the disease severity based on the FIQR categories.

Table 3: FIQR categories among study participants.

Disease severity based on FIQR categories	No. of participants (%)
Mild (0 - 42)	23 (39.0)
Moderate (43 - 59)	15 (25.4)
Severe (60 - 74)	14 (23.7)
Extreme (75 - 100)	7 (11.9)

Figure 1: Distribution of the overall FIQR scores



The HRQOL was measured by the SF-36 score which is divided into 8 subscales. A higher score usually indicates better-perceived health. The greatest impact was on the physical and emotional role limitation whereas the least impact was on social functioning. Table 4 summarizes the scores on the SF-36 subscales.

Table 4: Scores on the 8 SF-36 subscales

SF-36	Median [IQR]
Physical	55.0 [30.0, 75.0]
Physical role limitation	0.0 [0.0, 50.0]
Emotional role limitation	0.0 [0.0, 100.0]
Energy/Fatigue	40.0 [25.0, 55.0]
Emotional well being	56.0 [45.0, 72.0]
Social functioning	62.5 [37.5, 87.5]
Pain	42.5 [22.5, 57.5]
General health	45.0 [30.0, 65.0]

Correlation between FMS disease severity and HRQOL was done by comparing the FIQR domains, the overall FIQR score, and the SF-36 8 subscales. A higher domain FIQR score implies a higher disease severity. A higher SF-36 score implies a better quality of life. A negative correlation implies that with an increase in disease severity there is associated worsening HRQOL.

There was a negative correlation between the FIQR domains, the overall FIQR score with all the SF-36 subscales. This was statistically significant ($p < 0.05$) for all the SF 36 subscales. Table 5 demonstrates the correlation between the FIQR domains, overall FIQR score with the SF-36 subscales.

Table 5: Correlation between the FIQR scores and the SF 36 subscales

	SF 36 Subscales	Physical		Physical role limitation	Emotional role limitation	Energy
FIQR	Function domain	-0.619		-0.603	-0.457	-0.395
	<0.001		<0.001	<0.001	0.002	
	Overall domain	-0.374		-0.356	-0.452	-0.423
	0.004		0.006	<0.001	0.001	
	Symptom domain	-0.41		-0.466	-0.404	-0.619
	0.001		<0.001	0.002	<0.001	
	FIQR Overall	-0.555		-0.551	-0.51	-0.544
	<0.001		<0.001	<0.001	<0.001	
	SF 36 Subscales	Emotional		Social	Pain	General
FIQR	Function domain	-0.216		-0.551	-0.526	-0.463
	0.1		<0.001	<0.001	<0.001	
	Overall domain	-0.338		-0.508	-0.451	-0.47
	0.009		<0.001	<0.001	<0.001	
	Symptom domain	-0.396		-0.579	-0.5	-0.544
	0.002		<0.001	<0.001	<0.001	
	FIQR Overall	-0.365		-0.636	-0.583	-0.554
	0.004		<0.001	<0.001	<0.001	

1st Row = Correlation Coefficient
2nd Row = P-value
** Correlation method = Spearman ranks method

Multivariate logistic regression was performed to establish the association between FMS disease severity and SF-36 HRQOL domains when adjusted for other independent variables that included age, gender, level of education, and presence of psychiatric illnesses. The severity of the disease was categorized as those with a mild and moderate disease as one group and those with a severe and extreme disease as another group based on the FIQR scores.

From the results, with a one-unit increase in the various SF-36 domains, there is a reduction in the odds of being in the severe group. There was a significant negative association between the various SF-36 domains and the severity of the disease demonstrated by odds ratios of less than one ($p<0.05$). Table 6 summarizes the results of the associations.

Table 6: Multivariate logistic regression on the severity of the disease based on FIQR

SF-36 Domains	Odds Ratio	95% C.I	P-value
Physical	0.944	[0.914, 0.975]	0.001
Physical role limitation	0.964	[0.937, 0.992]	0.013
Emotional role limitation	0.971	[0.953, 0.989]	0.002
Energy	0.94	[0.9, 0.981]	0.004
Emotional	0.96	[0.925, 0.996]	0.03
Social	0.93	[0.893, 0.969]	0.001
Pain	0.931	[0.892, 0.973]	0.001
General	0.954	[0.922, 0.987]	0.007

Discussion

The study participants were enrolled at a private tertiary facility. The patients seen are likely to be referrals from other facilities and are also likely to have a more severe disease state.

There were demonstrable similar demographic characteristics with other studies. In the study, 5 (8.5%) of the study participants were male and 54 (91.5%) were female. A local study done had demonstrated a female predominance of 97.7% (6). In a study done in five European countries, 94% of the FMS participants were female (4). The mechanisms of the association between FMS and female sex have not been fully understood but the female gender is a strong predictor of disease (5). Generally, one should have a higher index of suspicion among female patients with suspected FMS.

The findings of the study demonstrated that FMS is common in the middle-aged population which is similar to what has been demonstrated in other studies. The median age of the study participants was 41.0 years. A local study had found the mean age among FMS participants to be 48.5 years (6). In a study done in the USA, the mean age of those studied was 51.0 years (9), whereas, in a study done in the Netherlands, the mean age was 40.0 years (14). The prevalence of FMS is thought to increase with age but recommendations remain that anyone presenting with widespread pain should be screened for FMS regardless of age.

Most of the participants in the study were married (57.6%). This is similar to two local studies done where the majority of the participants were married (6,8). In a study on the prevalence of FMS in Kansas, majority, 53% of the participants. were married (5). Previously FMS was thought to be more common in the single, divorced, or widowed due to psychosocial stressors but recent studies including our study show that it is more common even in the married who are perceived to be more stable psychosocially.

Most of the study participants had a tertiary level of education (76.3%). Other local studies done on FMS had not looked at the level of education. The result could be biased since most of the patients attending private clinics are from a higher social-economic status.

FMS is not a diagnosis of exclusion and can occur even in the presence of comorbidities. It plays a unique contribution to the overall burden of co-existing illnesses and treatment of each disorder contributes to the overall outcome. Hypertension was the most common co-existing illness among the participants at 17.9%. A local study did recognize hypertension as the most common comorbidity at 53.5% (6). A study done in Spain found hypertension as the most common comorbidity among FMS participants (12).

The degree of severity of FMS was assessed using the FIQR questionnaire. The majority of the study participants had mild disease severity (39%) followed by moderate disease severity (25.4%). The median FIQR score among the study participants was 50 in keeping with moderate disease severity. However, the assessment of disease severity is likely to be affected by interventions as the participants enrolled had been previously diagnosed to have FMS and were on follow-up. In a local study done on the prevalence of FMS, the average FIQR score was 55.9 implying moderate disease activity (6). In a study done in the USA, while validating the FIQR score, the average FIQR score was 56.58 implying moderate disease severity (9).

The HRQOL was assessed using the SF 36 tool. Understanding the degree of impact chronic illnesses have on the different domains of HRQOL whether physical, mental, or social functioning helps better defining the treatment strategies. The SF 36 encompasses both physical and mental health components. FMS patients are reported to have a lower HRQOL than most chronic illnesses. It also tends to have an impact on other domains apart from the physical domains, unlike other chronic illnesses. Social factors such as depression, anxiety, fatigue play a big role in the pathogenesis of FMS.

In the study, the greatest impact was on the physical and emotional role limitation whereas the least impact was on social functioning. This is similar to a study among Brazilian women where the highest impact was on physical role limitation and the least impact was on social functioning (11). This was also found in a Turkish study where the highest impact was on physical and emotional role limitation subscales and the least impact was on the social functioning subscale (18). This demonstrates that although FMS is a chronic musculoskeletal pain disorder, the results emphasize the functional impairment as a result of the disease.

The study demonstrated a negative correlation between FMS disease severity and HRQOL. This was statistically significant in all the SF-36 subscales. Verbunt *et al* (14) demonstrated that there was a statistically significant negative correlation between FMS and disability measured by the FIQ score and SF-36 subscales apart from the energy subscale. Birtane *et al* (18) demonstrated that physical functioning, physical role limitation, and pain subscales had a statistically significant negative correlation with the overall FIQ score. Martinez *et al* (11) demonstrated a statistically significant impact on FMS on all subscales of the SF-36 compared to a healthy control group. Tander *et al* (13) demonstrated a negative correlation between the total FIQR score and the social functioning and energy subscales of the SF-36.

Multivariate logistic regression was performed and adjustment for other independent variables including age, gender, level of education, and presence of other psychiatric illnesses was done. A negative association was demonstrated between disease severity and HRQOL that was statistically significant ($p<0.05$) in all the 8 domains of the SF-36.

This means that management strategies should focus on enhancing all aspects of HRQOL and not only symptom management. Measures to raise awareness of FMS by medical personnel should be enhanced and not ignored as it has a significant impact on the HRQOL. Reduced HRQOL means less productivity by FMS patients that has a major influence on the economy. Misdiagnosis and poor management of FMS patients mean maladaptive health-seeking behavior by the patients which leads to a significant waste of health care resources.

Conclusions and recommendations

The study found a negative correlation between FMS disease severity and HRQOL. The impact was significant on most aspects of HRQOL. The strongest impact on HRQOL was on physical and emotional role limitation which results in significant functional impairment. There should be both pharmacological management approaches to manage pain and non-pharmacological strategies to address psychosocial needs including psychotherapy and exercise. Assessment of all aspects of the disease should be done during hospital visits from physical, psychosocial, emotional, and coping strategies.

Limitations: The study participants were recruited from a private tertiary facility and are generally from a higher socio-economic status which could influence the study results in terms of socio-demographic characteristics and severity of the disease. The inclusion of a control group would have given a better overall impact of the disease on HRQOL. The data was all self-reported and no objective clinical tool is available to assess disease severity. The inclusion of those with comorbidities is a confounding factor in the study. The inclusion of participants who could be receiving interventions could skew the study results on disease severity.

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