Impact of COVID-19 Pandemic on Patients with Rheumatic and Musculoskeletal Diseases: Disruptions in Care and Self-Reported Outcomes

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Abstract

The COVID-19 pandemic presented a challenge to the care of patients with rheumatic and musculoskeletal diseases (RMDs). The objective of this study was to evaluate the impact of the pandemic on the care of RMDs patients and their health and well-being. This cross-sectional study involved 120 RMDs patients at the rheumatology department at Suez Canal University Hospital in Ismailia, Egypt, in July 2020. Patients were interviewed for sociodemographic and disease-related history. Further assessments were performed using Kessler 6-items, fears of COVID-19, and COV19–impact on quality of life scales. Rheumatoid arthritis and systemic lupus erythematosus represented the majority of our sample of RMDs patients (72.5% and 19.2%, respectively). About 50% of patients reported experiencing limitations in the access to rheumatologic care, and a similar percentage had changed or discontinued their medications. Disease-modifying antirheumatic drugs shortage and concerns about the increased risk of COVID-19 infection due to immunosuppressive drugs were the most frequently reported reasons for nonadherence. The percentage of patients with uncontrolled disease had significantly increased from 8.3% prior to the COVID-19 pandemic to 20% during the pandemic. About 60% of patients reported a high level of psychological distress. In conclusion, the pandemic negatively influenced mental health, quality of life, adherence to medications, access to rheumatology care, and the degree of disease control of RMDs patients.

Keywords

COVID-19, medication adherence, healthcare access, mental health, quality of life, RMDs

Introduction

Since the novel coronavirus disease 2019 (COVID-19) emerged in December 2019 in Wuhan, China, it constituted a major public health issue. The World Health Organization (WHO) declared it a pandemic on 11 March 2020 (1). As of March 10, 2022, the WHO reported more than 450 million confirmed cases of COVID-19 and about 6 million deaths worldwide (2).

The COVID-19 is now viewed as a complex multisystem disorder ranging from asymptomatic to severe or critical disease (3). Severe disease is particularly prevalent among older people and patients with preexisting chronic diseases such as chronic rheumatic and musculoskeletal diseases (RMDs), which was defined as a diverse group of diseases that commonly affect the joints, but can affect any organ of the body, affecting both children and adults, and usually caused by problems of the immune system, inflammation,

infections, or gradual deterioration of joints, muscles, and bones (4,5). RMDs include more than 200 diseases (eg, rheumatoid arthritis [RA], psoriatic arthritis, ankylosing spondylitis, systemic lupus erythematosus [SLE], Sjögren syndrome, etc), which commonly result in chronic and progressive pain, limitation of function leading to significant

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disability, and a substantial impact on the quality of life (QoL) and life expectancy (5,6).

The COVID-19 pandemic came with many challenges for both RMDs patients and the rheumatology healthcare providers with a substantial impact on the care and follow-up of these patients (7–9). However, the burden of the impact differs significantly with the health systems and the preventive public health measures applied across the countries, particularly in the Arab countries (8–10). Previous evidence showed that concerns have evolved among patients with RMDs regarding the increased risk of severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) infection and poor COVID-19 outcomes, particularly patients on immunosuppressive and immunomodulatory medications, and patients with disease activity and multimorbidity (11–13). Perception of such increased risks could lead to a greater impact on the disease management and patient's adherence to treatment, such as avoidance of medical visits or diagnostic testing or discontinuing immunomodulatory medications (14–16).

The COVID-19 pandemic has been shown to have an impact on the access to care among individuals with RMDs. Disruptions in the access to healthcare services and medications due to the lockdown and the social distancing constraints, as well as increasing the off-label use of many RMDs medications for the treatment of COVID-19, represented additional challenges to this population (10,11,15–18). Prior to COVID-19, evidence showed the inherent impact of RMDs on patients' QoL (19), while patients' during COVID-19, the increased concerns, psychological distress, and fears had a substantial added impact on patients' QoL (20, 21).

Little is known about the impact of COVID-19 on people with RMDs on their health and well-being. Therefore, our study primarily aimed to evaluate the impact of the COVID-19 pandemic on RMDs patients regarding their access to healthcare services and medications, adherence, mental health, and QoL. Secondary aims of this study included the evaluation of the associations between the fear of COVID-19 and psychological distress, and the medication adherence, disease control, and COVID-19-impact on QoL.

Methods

Study Design: This is a cross-sectional study conducted from July 1, 2020, to July 31, 2020.

Study Setting: The study was carried out at the Physical Medicine, Rheumatology, and Rehabilitation Outpatient Clinic at Suez Canal University Hospital in Ismailia, Egypt. This hospital is a large teaching hospital affiliated with the Suez Canal University with a capacity of more than 400 beds and provides the tertiary care for patients in the Suez Canal region (including 5 governorates: Ismailia, Suez, Port-said, North Sini, and South Sini).

Participants and Sampling: Patients with a confirmed diagnosis of RMDs for at least 1-year duration on July 1,

2020, were eligible to participate in this study. All RMDs patients who were registered at Suez Canal University Hospital were screened for eligibility ($N = 148$) of whom 126 patients were eligible. A total of 120 patients were eligible and gave their consent to participate in this study (6 patients refused to participate in the study). Participants were subject to an appointment for a face-to-face interview during their first visit to the hospital either for follow-up or to get their medications after July 1, 2020. During the interview, the investigator used a structured questionnaire to ask respondents about the different study variables.

Outcomes & Measures: Dependent variables included adherence to medications, disease control, and the impact of the COVID-19 pandemic on the QoL. Patients were asked if they were taking their medications as prescribed or not, and if they did not they listed the reasons for nonadherence (eg, forgetfulness and discontinuation). Nonadherence was evaluated before and during the pandemic. The frequency and severity of flares and the need for RMDs-related hospitalization were used as secondary outcomes for disease control status during the pandemic and before the date of declaration of the pandemic (ie, March 11, 2020). Although the main source of information was the patients' recall, patients' medical records were reviewed to match the information about hospitalization and frequency of visits due to flares. Patients were also asked to identify the reasons or context that lead to a worsening of their symptoms. The impact of the COVID-19 pandemic on the QoL was evaluated using the COV19–Impact on QoL scale (COV19-QoL scale), which has been validated for use in the general population and clinical sample of mental illnesses with satisfactory psychometric properties (Cronbach's alpha $= 0.885$ and 0.856, respectively) (22). The higher the total score of the COV19-QoL scale, the greater impact of the pandemic on the QoL as perceived by the participants (23).

Independent variables included psychological distress and fears related to the COVID-19 pandemic. Psychological distress was measured by using the Kessler 6-items scale (K6), which demonstrated excellent internal consistency and reliability (Cronbach's alpha $= 0.89$), and had consistent psychometric properties across major sociodemographic subsamples, and strongly discriminates against individuals with severe mental illness (24). The total K6 score ranges from 0 to 24, which could be interpreted as follow: 0 to 7 as low distress, 8 to 12 as moderate distress, and 13 to 24 as high risk of psychological distress (25). COVID-19-related fears were measured by the fears of COVID-19 scale (FCV-19S), which showed high internal consistency (Cronbach's alpha $= 0.90$) and satisfactory discrimination validity (26). The total score calculated as the sum of all item scores ranges from 7 to 35, with higher scores indicating greater levels of COVID-19 fear (21,27). Covariates included sociodemographic characteristics, medical history including type RMDs, disease duration, medication, access to healthcare services and medications, methods of healthcare services delivery during the

COVID-19 pandemic, and COVID-19 exposure. The patients' perceived health and well-being (eg, physical health, mental health, and social life), were measured on a 5-point rating scale, while the perceived overall QoL was measured on a 10-point rating scale.

Statistical Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS version 25.0; IBM Corporation). Demographic and clinical characteristics were presented as frequencies and percentages (%) if categorical or mean (standard deviation) if continuous variables. Changes in the distribution of disease control status and adherence to medications before and during the COVID-19 pandemic were tested for statistical analysis by the McNemar test or Fisher's exact test (if >20% of expected values were <5). Binary logistic regression was performed to test for the association between nonadherence to medications (yes/no) and uncontrolled disease (yes/no) as dependent

Table 1. Distribution of the Studied Patients by Their Sociodemographic Characteristics (N = 120).

Sociodemographic variables	No. (%)
Age, mean (SD), range	45.2 (11.1), 22–72
Age groups (years)	
<40	38 (31.7%)
40-49	39 (32.5%)
50-59	29 (24.2%)
60 or older	14 (11.7%)
Gender	
Male	12 (10.0%)
Female	108 (90.0%)
Residence	
Urban	52 (43.3%)
Rural	56 (46.7%)
Remote areas (other governorates)	12 (10.0%)
Marital status	
Married	111 (92.5%)
Single/divorced or widowed	9 (7.5%)
Number of offspring	
None	12 (10.0%)
1–2	34 (28.3%)
More than 2	74 (61.7%)
Education	
Illiterate	63 (52.5%)
Basic	20 (16.7%)
Secondary	32 (26.7%)
University	5 (4.2%)
Work	
Housewife	94 (78.3%)
Full-time job	15 (12.5%)
Not working/retired	9 (7.5%)
Cigarette smoking	
Never smoker	111 (92.5%)
Ex-smoker	7 (5.8%)
Current smoker	2 (1.7%)

Table 2. Distribution of the Studied Patients by the Disease and Health-Related Characteristics (N = 120).

Variables	No. (%)
RMDs	
RA	87 (72.5%)
SLE	23 (19.2%)
Others	10 (8.3%)
Duration of RMDs (years)	
<5	50 (41.7%)
5-10	41 (34.2%)
More than 10	29 (24.2%)
Medications for RMDs	
NSAIDS	21 (17.5%)
Steroids	9 (7.5%)
Nonbiologic DMARDs:	117 (97.5%)
1–2	28 (23.3%)
3+	89 (74.2%)
Biologic DMARDs	5 (4.2%)
Other treatment	
ACEI	80 (66.7%)
Vitamin D	40 (33.3%)
Frequency of dispensing the RMDs treatment	
Monthly	118 (98.3%)
Others	2 (1.7%)
Dispensing person of the RMDs treatment	
Patient	118 (98.3%)
Caregiver	2 (1.7%)
Health insurance	
Public insurance	112 (93.3%)
Out-of-pocket	1 (0.8%)
Comorbid conditions	
None	80 (66.7%)
Single	12 (10.0%)
Multiple	28 (23.3%)
Types of comorbidities	
Hypertension	12 (10.0%)
Diabetes mellitus	13 (10.8%)
Others	38 (31.7%)
COVID-19-related history	
Confirmed positivity	4 (3.3%)
Contact with confirmed cases	6 (5.0%)
Perceived health and well-being, mean (SD), range	
Physical health	1.80 (0.89), 0 – 4
Mental health	1.04 (1.16), 0 – 4
Social life	1.58 (0.84), 0 – 4
Overall quality of life	4.93 (0.70), 0 – 10
FCV-19S, mean (SD), range	26.0 (7.6), 7–35
COV19–impact on QoL, mean (SD), range	22.6 (6.7), 6–30
Kessler's scale for psychological distress (K6), Mean (SD), range	16.5 (6.2), 0 – 24
Level of psychological distress, n (%)	
Low	10 (8.3%)
Moderate	38 (31.7)
High	72 (60.0%)

RMD = rheumatic and musculoskeletal disease; RA = rheumatic arthritis; DMARDs = disease-modifying antirheumatic drugs; ACEI = angiotensin-converting enzyme inhibitors; FCV-19S = fear of COVID-19 scale; SLE = systemic lupus erythematosus; QoL = quality of life; NSAID = non-steroidal anti-inflammatory drugs.

variables and each fear of COVID-19 and K6 psychological distress scores as independent variables, in separate models as both independent variables were highly correlated. These associations were adjusted for a list of covariates that were statistically significant on bivariate associations. Likewise, linear regression was used to test for the association between the COVID-19-impact on QoL as a dependent variable and each fear of COVID-19 and K6 scores, adjusted for other covariates. A *p*-value <.05 was considered statistically significant.

Results

One-hundred and twenty RMDs patients were included with a mean age of 45 years (ranging from 22 to 72 years), and 90% were females. Table 1 summarizes other demographic characteristics of study respondents. Table 2 shows that RA and systemic lupus erythematosus represented the majority of all RMDs (72.5% and 19.2%, respectively). About one-fourth of patients had it for more than 10 years. Almost all patients (97.5%) were on nonbiologic disease-modifying antirheumatic drugs (DMARDs), while only 4 cases (4.2%) were on biologic DMARDs. They were mostly dispensing their medication monthly (98.3%). One-third of patients had chronic comorbidities. Six cases had a positive COVID-19 exposure history and 4 cases had a polymerase chain reaction-confirmed COVID-19 diagnosis.

As described in Table 2, health and well-being perceptions were below average, particularly the mental health and social life (1.04 and 1.58, respectively). They perceived their overall QoL as average (4.93 on a rating scale from 0 to 10). Furthermore, the mean fear of COVID-19 score was 26 (±7.6) and ranged from 7 to 35 points while the mean COV19-QoL was 22.6 (±6.7) and ranged from 6 to 30 points. The mean Kessler's score for psychological distress was 16.5 (±6.2) and ranged from 0 to 24 points. Further classification of Kessler's score indicated that 60% of patients had a high level of psychological distress while 32% had moderate psychological distress.

Table 3 shows that the percentage of patients with uncontrolled disease had significantly increased from 8.3% prior to the COVID-19 pandemic to 20% during the pandemic (ie, 1.4 times increase, *p* = .01). The frequency and severity of flares had also increased during the pandemic but were not significantly different from the prepandemic levels. Furthermore, the frequency of nonadherence to medications had significantly increased from 32% to 51% (ie, 60% increase from the prepandemic frequency, *p* = .003). In particular, increased nonadherence during the pandemic was attributed mainly to the discontinuation of medications (from 23.3% to 44.2%). During the pandemic, studied patients had experienced some limitations in their access to healthcare services (5.8% for inpatient care and 2.5% for outpatient care) but the major limitation was in their access to DMARDs medications (42.5%). Limitations in patients' access to inpatient care and DMARDs medications during the pandemic

were significantly higher than before the pandemic, while the limitation in outpatient care was not significantly different. Furthermore, about 14% of patients had tried the remote methods for healthcare services (ie, telemedicine) during the pandemic, compared to none of them before the pandemic (*p* < .001). However, about 50% rated their experiences with these methods as 5 or less on a 10-point scale (Table 3).

Figure 1 shows the reasons for limited access to healthcare services and medications among the study respondents. Shortage in DMARDs medications (42.5%), patients'

Table 3. Impact of COVID-19 on Disease Control, Access to Healthcare, and Medication Adherence Among RMDs Patients (*N* = 120).

Variables	Before COVID-19 pandemic	During COVID-19 Pandemic	*p*-value
Disease control			**.004**
Uncontrolled	10 (8.3%)	24 (20.0%)	
Controlled	110 (91.7%)	96 (80.0%)	
Frequency of flares/ crises			
Several times per month	4 (3.3%)	12 (10.0%)	.794
Several times per week	6 (5.0%)	11 (9.2%)	
Most of days per week	0	1 (0.8%)	
Severity of flares/ crises			
Not required hospitalization	5 (4.2%)	15 (12.5%)	.704
Required hospitalization	5 (4.2%)	9 (7.5%)	
Adherence to medication			
Adherent	82 (68.3%)	59 (49.2%)	**.001**
Not adherent:	38 (31.7%)	61 (50.8%)	
Forgetfulness	10 (8.3%)	8 (6.7%)	
Discontinuation	28 (23.3%)	53 (44.2%)	
Access to healthcare services/ medications:			
Limited access to inpatient care during flares/crises	0	7 (5.8%)	**.015**
Limited access to outpatient care	0	3 (2.5%)	.247
Limited access to DMARDs medications	0	51 (42.5%)	**<.001**
Methods of healthcare delivery:			
In-person	120 (100.0%)	103 (85.8%)	**<.001**
Remote (ie, telemedicine)	0	17 (14.2%)	

DMARDs = disease-modifying antirheumatic drugs.
Bold values are statistically significant *p*-value (<.05).

concerns about the immunosuppressive effect of DMARDs medications (19.2%), and the fear of exposure to COVID-19 in healthcare settings (17.6%) constituted the most frequent reasons for limited access to healthcare services and DMARDs medications during COVID-19 pandemic. Figure 2 shows that the most frequent reasons for nonadherence—other than forgetfulness (13.1%)—were the shortage of DMARDs medications (42.5%), patients' fear of the increased risk of COVID-19 infection due to the immunosuppressive effect of DMARDs (19.2%), and patients' boredom and dissatisfaction with the daily medication (10%).

Table 4 shows that nonadherence to medication was significantly associated with increasing fear of COVID-19 (model $\chi^2 = 17.6$, df = 5, p-value = .003; R^2 = .18; discrimination ability = 84.2%; adjusted for age groups, work status, types of RMDs, medication adherence before the pandemic, and psychological distress) and psychological distress (model $\chi^2 = 18.2$, df = 5, p-value = .003; R^2 = .19; discrimination ability = 86.4%; adjusted for age groups, work status, types of RMDs, medication adherence before the pandemic, and fear of COVID-19). For every 1-point increase on the fear of COVID-19 scale and Kessler's scale for psychological distress, the odds for nonadherence significantly increase by 7% and 9%, respectively. However, the uncontrolled disease was significantly associated with only increasing psychological distress; a 1-point increase in Kessler's scale was associated with a 12% increase in the odds for uncontrolled disease (model $\chi^2 = 20.3$, df = 6, p-value = .002; R^2 = .25; discrimination ability = 80.8%; adjusted for work status, education, types of RMDs, adherence before the pandemic, disease control before the pandemic, COVID-19 exposure, and fear of COVID-19). Furthermore, the COVID-19-impact on QoL score was significantly associated with both increasing fear of COVID-19 ($F = 434.1$, df(5,114), p-value < .001; R^2 = .95; adjusted for age groups, types of RMDs, medication adherence during the pandemic, and disease control during the pandemic), and psychological distress ($F = 149.0$, df (5,114), p-value < .001; R^2 = .87; adjusted for age groups, types of RMDs, medication adherence during the pandemic, and disease control during the pandemic). Every 1-point increase on the fear of COVID-19 scale and Kessler's scale for psychological distress was significantly associated with a 0.86 and 1.0 increase on the fear of COVID-19 and Kessler's scores, respectively.

Discussion

The current study highlighted the negative impacts of the COVID-19 pandemic on a sample of patients with RMDs in Egypt. It showed that the pandemic negatively influenced the delivery of rheumatology care to about half of the patients. This finding was in line with earlier studies by George et al (11) and Michaud et al (14) who reported that 56.6% and 42% of patients, respectively, had a change in their rheumatology care or they avoided clinic visits due to the pandemic. In contrast, Ziade et al (10) in a web-based

survey in 15 Arab countries reported that 82% of patients with RMDs experienced limited access to their rheumatology care. A study by Zomalheto et al (20) reported also that 92% of 68 Beninese patients with RA were negatively impacted. These wide variations across the studies could be linked to how much strict were the restrictive measures, the health system performance, and patients' concerns and fears of COVID-19, and the level of psychological distress.

In Egypt, most RMDs patients receive their prescribed medications from the public hospital they have registered in to get the rheumatology care (ie, through public health insurance services). However, some patients may choose to get their prescriptions from private pharmacies (ie, out-of-pocket). During the COVID-19 lockdown, all patients have experienced a hardship reaching their suppliers and shortage in their medications. Moreover, most of the public clinics, healthcare facilities, and pharmacies were working with limited capacity and emergency services as a priority. Private pharmacies were not closed but they were struggling with supply restrictions. Our study showed that the pandemic negatively influenced the adherence to medications in about half of our patients. These results support Michaud et al (14) who reported that 42% of patients had changed or discontinued their treatment due to the pandemic. In contrast, other studies (8–11,16,17) have reported lesser rates of nonadherence; ranging from 5.2% in Ma et al (16) to 27.4% in Ziade et al (10).

DMARDs shortage and concerns about the increased risk of COVID-19 infection with the immunosuppressive drugs were the most frequently reported reasons for nonadherence in our study (42.5% and 19.2%, respectively). These findings were consistent with Pineda-Sic et al (8), who reported that 48% of nonadherence was due to lack of drug availability and 25% due to fears of COVID-19 infection. In Ma et al (16), worries about the increased risk of COVID-19, due to medications, contributes to nonadherence in 36.8% of studied patients. Studies by Ziade et al (10) and Fragoulis et al (9) reported lower contributions, as low as 3.8% and 2.2% for drug shortage and fear of immunosuppression, respectively. These findings suggest that the challenge for rheumatologic care during the pandemic is not only to encourage adherence to medication but also to ensure adequate access to medication, and correct information regarding the uncertainties about these medications and the increased risk for COVID-19 infection.

Mental health was also negatively impacted during the pandemic in about 92% of our patients with 60% reporting high levels of psychological distress. These findings were in line with Ziade et al (10) study in which 73.3% of RMDs patients experienced a minor or major impact on their mental health, and Koppert et al (21) study, which reported that about half of Dutch participants had experienced more stress during the pandemic. Although Kessler K6 is a widely-used distress scale for the screening of severe mental illness (defined as a K6 score ≥ 13), it is non-specific and usually fails to capture individuals struggling
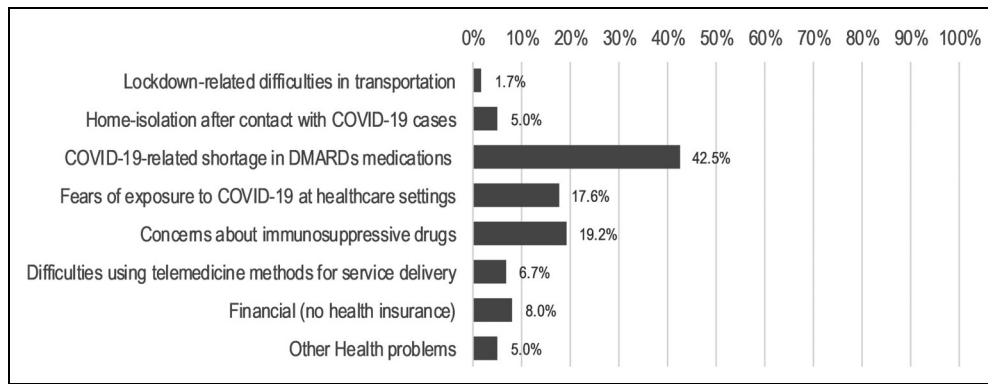
Figure 1. Reasons for limited access to healthcare services/medications among rheumatic and musculoskeletal diseases (RMDs) patients during the COVID-19 pandemic (N = 120).
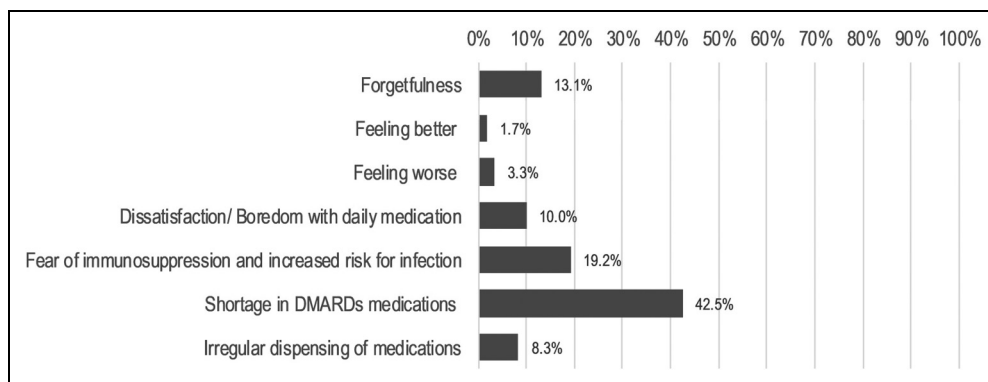

Figure 2. Reasons for nonadherence to medications among rheumatic and musculoskeletal diseases (RMDs) patients during COVID-19 (N = 120).

with more moderate mental distress that warrants mental health intervention (28).

Besides its direct effect on health and well-being, it could trigger RMDs flares and contribute to uncontrolled disease (10,14,15,20,29,30). In our study, increasing psychological distress was significantly associated with the likelihood of medication nonadherence, uncontrolled disease, and increased COVID-19-Impact on QoL. These findings support Ziade et al (10) study in which the negative impact of the pandemic on mental health was significantly associated with medication nonpersistency. Further studies by Zomalheto et al (19) and Cleaton et al (29) reported that the QoL of RMDs patients was negatively impacted during the COVID-19 pandemic.

Since the COVID-19 pandemic has negatively affected the delivery of rheumatology services, remote management of rheumatologic patients introduced a potential solution to the drawbacks of restrictive measures on service delivery (31). In our study, remote methods or telemedicine methods were used by only 4% of study participants with low acceptability and satisfaction. In contrast, telemedicine appointments were used more frequently by RMDs patients in studies by Ziade et al (10), Michaud et al (14), and Banerjee et al (17) (28.9%, 24%, and 44%, respectively).

Telemedicine utilization was low in our sample due to either the low acceptability of these methods among our patients, particularly about two-thirds of the sample were illiterate or low-educated individuals, or due to the limited resources for the care providers and the patients. Continued research is needed on the effectiveness of integrating telemedicine into routine rheumatology care.

On the other hand, the percentage of patients with confirmed SARS-CoV-2 infection in our sample was low (3.3%), which is in line with previous studies. A Spanish cohort of 3,591 RMDs patients reported a 3.4% incidence of COVID-19 (32). In another study in more than 15 Arab countries, a web-based survey of 2,163 RMDs patients revealed a 2.8% prevalence of COVID-19 (15). Our study respondents did not report directly their strategies to limit their exposure to COVID-19. However, 17.6% expressed their fears of exposure to COVID-19 in healthcare settings, which might make them avoid or postpone their medical appointments. Also, 5% of respondents reported that they follow home isolation after contact with COVID-19 cases, while 19.2% were concerned about the immunosuppressive drug they use leading to nonadherence or discontinuing these medications.

Table 4. Associations Between the Fear of COVID-19 and Psychological Distress, and the Medication Adherence, Disease Control, and COVID-19-Impact on QoL.

Variable	Nonadherence to medication OR[a] (95% CI), p-value	Uncontrolled disease OR[b] (95% CI), p-value	COVID-19-impact on QoL β[c] (Std. Error), p-value
Fear of COVID-19	**1.07** (1.01–1.13), **.019**	1.07 (0.99–1.15), .092	**0.86** (0.02), **<.001**
Psychological Distress	**1.09** (1.02–1.17), **.014**	**1.12** (1.02–1.23) **.022**	**1.00** (0.04), **<.001**

[a]Adjusted for age groups, work status, types of RMDs, medication adherence before the pandemic, and psychological distress (or fear of COVID-19).
[b]Adjusted for work status, education, types of RMDs, adherence before the pandemic, disease control before the pandemic, COVID-19 exposure, and psychological distress (or fear of COVID-19).
[c]Adjusted for age groups, types of RMDs, medication adherence during the pandemic, and disease control during the pandemic.
Bol values are statistically significant p-value (<.05).

The current study had some limitations that should be noted while interpreting its findings. First, this study was a single-center experience that reflects its resources and practices for rheumatology care. Second, all data were self-reported by patients which were subject to recall bias. The study design was a cross-sectional which reflects the pandemic status during that period of time and the restrictive measures in the setting where it was conducted. Finally, the generalizability of the findings of this study is limited by some of the respondents' characteristics since 78% of them were housewives and 72% were RA patients.

In conclusion, we found that besides the substantial influence of the COVID-19 pandemic on the mental health and QoL of RMDs patients, it negatively impacted their adherence to medications, access to rheumatology care, and the degree of RMDs control. These substantial indirect impacts of the COVID-19 on RMDs patients—which may be more deleterious than the direct impact of the SARS-CoV-2 infection—highlight the public health perspective of the pandemic in this vulnerable population and suggest a space for policy intervention.

Authors' Note

This study was approved by the Ethical approval to report this case was obtained from the Ethics Committee of the Faculty of Medicine, Suez Canal University, Ismailia, Egypt (Approval Number: 4240/2020). All procedures in this study were conducted in accordance with the Research Ethics Committee of Faculty of Medicine, Suez Canal University (Approval Number: 4240/2020) approved protocols. Written informed consent was obtained from all studied patients for their anonymized information to be published in this article.

Declaration of Conflicting Interests

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References

1. Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. Acta Biomed. 2020;91(1):157-60.
2. WHO. WHO coronavirus (COVID-19) dashboard. The World Health Organization (WHO); 2021. https://covid19.who.int/. Accessed 10 March 2022.
3. Roberts CM, Levi M, McKee M, Schilling R, Lim WS, Grocott MPW. COVID-19: a complex multisystem disorder. Br J Anaesth. 2020;125(3):238-42.
4. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72314 cases from the Chinese center for disease control and prevention. JAMA. 2020;323(13): 1239-42.
5. van der Heijde D, Daikh DI, Betteridge N, Burmester GR, Hassett AL, Matteson EL, et al. Common language description of the term rheumatic and musculoskeletal diseases (RMD) for use in communication with the lay public, healthcare providers and other stakeholders endorsed by the European league against rheumatism (EULAR) and the American college of rheumatology (ACR). Ann Rheum Dis. 2018;77(6):829-32.
6. Salaffi F, Di Carlo M, Carotti M, Farah S, Ciapetti A, Gutierrez M. The impact of different rheumatic diseases on health-related quality of life: a comparison with a selected sample of healthy individuals using SF-36 questionnaire, EQ-5D and SF-6D utility values. Acta Biomed. 2019;89(4):541-57.
7. Romao VC, Cordeiro I, Macieira C, Oliveira-Ramos F, Romeu JC, Rosa CM, et al. Rheumatology practice amidst the COVID-19 pandemic: a pragmatic view. RMD Open. 2020;6(2):e001314.
8. Pineda-Sic RA, Galarza-Delgado DA, Serna-Pena G, Castillo-Torres SA, Flores-Alvarado DE, Esquivel-Valerio JA, et al. Treatment adherence behaviours in rheumatic diseases during COVID-19 pandemic: a Latin American experience. Ann Rheum Dis. 2020;80(6):e85.
9. Fragoulis GE, Evangelatos G, Arida A, Bournia VK, Fragiadaki K, Karamanakos A, et al. Treatment adherence of patients with systemic rheumatic diseases in COVID-19 pandemic. Ann Rheum Dis. 2020;80(4):e60.
10. Ziade N, El Kibbi L, Hmamouchi I, Abdulateef N, Halabi H, Hamdi W, et al. Impact of the COVID-19 pandemic on patients with chronic rheumatic diseases: a study in 15 Arab countries. Int J Rheum Dis. 2020;23(11):1550-7.

11. George MD, Venkatachalam S, Banerjee S, Baker JF, Merkel PA, Gavigan K, et al. Concerns, healthcare use, and treatment interruptions in patients with common autoimmune rheumatic diseases during the COVID-19 pandemic. J Rheumatol. 2020;48(4):603-7.

12. Robinson PC, Bursle EC. Management of autoimmune disease during the COVID-19 pandemic. Aust Prescr. 2020;43(5):146-7.

13. Koker O, Demirkan FG, Kayaalp G, Cakmak F, Tanatar A, Karadag SG, et al. Does immunosuppressive treatment entail an additional risk for children with rheumatic diseases? A survey-based study in the era of COVID-19. Rheumatol Int. 2020;40(10):1613-23.

14. Michaud K, Wipfler K, Shaw Y, Simon TA, Cornish A, England BR, et al. Experiences of patients with rheumatic diseases in the United States during early days of the COVID-19 pandemic. ACR Open Rheumatol. 2020;2(6):335-43.

15. George MD, Baker JF, Banerjee S, Busch H, Curtis D, Danila MI, et al. Social distancing, health care disruptions, telemedicine use, and treatment interruption during the COVID-19 pandemic in patients with or without autoimmune rheumatic disease. ACR Open Rheumatol. 2021;3(6):381-9.

16. Ma MH, Tay SH, Cheung PP, Santosa A, Chan YH, Yip JW, et al. Attitudes and behaviors of patients with rheumatic diseases during the early stages of the COVID-19 outbreak. J Rheumatol. 2021;48(1):35-9.

17. Banerjee S, George M, Young K, Venkatachalam S, Gordon J, Burroughs C, et al. Effects of the COVID-19 pandemic on patients living with vasculitis. ACR Open Rheumatol. 2021;3(1):17-24.

18. Ciurea A, Papagiannoulis E, Burki K, Von Loga I, Micheroli R, Möller B, et al. Impact of the COVID-19 pandemic on the disease course of patients with inflammatory rheumatic diseases: results from the Swiss clinical quality management cohort. Ann Rheum Dis. 2021;80(2):238-41.

19. Branco JC, Rodrigues AM, Gouveia N, Eusébio M, Ramiro S, Machado PM, et al. Prevalence of rheumatic and musculoskeletal diseases and their impact on health-related quality of life, physical function and mental health in Portugal: results from EpiReumaPt – a national health survey. RMD Open. 2016;2: e000166. doi: 10.1136/rmdopen-2015-000166

20. Zomalheto Z, Assogba C. Dossou-yovo H. Impact of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) infection and disease-2019 (COVID-19) on the quality of life of rheumatoid arthritis patients in Benin. The Egyptian Rheumatologist. 2021;43(1):23-7.

21. Koppert TY, Jacobs JWG, Geenen R. The psychological impact of the COVID-19 pandemic on Dutch people with and without an inflammatory rheumatic disease. Rheumatology. 2020;60(8):3709-15.

22. Repišti S, Jovanović N, Kuzman MR, Medved S, Jerotić S, Ribić E, et al. How to measure the impact of the COVID-19 pandemic on quality of life: COV19-QoL–the development, reliability and validity of a new scale. Glob Psychiatry. 2020;3(2):201-10.

23. Roux C, Brocq O, Gerald F, Pradier C, Bailly L. Impact of home confinement during the COVID-19 pandemic on medication use and disease activity in spondyloarthritis patients. Arthr Rheumatol. 2020;72(10):1771-2.

24. Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand SL, et al. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. Psychol Med. 2002;32(6):959-76.

25. Yiengprugsawan V, Kelly M, Tawatsupa B. Kessler psychological distress scale. In: Michalos AC (ed) Encyclopedia of Quality of Life and Well-Being Research. Dordrecht, the Netherlands: Springer; 2014, pp.3469-70.

26. Ahorsu DK, Lin CY, Imani V, Saffari M, Griffiths MD, Pakpour AH. The fear of COVID-19 scale: development and initial validation. Int J Ment Health Addict. 2020;27:1-9. doi: 10.1007/s11469-020-00270-8

27. Alyami M, Henning M, Krageloh CU, Alyami H. Psychometric evaluation of the Arabic version of the fear of COVID-19 scale. Int J Ment Health Addict. 2020;19(6):2219-32.

28. Prochaska JJ, Sung HY, Max W, Shi Y, Ong M. Validity study of the K6 scale as a measure of moderate mental distress based on mental health treatment need and utilization. Int J Methods Psychiatr Res. 2012;21(2):88-97. doi: 10.1002/mpr.1349

29. Cleaton N, Raizada S, Barkham N, Venkatachalam S, Sheeran T, Adizie T, et al. COVID-19 prevalence and the impact on quality of life from stringent social distancing in a single large UK rheumatology centre. Ann Rheum Dis. 2020;80(6):e93.

30. Seyahi E, Poyraz BC, Sut N, Akdogan S, Hamuryudan V. The psychological state and changes in the routine of the patients with rheumatic diseases during the coronavirus disease (COVID-19) outbreak in Turkey: a web-based cross-sectional survey. Rheumatol Int. 2020;40(8):1229-38.

31. Gkrouzman E, Wu DD, Jethwa H, Abraham S. Telemedicine in rheumatology at the advent of the COVID-19 pandemic. HSS J. 2020;16(1_suppl):108-11.

32. Fernandez-Gutierrez B, Leon L, Madrid A, Rodriguez-Rodriguez L, Freites D, Font J, et al. Hospital admissions in inflammatory rheumatic diseases during the peak of COVID-19 pandemic: incidence and role of disease-modifying agents. Ther Adv Musculoskelet Dis. 2021;13:1-12. doi: 10.1177/1759720X20962692