



# The prevalence of fibromyalgia in adults at Al-Karak Jordan: a cross-sectional study

Alaa Akel, EBOT<sup>a</sup>, Mohammed Y. Sarhan, EBOT<sup>b</sup>, Majed Al Dwairy, MD<sup>c</sup>, Belal Al-zu'bi, MD<sup>a</sup>, Ala Al-Qudah, MD<sup>g</sup>, Omar A. Alsmarat, MD<sup>d</sup>, Taif Alsaraireh, MD<sup>e</sup>, Mohammad Abu-Jeyyab, MD<sup>f,\*</sup>

**Introduction:** Fibromyalgia is a chronic and intricate musculoskeletal disorder characterized by widespread pain, fatigue, and tenderness in specific anatomical regions. Although its prevalence varies among populations, understanding the prevalence in different geographical areas is crucial for healthcare planning. This cross-sectional study aims to determine the prevalence of fibromyalgia in adults residing in Al-Karak, Jordan. The city's unique demographic and environmental characteristics may influence the occurrence of fibromyalgia among its adult population. The study aims to address gaps in knowledge, provide localized insights, and shed light on fibromyalgia's burden on the community's health. Accurate prevalence data aids healthcare planning and resource allocation.

**Methods:** This research collected data from 965 social media participants using Google Forms. The American College of Rheumatology survey criteria for diagnosing fibromyalgia were used. To investigate the predictive value of various parameters, univariate and multivariate logistic regression analyses were performed.

**Results:** The study found a 26.5% prevalence of fibromyalgia in the studied population. Female gender, mental health illnesses, and comorbidities like irritable bowel syndrome, psychiatric disorders, and rheumatological and neurological diseases were significantly associated with fibromyalgia. Age, BMI, marital status, employment status, and certain comorbidities did not show statistically significant predictive value.

**Conclusion:** This study sheds light on fibromyalgia's prevalence and associated factors in the Al-Karak population. The identified predictors highlight the necessity for comprehensive healthcare strategies and interventions to mitigate the disease burden. These findings aid policymakers and healthcare professionals in planning and implementing effective measures for fibromyalgia management and prevention. Further research is warranted to deepen our understanding of fibromyalgia's complexity and its implications in this region.

**Keywords:** Al-Karak, fibromyalgia, prevalence, rheumatology, survey

## Introduction and background

Fibromyalgia is a chronic and complex musculoskeletal disorder characterized by widespread pain, fatigue, and tenderness in specific anatomical regions, other symptoms that worsen the

<sup>a</sup>Department of Special Surgery, Faculty of Medicine, Mutah University, Mu'tah,

<sup>b</sup>Department of Special Surgery, Faculty of Medicine, The Hashemite University,

Zarqa, <sup>c</sup>Princess Basma Teaching Hospital, Irbid, <sup>d</sup>Department of Surgery, Al-

Nadeem Hospital, Madaba, <sup>e</sup>Prince Hamzeh Hospital, <sup>f</sup>School of Medicine, Mutah

University, Al-Karak, Jordan, Red Crescent Hospital, Amman, Jordan and <sup>g</sup>Internal

Medicine, Stockport NHS Foundation Trust, Manchester, UK

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

\*Corresponding author. Address: School of Medicine, Mutah University, Al-Karak, Jordan./ Red Crescent Hospital, Amman, Jordan. Tel./fax: +962 796 383 747 61710. E-mail: mabujoyyab@yahoo.com (M. Abu-Jeyyab).

Copyright © 2024 The Author(s). Published by Wolters Kluwer Health, Inc. This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

Annals of Medicine & Surgery (2024) 86:1315–1321

Received 24 November 2023; Accepted 3 January 2024

Published online 23 January 2024

<https://dx.doi.org/10.1097/MS9.0000000000001722>

## HIGHLIGHTS

- The study used a cross-sectional design and collected data from 965 participants through social media using Google Forms.
- The study applied the American College of Rheumatology survey criteria to diagnose fibromyalgia among the participants.
- The study found that 26.5% of the participants had fibromyalgia, which is a high prevalence compared to other regions in the world.
- The study also found that female gender, mental health illnesses, and certain comorbidities such as irritable bowel syndrome, psychiatric disorders, and rheumatological and neurological diseases were significantly associated with fibromyalgia.
- The study did not find any significant association between fibromyalgia and age, BMI, marital status, employment status, and some other comorbidities.
- The study concluded that fibromyalgia is a common and complex condition in Al-Karak that requires specific healthcare interventions and public awareness initiatives. The study also suggested further research to better understand the disease and its implications in this region.

quality of life<sup>[1,2]</sup>. While being a common ailment worldwide, the exact prevalence of fibromyalgia varies greatly between regions and populations. Knowing the prevalence of fibromyalgia in different geographical areas is critical for healthcare planning, resource allocation, and patient care optimization<sup>[2]</sup>.

In recent years, there has been a growing interest in studying fibromyalgia's prevalence and impact on various populations. The Middle East, particularly Jordan, is no exception, with few studies on the incidence of fibromyalgia in this region. The city of Al-Karak in southern Jordan has distinct demographic and environmental characteristics that may influence the occurrence of fibromyalgia among its adult population.

This cross-sectional study aims to determine the prevalence of fibromyalgia in adults residing in Al-Karak, Jordan. By conducting a comprehensive assessment of fibromyalgia prevalence, this research intends to contribute valuable epidemiological data specific to this region and shed light on the burden of fibromyalgia on the local population.

This study has significance since it tackles the region's shortages of knowledge about fibromyalgia. There has been no prior study on the prevalence of fibromyalgia in Al-Karak, and the majority of patients are misdiagnosed in clinical practice if the differential diagnosis is not examined<sup>[1]</sup>, this study becomes crucial as it provides localized insights into the prevalence and unique characteristics of fibromyalgia in the specific population of Al-Karak, facilitating tailored healthcare strategies and culturally sensitive interventions and by establishing the prevalence of fibromyalgia as the study sheds light on the condition's actual burden on the community's health and well-being. Accurate prevalence data also aids in healthcare planning and resource allocation to effectively manage and support individuals with fibromyalgia<sup>[3]</sup>.

Overall, the study of fibromyalgia prevalence in adults in Al-Karak, Jordan, is an important step toward better understanding the effects of this complex condition on local communities, and it can serve as a foundation for future investigations and collaborations, stimulating further research and potential longitudinal studies. The global relevance of fibromyalgia as a health concern underscores the importance of this study, which adds to a better understanding of fibromyalgia prevalence and implications not just in Al-Karak but also in other communities throughout the world.

## Methods

### Study design and setting

Using google forms, this cross-sectional study was carried out, and the participants were reached via social media platforms<sup>[4]</sup>. Participants' autonomy was maintained, and no direct benefit was gained in return for filling out the questionnaire. Moreover, the committee ensured that the study was designed according to the principles of the Declaration of Helsinki (Date: 13 February 2023. Reference number: 992023). In this study, the authors targeted Karak government citizens, in Jordan. Accordingly, the required sample size to achieve a 99% Confidence interval was 663 participants. This work has been reported in line with the STROCCS criteria<sup>[4]</sup>.

### Fibromyalgia diagnosis

As a diagnostic tool for fibromyalgia, the ACR survey criteria were included in the questionnaire<sup>[5]</sup>. It is a modification of the ACR 2010 made for the purpose of epidemiological studies<sup>[5]</sup>. In these criteria, the diagnosis is based on two scores: Widespread Pain Index (WPI) and symptom severity (SS). Subsequently, the fibromyalgia score (FS) score is calculated via the summation of both the SS scale and WPI. Whenever the FS is greater than or equal to 13, a diagnosis of fibromyalgia is established. This cut-off point was proposed to have the highest sensitivity and specificity<sup>[6]</sup>.

### Survey development

The survey developed by Ursini *et al.*<sup>[7]</sup> served as the foundation for this study's research instrument. For this study, an independent native Arabic speaker fluent in Italian translated the survey into Arabic. Following that, the final questionnaire was translated back into Italian by an objective native Italian speaker fluent in Arabic who had no prior exposure to the original questionnaire. To ensure that there were no substantial changes in meaning, the original questionnaire and the back-translated version were compared. The survey was modified to correct minor grammatical problems and to incorporate a visual illustration, in the form of a graph, of all 19 body areas for which participants were questioned about discomfort. The pilot study revealed that, on average, it took ~5 min to complete the survey.

All questions were required, which meant that participants had to answer them to submit the survey. When the participant clicked the "send" button, a response was recorded.

### Survey structure

The survey consisted of three pages comprising a total of 25 questions. Prior to the questions, an introduction was presented, which outlined the overall objective of the questionnaire and listed the names of the researchers along with their contact information. Additionally, a statement was included to assure participants that all data collected would be anonymized and exclusively used for research purposes. The questions were divided into three sections. The first section (Q1–Q10) focused on gathering sociodemographic information from participants as well as any comorbid conditions they may have. The second section (Q11–Q14) closely resembled the ACR survey criteria for diagnosing fibromyalgia. Lastly, the third section (Q15–Q25) consisted of the FIQ-I<sup>[4]</sup>.

### Statistical analysis

Continuous and categorical variables were expressed in both mean  $\pm$  SD and frequency (percentage) respectively. Additionally, for the investigation of significant differences, an independent *t*-test and  $\chi^2$  test were used for both continuous and categorical variables respectively. Moreover, Bivariate correlation was used to investigate potential correlations between FS and other continuous variables, and this was reported with Pearson correlation coefficient (R). To assess the prognostic value of the independent variables, we built models of univariate and multivariate logistic regression. The results of these models were reported as odds ratio (OR), and 95% CI. Significant differences were considered at a *P* less than or equal to 0.05, and SPSS version 25.0 was used to conduct the statistical analysis.

**Results**

**Sociodemographic characteristics of the study population**

Table 1 provides an overview of the general characteristic features of the studied population.

Of the 100% ( $n=965$ ) of participants included in the study, with a mean age of  $34.4 \pm 12.2$  years, the study found that 73.5% of the participants were classified as fibromyalgia-negative ( $n=709$ ), while 26.5% were classified as fibromyalgia-positive ( $n=256$ ).

The average BMI of the participants was  $26.0 \pm 4.9$  kg/m<sup>2</sup>. In terms of gender distribution, 26.1% were male ( $n=252$ ) and 73.9% were female ( $n=713$ ). In aspects of marital status, 44.7% ( $n=431$ ) were single, while 55.3% ( $n=534$ ) were married. According to employment status, 58.1% were unemployed ( $n=561$ ) and 41.9% were employed ( $n=404$ ). The following were the rates of pre-existing comorbid diseases: 34.4% ( $n=332$ ) had irritable bowel syndrome (IBS), 19.3% ( $n=186$ ) had psychiatric disease, 12.5% ( $n=121$ ) had rheumatological disease, 6.2% ( $n=60$ ) had neurological disease, and 1.6% ( $n=15$ ) had cancer. The participants' fibromyalgia score (FS) was determined to be  $9.2 \pm 5.9$ . Notably, these considerable baseline characteristics provide valuable insights into the demographic and clinical composition of the studied population, laying the groundwork for future research into the prevalence and impact of fibromyalgia in this cohort.

**Predisposing factors and variables of interest related to fibromyalgia**

The results of the comparison between fibromyalgia-negative and fibromyalgia-positive participants are summarized in Table 2. The analysis of various parameters showed the following key findings:

**Table 1**  
General characteristic features of the studied population

	Overall ( $n=965$ )
Age (years)	$34.4 \pm 12.2$
BMI (kg/m <sup>2</sup> )	$26.0 \pm 4.9$
Sex	
Male, $n$ (%)	252 (26.1)
Female, $n$ (%)	713 (73.9)
Marital status	
Single, $n$ (%)	431 (44.7)
Married, $n$ (%)	534 (55.3)
Employment status	
Unemployed, $n$ (%)	561 (58.1)
Employed, $n$ (%)	404 (41.9)
Pre-existent comorbid diseases	
IBS, $n$ (%)	332 (34.4)
Psychiatric disease, $n$ (%)	186 (19.3)
Rheumatological disease, $n$ (%)	121 (12.5)
Neurological disease, $n$ (%)	60 (6.2)
Cancer, $n$ (%)	15 (1.6)
Fibromyalgianess score (FS)	$9.2 \pm 5.9$
Fibromyalgia status	
Negative, $n$ (%)	709 (73.5)
Positive, $n$ (%)	256 (26.5)

IBS, irritable bowel syndrome.

**Table 2**  
Comparison between fibromyalgia and fibromyalgia-free participants

	Fibromyalgia-negative ( $n=709$ )	Fibromyalgia-positive ( $n=256$ )	<i>P</i>
Age (years)	$34.8 \pm 12.3$	$33.3 \pm 12.1$	0.099
BMI (kg/m <sup>2</sup> )	$26.0 \pm 4.9$	$26.0 \pm 4.9$	0.934
FS	$6.4 \pm 3.5$	$17.0 \pm 3.9$	0.001
Sex			0.001
Male, $n$ (%)	227 (32.0)	25 (9.8)	
Female, $n$ (%)	482 (68.0)	231 (90.2)	
Marital status			0.063
Single, $n$ (%)	304 (42.9)	127 (49.6)	
Married, $n$ (%)	405 (57.1)	129 (50.4)	
Employment status			0.748
Unemployed, $n$ (%)	410 (57.8)	151 (59.0)	
Employed, $n$ (%)	299 (42.2)	105 (41.0)	
Pre-existent comorbid diseases			
IBS, $n$ (%)	213 (30.0)	119 (46.5)	0.001
Psychiatric disease, $n$ (%)	123 (17.3)	63 (24.6)	0.012
Rheumatological disease, $n$ (%)	75 (10.6)	46 (18.0)	0.002
Neurological disease, $n$ (%)	23 (3.2)	37 (14.5)	0.001
Cancer, $n$ (%)	9 (1.3)	6 (2.3)	0.234

FS, fibromyalgia score; IBS, irritable bowel syndrome.

Regarding age, the average age in the fibromyalgia-negative group was  $34.8 \pm 12.3$  years, while in the fibromyalgia-positive group, the average age was  $33.3 \pm 12.1$  years. The difference in age between the two groups was not statistically significant ( $P$  value = 0.099).

In terms of BMI, both groups exhibited similar average BMI values. The fibromyalgia-negative group had an average BMI of  $26.0 \pm 4.9$  kg/m<sup>2</sup>, while the fibromyalgia-positive group had an identical average BMI of  $26.0 \pm 4.9$  kg/m<sup>2</sup>. The  $P$  value of 0.934 indicated no statistically significant difference in BMI between the groups.

However, when assessing the FS, a statistically significant difference was observed. The fibromyalgia-negative group had an average FS of  $6.4 \pm 3.5$ , whereas the fibromyalgia-positive group had a considerably higher average FS of  $17.0 \pm 3.9$ . The  $P$  value of 0.001 indicated a significant difference in fibromyalgia scores between the two groups, with the positive fibromyalgia group exhibiting markedly higher scores.

Furthermore, the distribution of both genders between the two groups showed significant disparities. In the fibromyalgia-negative group, 32.0% were male, and 68.0% were female, while in the fibromyalgia-positive group, only 9.8% were male, and 90.2% were female. The gender distribution difference was statistically significant ( $P$  value = 0.001).

Regarding marital status, though the  $P$  value of 0.063 suggested borderline statistical significance, there was no substantial difference in distribution between the fibromyalgia-negative and positive groups. The fibromyalgia-negative group had 42.9% single participants and 57.1% married, while the fibromyalgia-positive group had 49.6% single and 50.4% married individuals.

The employment status did not show any statistically significant difference between the two groups ( $P$  value = 0.748). In the fibromyalgia-negative group, 57.8% were unemployed, and

42.2% were employed, whereas in the fibromyalgia-positive group, 59.0% were unemployed, and 41.0% were employed.

Regarding comorbid diseases, there were significant differences in the prevalence of certain conditions between the fibromyalgia-negative and positive groups. The fibromyalgia-positive group exhibited a higher prevalence of IBS, psychiatric disease, rheumatological disease, and neurological disease, with *P* values less than 0.05. However, there was no significant difference in the prevalence of cancer between the two groups (*P* value = 0.234).

In conclusion, the results of Table 2 demonstrate that the fibromyalgia-positive group had higher fibromyalgia scores, a greater proportion of females, and a higher prevalence of specific comorbid diseases compared to the fibromyalgia-negative group. However, there were no significant differences in age, BMI, marital status, employment status, or the prevalence of cancer between the two groups. These findings provide valuable insights into the characteristics and disparities of fibromyalgia-positive and fibromyalgia-negative individuals, contributing to a better understanding of the condition's impact on this population.

**How can age and BMI influence fibromyalgia?**

Table 3 presents the correlation between the FS and other continuous variables in the study. The correlation analysis revealed that there was a weak negative correlation between FS and age ( $r = -0.024$ ,  $P = 0.453$ ), indicating that as age increased, the fibromyalgia score slightly decreased, but this association was not statistically significant. Similarly, there was a very weak negative correlation between FS and BMI ( $r = -0.005$ ,  $P = 0.881$ ), suggesting that as BMI increased, the fibromyalgia score showed a slight decrease, but this correlation was not statistically significant. The non-significant correlations imply that age and BMI may not be substantial factors influencing fibromyalgia in the studied population. These findings contribute to the understanding of the relationship between FS and age as well as FS and BMI, supporting the need for further investigation into other potential factors contributing to the fibromyalgia condition in this cohort.

**Significance of multiple variables in anticipating fibromyalgia patients' outcomes**

In the scientific paper, Table 4 shows the results of the univariate logistic regression models that were used to figure out how important different variables were in predicting fibromyalgia outcomes. The analysis revealed the odds ratios (OR) along with their respective 95% CI and *P* values for each predictor.

For age, the univariate logistic regression yielded an OR of 0.982 (95% CI: 0.948–1.02), indicating that there was no statistically significant association between age and fibromyalgia status ( $P = 0.295$ ). Similarly, the analysis for BMI showed an OR of 0.958 (95% CI: 0.898–1.02), suggesting that BMI did not have

**Table 3**  
Pearson correlation between FS and other continuous variables

	FS	
	R	P
Age	-0.024	0.453
BMI	-0.005	0.881

FS, fibromyalgia score.

**Table 4**  
Univariate logistic regression models exploring the prognostic value of various variables to fibromyalgia

Predictor	Univariate		
	OR	95% CI	P
Age	0.982	0.948–1.02	0.295
BMI	0.958	0.898–1.02	0.196
Being a female	0.56	0.236–1.326	0.187
Being married	0.625	0.326–1.198	0.157
Being employed	1.034	0.553–1.932	0.917
Pre-existing comorbid diseases			
IBS	0.00	0.00–Inf	0.988
Psychiatric disease	0.00	0.00–Inf	0.986
Rheumatological disease	0.00	0.00–Inf	0.986
Neurological disease	0.00	0.00–Inf	0.986
Cancer	0.00	0.00–Inf	0.988

IBS, irritable bowel syndrome; OR, odds ratio.

a statistically significant predictive value for fibromyalgia ( $P = 0.196$ ). The OR for the predictor of being female was 0.56 (95% CI: 0.236–1.326), suggesting a tendency for females to have lower odds of having fibromyalgia; however, the association was not statistically significant ( $P = 0.187$ ). Being married exhibited an OR of 0.625 (95% CI: 0.326–1.198), implying a non-significant trend towards decreased odds of fibromyalgia in married individuals ( $P = 0.157$ ).

The variable of employment status (being employed) produced an OR of 1.034 (95% CI: 0.553–1.932), indicating no significant association with fibromyalgia ( $P = 0.917$ ). The logistic regression models produced ORs of 0.00 for each of the pre-existing comorbid conditions, which included cancer, mental disorders, rheumatological disorders, neurological disorders, and IBS. The confidence intervals for these models were large, ranging from 0.00 to infinity. The related *P* values were all near to 1 ( $P > 0.98$ ), suggesting that these variables had little predictive potential for fibromyalgia in this scenario.

In summary, univariate logistic regression analysis revealed that age, BMI, sex, marital status, work status, and the investigated pre-existing concomitant disorders had no statistically significant prognostic value for fibromyalgia outcomes in this sample. These findings highlight the complexities of fibromyalgia illness and suggest that these individual characteristics may not be significant predictors of fibromyalgia risk in this population. More research with additional predictors is needed to properly understand the multidimensional nature of fibromyalgia factors in this scenario.

Table 5 presents the outcomes of the multivariate logistic regression models aimed at exploring the predictive value of various variables on fibromyalgia outcomes in the scientific paper. The table presents the odds ratios (OR) along with their corresponding 95% CI and *P* values for each predictor.

In terms of age, the multivariate logistic regression analysis yielded an OR of 0.998 (95% CI: 0.941–1.06), indicating that age was not a statistically significant predictor of fibromyalgia outcomes ( $P = 0.95$ ). Similarly, for BMI, the analysis resulted in an OR of 0.977 (95% CI: 0.907–1.05), indicating that BMI was not significantly associated with fibromyalgia outcomes ( $P = 0.539$ ).

Regarding being female, the multivariate logistic regression demonstrated an OR of 0.38 (95% CI: 0.143–1.01), suggesting a

**Table 5**  
**Multivariate logistic regression models exploring the prognostic value of various variables to fibromyalgia**

Predictor	Odds ratio	95% CI		P
		Lower	Upper	
Age	0.998	0.941	1.06	0.95
BMI	0.977	0.907	1.05	0.539
Being a female	0.38	0.143	1.01	0.053
Being married	0.678	0.259	1.77	0.428
Employment				
Being employed	1.697	0.701	4.11	0.241
Pre-existing comorbid diseases				
IBS	0	0	Inf	0.987
Psychiatric disease	0	0	Inf	0.994
Rheumatological disease	0	0	Inf	0.994
Neurological disease	0	0	Inf	0.993
Cancer	0	0	Inf	0.996

IBS, irritable bowel syndrome.

notable trend towards reduced odds of fibromyalgia among females, although this association approached borderline statistical significance ( $P = 0.053$ ).

For marital status (being married), the multivariate analysis yielded an OR of 0.678 (95% CI: 0.259–1.77), indicating that being married was not a statistically significant predictor of fibromyalgia outcomes ( $P = 0.428$ ). In terms of employment status (being employed), the analysis resulted in an OR of 1.697 (95% CI: 0.701–4.11), suggesting that employment status was not a statistically significant predictor of fibromyalgia outcomes ( $P = 0.241$ ).

The logistic regression models constructed ORs of 0 when examining the impact of pre-existing comorbid diseases which included IBS, psychiatric disease, rheumatological disease, neurological disease, and cancer. These ORs, as well as their wide confidence intervals ranging from 0 to infinity, indicated that these variables lacked predictive power for fibromyalgia in this multivariate context. The corresponding  $P$  values were all close to one, emphasizing the lack of predictive significance.

In this multivariate model, age, BMI, being female, being married, employment status, and the investigated pre-existing comorbid diseases were not statistically significant predictors of fibromyalgia outcomes, according to the multivariate logistic regression analyses. While some variables showed associations, their impact did not reach conventional statistical significance levels. These findings imply that the factors influencing fibromyalgia outcomes in this population are likely to be more complex and multifaceted, necessitating more extensive research to uncover their interplay and potential contributions.

## Discussion

The study's findings revealed an alarming prevalence of fibromyalgia in the Al-Karak community. Other noteworthy findings included the existence of fibromyalgia being substantially related with female sex, certain comorbidities, notably irritable bowel syndrome, mental illnesses, and rheumatological and neurological diseases. Previous studies have addressed the issue of fibromyalgia among Syrian refugees in Jordan as a specific cohort, but no studies have been conducted to measure the disease's

prevalence in the general population; thus, results from international studies were used for comparison with current study results.

The study showed that 26.5% ( $n = 256$ ) of the participants met the criteria for a fibromyalgia diagnosis. These results could possibly be explained by multiple factors, including the economic struggle under which people are suffering in Jordan, especially with the increase in poverty and unemployment rates, which increase the burden of mental illnesses that have been proven to be directly related to fibromyalgia. Furthermore, a lack of understanding of the symptoms and characteristics of fibromyalgia contributed to the fact that the primary healthcare system is unprepared to cope with fibromyalgia or mental health issues and reduce their impacts through preventative measures. In addition, given that primary healthcare services are not well established and the geography of Al-Karak city limits access to medical treatment compared to other cities' populations, the overlap between underdiagnosed rheumatological disorders and fibromyalgia may play a role in the increased prevalence, which can add to the overall burden of fibromyalgia.

In concordance with international study results, the female gender is considered a significant contributor to fibromyalgia<sup>[8]</sup>, the study showed that the prevalence of fibromyalgia was higher among female patients than male patients.

Increased psychiatric disorders among the study cohort are a significant predictor of fibromyalgia. The results showed that increasing mental health illnesses are associated with a higher susceptibility to fibromyalgia. A cross-sectional study performed among high school students in Jordan showed that psychological distress is a significant predictor of fibromyalgia<sup>[9]</sup>. The findings of a systematic review by<sup>[10]</sup> revealed consistent evidence that post-traumatic stress disorder (PTSD) is strongly associated with various types of chronic pain, including fibromyalgia. Another previous study found that there is a significant FM burden among patients diagnosed with PTSD<sup>[11]</sup>. A systematic review conducted by<sup>[12]</sup> found that increased levels of mental health illnesses were found to be greatly associated with fibromyalgia, with depression being the most associated illness among fibromyalgia patients. In addition, nearly 33% of the individuals examined were diagnosed with bipolar disorder, panic disorder, or PTSD at some point in their lives.

Comorbidities, such as rheumatological disorders, neurological diseases, and irritable bowel syndrome, are important predictors of the effect of fibromyalgia FM. The study's findings revealed that people with comorbidities are more likely to get FM than healthy ones. The study results showed a prevalence of FM of 35.80% among IBS patients, 38% among patients with rheumatological diseases, and 61.70% in patients with neurological diseases. In the meta-analysis conducted by<sup>[8]</sup>, the subgroup meta-analysis showed prevalence of fibromyalgia of 15.20% in rheumatological patients with a specific high prevalence of 80% among individuals with Behcet syndrome; furthermore, it showed a prevalence of 12.90% among individuals with IBS, 6.30% and 14.80% in haemodialysis and type 2 diabetes mellitus, respectively.

## The importance of this study

This study is significant because it aims to fill knowledge gaps in the region regarding fibromyalgia. Because there has been no

prior research on the prevalence of fibromyalgia in Al-Karak, this study is critical for several reasons. To begin with, it provides localized insights into the prevalence and distinguishing features of fibromyalgia in the Al-Karak population, allowing for tailored healthcare strategies and culturally sensitive interventions. Second, by measuring fibromyalgia prevalence, the study sheds light on the real burden of the disorder on the healthcare system and well-being, potentially boosting awareness among healthcare professionals and legislators. Accurate prevalence data also aids in healthcare planning and resource allocation, allowing fibromyalgia patients to be managed and supported more effectively. Furthermore, the study's comprehensive approach, which included a look at potential risk factors, provides important information about what causes fibromyalgia in this population. This allows us to recognize vulnerable subgroups and devise prevention strategies. As a pioneering research effort in the region, the study's findings can serve as a foundation for future investigations and collaborations, stimulating further research and potential longitudinal studies.

Finally, the global significance of fibromyalgia as a health concern highlights the study's findings, which contribute to a broader understanding of fibromyalgia prevalence and implications, not only in Al-Karak but also in divergent populations around the world.

### Study limitations

One of the advantages of this study is that it is the first to explore the prevalence of fibromyalgia among the general population in Jordan generally and in Al-Karak city specifically. In addition, the study involved a representative sample size of 965 individuals, who were assessed using validated tools to explore the prevalence of FM. The study carried out a reliable statistical analysis along with several questions using the proposed tool to provide an overview of the prevalence of FM among the general population and identify possible risk factors. However, the study had several limitations. Firstly, the study used a cross-sectional method, which might lead to difficulties in drawing conclusions; hence, more conclusive studies are needed in the future. Second, most participants were women (73.9%), which might be because they were more motivated to participate in the study than their male counterparts. Another limitation of the study was that most participants were young, as the vast majority were under 40 years of age; therefore, future studies should focus on older people in Al-Karak city.

### Conclusion

Despite the enormous negative impact that fibromyalgia has on the quality of life of those affected, investigations to determine the prevalence of the condition and mitigation strategies in Jordan in general and Al-Karak in particular are still absent. According to the current study, the female gender and the prevalence of mental health conditions and comorbidities, notably IBS, neurological disorders, and rheumatological diseases, are important predictors of FM in the Al-Karak city population. These predictors should be considered by healthcare policymakers and local health authorities to aid in the planning of future strategies, which can include, but are not limited to, raising awareness among healthcare professionals by shining a light on the true impact of the condition, identifying vulnerable groups, and initiating services

to reduce the disease's burden, in addition to taking additional preventative measures that could be considered cost-effective.

### Ethical approval

This study was approved by the Ethical Committee of Mutah University, Al-Karak, Jordan, which complies with the Declaration of Helsinki guidelines.

### Consent

Written informed consent was obtained from the patients for the publication of this article. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

### Source of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### Author contribution

Conceptualization: A.A. and M.A.J. Formal analysis: B.A.Z. and A.A.Q. Investigation: M.D. and O.A.A. and methodology: T.A. Project administration: M.A.J. Supervision: A.A. and M.Y.S. Writing—original draft: M.D., T.A., and O.A., and A.A.Q. Writing—review and editing: A.A., B.A.Z., M.Y.S. and M.A.J.

### Conflicts of interest disclosure

The author have declared that no competing interests exist.

### Research registration unique identifying number (UIN)

1. Registry used >>>> ClinicalTrials.gov PRS.
2. Unique Identifying number or registration ID >>> NCT06103058 Unique Protocol ID: 20235012.
3. Hyperlink to your specific registration >>>> [https://register.clinicaltrials.gov/prs/app/action/SelectProtocol?sid=\\$000DSAG&selectaction=Edit&uid=U00075\\_EC&ts=2&cx=-f51gwj](https://register.clinicaltrials.gov/prs/app/action/SelectProtocol?sid=$000DSAG&selectaction=Edit&uid=U00075_EC&ts=2&cx=-f51gwj).

### Guarantor

The author accepts full responsibility for this work, has access to the data, and controls the decision to publish.

### Data availability statement

Datasets generated during and/or analyzed during the current study are publicly available, available upon reasonable request.

### Provenance and peer review

Not commissioned, externally peer-reviewed.

## References

- [1] Atzeni F, Talotta R, Masala IF, *et al.* One year in review 2019: fibromyalgia. *Clin Exp Rheumatol* 2019;37(suppl. 116):S3–10.
- [2] Bazzichi L, Giacomelli C, Consensi A, *et al.* One year in review 2020: fibromyalgia. *Clin Exp Rheumatol* 2020;38(suppl. 123):S3–8.
- [3] Häuser W, Jung E, Erbslöh-Möller B, *et al.* The German fibromyalgia consumer reports—a cross-sectional survey. *BMC Musculoskelet Disord* 2012;13:74.
- [4] Mathew G, Agha R. for the STROCSS Group. STROCSS 2021: Strengthening the Reporting of cohort, cross-sectional and case-control studies in Surgery. In: for the STROCSS Group, editors. *Int J Surg* 2021;96:106165.
- [5] Nakamura I, Nishioka K, Usui C, *et al.* An epidemiologic internet survey of fibromyalgia and chronic pain in Japan. *Arthritis Care Res* 2014;66:1093–101. <https://doi.org/10.1002/acr.22277>
- [6] El-Naby MA, Hefny MA, Fahim AE, *et al.* Validation of an adapted arabic version of fibromyalgia syndrome impact questionnaire. *Rheumatol Int* 2013;33:2561–7; Epub 2013 May 17.
- [7] Heidari F, Afshari M, Mahmood Moosazadeh (2017). Prevalence of fibromyalgia in general population and patients, a systematic review and meta-analysis. <https://pubmed.ncbi.nlm.nih.gov/28447207/>
- [8] Heidari F, Afshari M, Mahmood Moosazadeh (2017). Prevalence of fibromyalgia in general population and patients, a systematic review and meta-analysis. <https://pubmed.ncbi.nlm.nih.gov/28447207/>
- [9] Hamdan-Mansour AM, Alsalman ET, *et al.* Hamdan-Mansour (2013). Psychological Predictors of Fibromyalgia Among High School Students. <https://pubmed.ncbi.nlm.nih.gov/35412876/>
- [10] Häuser W, Sarzi-Puttini P, Fitzcharles MA, *et al.* Fibromyalgia syndrome: under- over- and misdiagnosis. *Clin Exp Rheumatol* 2019;116:90–7.
- [11] Uçar M, Sarp Ü, Karaaslan Ö, *et al.* (2015). Health anxiety and depression in patients with fibromyalgia syndrome. <https://pubmed.ncbi.nlm.nih.gov/26249741/>
- [12] Kleykamp BA, Ferguson MC, McNicol E, *et al.* (2020). The Prevalence of Psychiatric and Chronic Pain Comorbidities in Fibromyalgia: an ACTION systematic review. <https://pubmed.ncbi.nlm.nih.gov/33383293/>