Curr Rheumatol Rep (2023) 25:128–143
https://doi.org/10.1007/s11926-023-01103-y

Has the COVID 19 Pandemic Impacted the Management of Chronic Musculoskeletal Pain?

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Accepted: 19 March 2023 / Published online: 3 May 2023

Abstract

Purpose of Review The COVID-19 pandemic has affected the management of chronic musculoskeletal pain; however, the extent of its impact has not been established. We conducted a comprehensive review of the pandemic's impact on clinical outcomes and healthcare accessibility for osteoarthritis (OA), rheumatoid arthritis (RA), fibromyalgia (FM), lower back pain (LBP), and other musculoskeletal disorders and chronic pain syndromes to better inform clinical decision-making.

Recent Findings We examined 30 studies ($n = 18{,}810$) from 36 countries investigating the impact of the COVID-19 pandemic on chronic musculoskeletal pain outcomes. The available evidence suggests that the pandemic significantly impacted pain levels, mental health, quality of life and healthcare accessibility in patients with chronic musculoskeletal pain. Of 30 studies, 25 (83%) reported symptom worsening, and 20 (67%) reported reduced healthcare accessibility. Patients were unable to access necessary care services during the pandemic, including orthopedic surgeries, medications, and complementary therapies, leading to worsened pain, psychological health, and quality of life. Across conditions, vulnerable patients reported high pain catastrophizing, psychological stress, and low physical activity related to social isolation. Notably, positive coping strategies, regular physical activity, and social support were associated with positive health outcomes.

Summary Most patients with chronic musculoskeletal pain had greatly affected pain severity, physical function, and quality of life during the COVID-19 pandemic. Moreover, the pandemic significantly impacted treatment accessibility, preventing necessary therapies. These findings support further prioritization of chronic musculoskeletal pain patient care.

Keywords Chronic musculoskeletal pain · COVID-19 impact · Pain management · Access to care

Introduction

Chronic musculoskeletal pain, attributable to conditions such as osteoarthritis (OA), rheumatoid arthritis (RA), fibromyalgia, and low back pain (LBP), is a challenging, widespread condition requiring management strategies that are both individualized and multidisciplinary [1]. Chronic musculoskeletal pain is not only a complex, multi-dimensional experience that can dramatically alter patient quality of life by compromising mental health and limiting physical function [2, 3], but is also a substantial social burden due to significant healthcare costs and disability [4]. Chronic musculoskeletal pain conditions have traditionally been a challenge to treat successfully, requiring a biopsychosocial approach that considers the biological, psychological, and social factors affecting pain [5••]. The COVID-19 pandemic has added an additional dimension of therapeutic challenges that the field of chronic pain management should be better informed upon to provide the best care for their patients [6•].

The outbreak of COVID-19, declared a global pandemic in March 2020, triggered a tremendous public health crisis and imposed significant changes in social behaviors worldwide, including in patients with chronic pain [6•, 7••, 8]. Strict quarantine led to high levels of social isolation [9], and numerous studies have reported correlations between social isolation and poorer coping with management of chronic pain [10, 11]. For patients with chronic pain, the mandatory stay-at-home strategy may have increased physical inactivity, with sedentary behavior correlated to musculoskeletal

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problems and increased pain levels [12–14]. In addition, healthcare resources shifted to intensive care services [15], and outpatient and elective procedures decreased or stopped indefinitely to mitigate viral transmission [3]. COVID-19-related fear and avoidance has also been associated with depression [16•], and can worsen pain and decrease function in patients with chronic musculoskeletal pain [16•, 17, 18]. Moreover, social distancing restricted many other useful therapies, including acupuncture, physical therapy, rehabilitation therapy, and counseling services [8]. The high prevalence of long-lasting, unresolved symptoms related to COVID-19 infection is also an important consideration for understanding the impact of the pandemic on chronic pain, as many lasting COVID-19 symptoms, including fatigue, overlap with chronic pain syndromes [19••].

Three prior reviews summarized evidence of the pandemic's impact on patients with musculoskeletal pain [20•, 21, 22•]. Specifically, a narrative review reported the effects of pandemic-related isolation on geriatric patients with chronic musculoskeletal pain and found that loneliness stemming from the COVID-19 pandemic had deleterious effects on both physical and mental health [22•]. Two other reviews also found decreased access to healthcare and cancelations of elective orthopedic surgeries, which could worsen physical and mental health among OA patients [20•, 21]. However, these reviews only focused on specific chronic pain patient populations, which limited generalizability of findings. Furthermore, they only used a small number of studies with outcomes reported by patients during the pandemic [20•, 21, 22•]. Therefore, the impact of COVID-19 pandemic in the management of pain has not been clearly delineated.

We conducted a comprehensive review of the impact of the COVID-19 pandemic on a broad range of chronic musculoskeletal pain conditions and healthcare system accessibility during 2020–2022. We evaluated the effects of the COVID-19 pandemic on symptom severity, physical and psychological health, and treatment accessibility in patients with OA, RA, fibromyalgia, LBP, and other musculoskeletal disorders and chronic pain syndromes. We further assessed the COVID-19 pandemic's impact on chronic musculoskeletal pain management and healthcare system accessibility to better inform clinical decision-making during the pandemic and in a post-pandemic world.

Methods

Data Sources and Search Methods

We searched the PubMed/MEDLINE and Google Scholar databases for studies of any design published in English between December 2019 and August 2022 that reported the effects of the COVID-19 pandemic on patients with chronic musculoskeletal pain. The search terms used were COVID-19, chronic musculoskeletal pain, chronic low back pain, osteoarthritis, fibromyalgia, and rheumatoid arthritis. We also checked the reference lists of all relevant studies retrieved through search terms. Screening and data extraction were undertaken by two reviewers. We summarized disease conditions, demographic information, study design types, treatment accessibility, outcomes measured, main conclusions, and author recommendations.

Selection of Studies

Full-text articles of potentially relevant abstracts were retrieved and evaluated for eligibility by two investigators (MP, SO) and confirmed by a third investigator (CW). Published articles that reported original data from studies of any design were eligible if they investigated COVID-19 pandemic-related effects on patients over 18 years old diagnosed with chronic musculoskeletal pain. We categorized studies as OA, RA, fibromyalgia, LBP, and other musculoskeletal disorders and chronic pain syndromes. Evaluation of at least one of the following outcomes was required: (1) pain severity or (2) disease activity. We also extracted any of following outcomes: (1) physical activity; (2) quality of life; (3) psychological health; (4) medication use; (5) healthcare or medication access. Chronic musculoskeletal pain was defined as three or more months of persistent or recurrent pain that arises as part of a disease process affecting bones, joints, muscles, or related soft tissues [23, 24].

Results

We screened 1078 abstracts published between December 2019 and August 2022. Thirty studies involving 18,810 participants met inclusion criteria and were reviewed. Studies were predominately from Europe and North America (26/30), although two were set in Egypt, one in Benin, and one sourced from 19 Latin American Countries. Seventeen studies were cross-sectional in nature, 11 were longitudinal cohort, one was a descriptive study, and one was a case–control study.

The mean age ranged from 41 to 65 years and 44 to 100% of participants were female. Patient disease duration ranged from 3 months to > 10 years. University education level was reported in 16 studies, with 12–82% of patients holding a university educational degree and one study reported education as mean (SD): 15.3 years (1.9) [25]. Medication usage was reported in 10 studies. Of the patients in these studies, 33–90% took pain medications, 39–85% took nonsteroidal anti-inflammatory drugs (NSAIDs), 19–80% took corticosteroids, and 13–30% took opioids. Comorbidities were reported in 11 studies, with hypertension, cardiovascular disease, and diabetes as the most reported, affecting 7–56%, 3–38%, and 5–13% of patients, respectively. Depression/anxiety was reported in 5 studies in 10–55% of chronic musculoskeletal pain patients.

Table 1 presents a summary of the reported impacts of the COVID-19 pandemic on chronic musculoskeletal pain patients, including clinical outcomes and treatment accessibility. Of 30 studies, 25 (83%) reported increased symptom severity, 17 (57%) reported reduced physical activity, 23 (77%) reported poor psychological health, and 20 (67%) found reduced healthcare accessibility.

Table 2 summarizes the evidence reviewed according to types of conditions, including OA, fibromyalgia, RA, LBP, and other musculoskeletal disorders and chronic pain syndromes. Below, we describe the clinical and healthcare accessibility outcomes individually for each pain condition.

Osteoarthritis

Three studies with 988 hip or knee OA patients assessed the effect of COVID-19-related cancelation/postponement of elective orthopedic surgeries [26–28]. Sample size ranged from 34 to 848; 44–57% of patients were female. None of the studies reported the rate of COVID-19 positive subjects.

All three studies reported higher levels of pain due to COVID-19-related cancelation of surgeries [26–28]. The two prospective cohort studies reported an average visual analog score (VAS) increase of 0.7 in the 4–8 weeks following canceled surgery [26, 27]. One cross-sectional study revealed that hip OA patients were more likely to experience worsening arthritis symptoms than knee OA patients during the pandemic [28]. Similarly, patients with hip OA showed higher WOMAC scores compared to patients with knee OA in another study; however, patients with knee OA experienced faster deterioration in VAS pain scores during the lockdown [26]. Patients reported decreased physical activity in two studies, which correlated to increased VAS and WOMAC scores [26, 28]. Of the three studies, two found that surgical cancelation or delay induced psychosocial distress among patients [27, 28], while the other reported that mental health remained unaffected during lockdown [26]. Unknown length of surgical delay was the most common cause of anxiety [28], and 79–87% of patients wished to reschedule as soon as possible [26]. Additionally, postponed surgery led to increased analgesic consumption in some patients [27]. Overall, the COVID-19 lockdown had a negative impact on surgical accessibility in patients with end-stage hip or knee OA and led to increased pain, worsened physical function, and psychosocial distress.

Rheumatoid Arthritis

Four studies with 1424 patients evaluated the effects of the COVID-19 pandemic on patients with RA [29–32]. Sample size ranged from 68 to 1037; 75–96% of participants were female. Two studies reported a COVID-19 infection rate of 2–3% [29, 30]. One study excluded patients with COVID-19 infection [31].

All four studies reported an increase in disease activity during the pandemic [29–32]. In one study, 85% of patients experienced moderate-to-high disease activity and 80% experienced mild-to-moderate functional impairment [32], and another study reported a significant increase in disease flares related to the pandemic and difficulty accessing medication to 30.8% prevalence [30]. The study by Hassan et al. compared RA patient outcomes to healthy controls during the pandemic, and found significantly worse psychological symptoms and quality of life in RA patients [32]. Increased disease activity, functional impairment, and pandemic-related psychological stress

Table 1 Summary of evidence and impact of the COVID-19 pandemic on chronic musculoskeletal pain

Conditions	*Clinical domains and number of studies*			
	Increased symptom severity	Reduced physical activity	Poor psychological health	Reduced healthcare or medication access
Osteoarthritis (*n* = 3)	3	2	2	3
Rheumatoid arthritis (*n* = 4)	4	1	2	3
Fibromyalgia (*n* = 7)	4	3	6	2
Chronic low back pain (*n* = 3)	2	3	1	3
Other musculoskeletal conditions and chronic pain syndromes (*n* = 13)	12	8	12	9

n = number of studies

Table 2 Characteristics of the 30 studies on the COVID-19 pandemic's impact on chronic musculoskeletal pain

Authors, year, country	Study design	Population	*N* analyzed (% female) COVID-19 (%)	Mean age or range, years	Methodology	Patient symptoms	Healthcare accessibility and author recommendations
Osteoarthritis (OA), $N=3$							
Endstrasser, 2020, Austria	Prospective cohort	End-stage hip and knee OA with delayed arthroplasty	63 (44)	62	Patients evaluated by telephone interviews during the first, fourth and final week of the lockdown - VAS for pain - WOMAC - Short form 12 (SF-12) - Tegner activity scale (TAS)	Lockdown significantly affected level of physical activity, joint function and physical function in patients with advanced hip and knee OA. Knee OA patients showed faster pain deterioration in pain score compared to hip OA patients. Lower physical activity correlated to worse pain and physical function	79% of patients preferred to have arthroplasty rescheduled as soon as possible Lockdown's effect on patients with advanced OA could result in a higher request for arthroplasty surgery in Europe in the months to come
Brown, 2020, USA	Cross-sectional	Hip and knee OA with delayed arthroplasty	848 (57)	63	Survey distributed to patients via telephone or online - Self-report questionnaires (planned operation, anxiety around COVID-19, canceled operation, disease state, and socioeconomic concerns)	Patients with canceled surgeries suffered from daily pain, and 54% of patients reported worsening arthritis symptoms, particularly those with hip OA. 50% of patients reported becoming less physically active	86% of surgeries postponed/canceled by the surgeon or hospital, 14% by patients. 87% of patients wished to reschedule soon Orthopedic surgeons need to carefully plan how to deliver care to patients in a safe and responsible way
Knebel, 2021, Germany	Prospective cohort	Delayed knee or hip arthroplasty	77 (44)	30–79 (87%)	Data collected by online or postal questionnaire before and after surgery cancelation - VAS for pain - Patient Health Questionnaire (PHQ) - Self-report questionnaires (planned operation, personal/operational restrictions, confidence in health systems)	Cancelations resulted in significantly higher pain levels, leading to increased analgesic use. Some patients experienced significant cancelation-induced psychosocial distress, particularly middle-aged women	79% of surgeries canceled by the hospital and 16% by patients due to fear of COVID-19
Rheumatoid arthritis (RA), $N=4$							
Zomalheto, 2020, Benin	Cross-sectional	RA patients with > 1-year disease duration	68 (96), COVID-19 positive: 2%	50	Questionnaires filled out in-person or via WhatsApp - VAS for pain - Disease activity score (DAS28) - Medical outcome study short form 36 (MOS-SF36) - Self-report questionnaires (COVID-19 symptoms, economic consequences, psychological effects)	Significant deterioration of patient QoL with increases in pain and disease activity, associated with stress of COVID-19 infection, disease flare-up, stigmatization, and drug discontinuation	87% of patients reported difficulty obtaining medications

Table 2 (continued)

Authors, year, country	Study design	Population	*N* analyzed (% female) COVID-19 (%)	Mean age or range, years	Methodology	Patient symptoms	Healthcare accessibility and author recommendations
Abualfadl, 2020, Egypt	Cross-sectional	RA patients	1037(82) COVID-19 positive: 3%	44	Face-to-face questionnaire (health/disease status, COVID-19 knowledge, COVID-19 infection)	Remarkable difficulty obtaining medicine led to worsened disease status in 41% of patients. Significant increase in disease flares at 30.8% prevalence	59% reported difficulty obtaining medications, 42% had difficulty obtaining HCQ. 70% considered use of telemedicine to maintain contact with rheumatologist. 22% considered complementary therapy to treat new symptoms
Tuna, 2021, Turkey	Descriptive	RA patients in remission	119 (75)	49	Face-to-face questionnaire - VAS for pain - Open-ended questions on disease status and healthcare accessibility	Significant increase in pain, leading to hygiene, dressing and nutritional problems. 78% of patients stated the pandemic had negatively affected their disease. Patients who could not go to the hospital had increased pain and difficulty coping	53% of patients needed the support of a healthcare professional during the pandemic period. 47% of patients needed a healthcare professional for self-care, 39% for injections, and 34% for pain management during the pandemic period
Hassan, 2022, Egypt	Cross-sectional	100 patients with RA and 100 as healthy control without a history of psychiatric disorders	200 (92)	44	Participants interviewed using semi-structured checklist - Fear of COVID-19 scale (FCV-19S) - Symptom checklist-90 scale (SCL-90) - World Health Organization Quality of life scale (WHOQOL-BREF) - Disease activity score 28 (DAS28) - Modified health assessment questionnaire (MHAQ)	85% of patients experienced moderate-to-high disease activity and 80% experienced mild-to-moderate functional impairment. Perceived fear of COVID-19 was associated with more severe psychological symptoms	Routine screening interviews should be developed for psychological and physical health-related issues during and after the pandemic
Fibromyalgia, $N=7$							
Salaffi, 2020, Italy	Cross-sectional	897 Patients with FM alone, 68 with concomitant FM and COVID-19	965 (91) COVID-19 positive: 7%	52	In-person questionnaire - Widespread pain index (WPI) - Symptom severity scale (SSS) - Fibromyalgia impact questionnaire (FIQR) - Polysymptomatic distress scale - Modified fibromyalgia assessment status 2019 (FASmod)	Fibromyalgia symptoms were significantly more severe in COVID-19 + patients due to physical and mental stress of infection, including sleep quality, fatigue, pain and stiffness	No discussion of healthcare accessibility

Table 2 (continued)

Authors, year, country	Study design	Population	*N* analyzed (% female) COVID-19 (%)	Mean age or range, years	Methodology	Patient symptoms	Healthcare accessibility and author recommendations
Aloush, 2021, Israel	Cross-sectional	Patients with FM	231 (91)	40–60 (46%)	Online questionnaire - VAS for pain and perception of deterioration - Widespread pain index (WPI) - Symptom severity scale (SSS) - Patient health questionnaire (PHQ) - Multi-dimensional perceiver social support (MSPSS) - Brief coping strategies (COPE) - Life orientation test (LOT) - Insomnia severity questionnaire (ISI)	Patients reported adverse mental and physical outcomes. Over half of respondents reported moderate-to-severe levels of anxiety and depression. Avoidant coping style and stopping current treatments correlated with worsened symptoms, while social support and a positive life approach were protective. 85.7% of patients discontinued their regular exercise routine	98% of patients who had been treated with complementary alternative treatments had to discontinue. 30% of those treated with medical cannabis had to discontinue, leading to increased pain and stress. 43% of patients lost contact with their physician Continuous medical follow-up by telemedicine, psychological support to enhance positive coping, and physical exercise including walking are recommended
Cankurtaran 2021, Turkey	Cross-sectional	FM patients (n = 31), Healthy control group (n = 31)	62 (87)	44	- Revised fibromyalgia impact questionnaire (FIQR) - Pitsburg sleep quality index (PSQI) - Hospital anxiety depression scale (HADS) - Fear of COVID-19 scale (FCV-19S) - Coronavirus anxiety scale (CAS)	Psychological stress affected patients more than healthy control, negatively affecting symptom severity, sleep quality, and mood	Patients should be closely monitored in terms of psychological stressors and their effects during pandemics
Bacon, 2021, UK,	Longitudinal	FM patients (n = 390), Healthy control group (n = 151)	541 (86)	44	Questionnaires collected online at weeks 3, 6 and 10 of lockdown - General Symptom Questionnaire (GSQ-65) - BBC subjective wellbeing scale (BBC-SWB) - Cognitive Emotion Regulation questionnaire short (CERQ-short)	Patients reported no worsening of symptoms and an increase in wellbeing, correlated to positive reappraisal and refocusing. Healthy controls experienced worsening health symptoms and no change in wellbeing	There is a need to develop new therapeutic targets to support resilience in fibromyalgia patients
Rivera, 2021, Spain	Longitudinal	FM patients > 18y fulfilling the 2010 ACR criteria	93 (96)	48	Questionnaires collected in person pre-pandemic and during pandemic - Index of severity of fibromyalgia (ICAF) - Patient Global Impression of Change (PGIC)	49% of patients reported worsening of symptoms, although no significant changes were found in pain, sleep quality, daily life activities, depression, and anxiety. Authors attributed discrepancies to patient coping skills	No discussion of healthcare accessibility

Table 2 (continued)

Authors, year, country	Study design	Population	N analyzed (% female) COVID-19 (%)	Mean age or range, years	Methodology	Patient symptoms	Healthcare accessibility and author recommendations
Lazaridou, 2022, USA,	Longitudinal mixed-method	FM patients with baseline pain intensity of at least 4/10 on average and pain report for at least 50% of days	38 (100) COVID-19 positive: 5%	43	Online questionnaire - Brief pain inventory (BPI) - Pain catastrophizing scale (PCS) - Fibromyalgia impact questionnaire-revised (FIQR) - Self-report questionnaire (COVID-19 impact, symptoms)	Increase of pain-related symptoms and a significant increase in pain catastrophizing scores and fibromyalgia impact. 87% reported negatively impacted mental health and 89% reported worsened mood. Pain catastrophizing significantly correlated to increased pain and worsened mental health	74% of patients experienced reduced access to medical care. 42% received fibromyalgia-related medical treatment via telehealth. 66% felt virtual therapies were not sufficient for pain-related needs Women with fibromyalgia might benefit from follow-up visits to assess symptom severity, evaluate psychosocial status (including any changes in pain-related catastrophizing) and re-evaluate treatment regimens
Koppert, 2022, Netherlands	Repeated cross-sectional	FM patients > 18y with a self-reported diagnosis of FM	541 (100)	49	Online Questionnaire - RAND 36-Item Short Form Health Survey (RAND SF-36)	Patients reported improvements in pain, somatic symptoms, role physical[1] and physical functioning, but worsened mental health	Reducing social constraints could be key for fibromyalgia management
Chronic low back pain (CLBP), $N=3$							
Amelot, 2021, France	Prospective cohort	CLBP due to degenerative disc disease with paraspinal muscle impact	50 (52)	53	Questionnaires collected during face-to-face follow-up consultation - VAS for pain - Impact of event scale (IES) - Oswestry disability index (ODI) - Roland–Morris questionnaire (RMQ)	Lockdown affected the somatic component of CLBP by decreasing activities and physical measures, but improved the psychic and emotional components of CLBP. 36% of patients reported improved CLBP, while 28% worsened CLBP. 50% of patients increased analgesic consumption	96% of those treated with physiotherapy had to stop
Bailly, 2021, France & Switzerland	Cross-sectional	Adults with non-specific LBP for at least 3 months without improvement	360 (59) COVID-19 positive: 6%	52	Questionnaires collected via phone or electronic version - VAS for pain - Self-report questionnaire (medical status, lockdown experience, pain, medication use, physical activity)	Patients suffered from significant increase in pain, with 41% of patients experiencing worsened CLBP. Decreased physical activity, bad experience of lockdown, and teleworking correlated with worsened symptoms	About 30% of patients increased their treatment, 12% decreased treatments Very few people increased their consumption of psychoactive substances to decrease pain

Table 2 (continued)

Authors, year, country	Study design	Population	*N* analyzed (% female) COVID-19 (%)	Mean age or range, years	Methodology	Patient symptoms	Healthcare accessibility and author recommendations
Şan, 2021, Turkey	Prospective and Cross-Sectional	Low back pain for > 3 months with spinal intervention within past year	145 (66)	55	Patient data were obtained by telephone interview - VAS for pain - International physical activity questionnaire (IPAQ) - Self-report questionnaire (pain, analgesic use, activity levels, stress, sleep)	Social isolation increased lower back pain and analgesic consumption significantly increased. Significant negative correlation between activity level, and pain intensity and analgesic consumption	58% of patients could not consult a doctor
Other musculoskeletal conditions and chronic pain syndromes, $N = 13$							
Pagé, 2020, Canada	Cross-sectional	Lower limb and lower body 77%, Generalized pain 12%, Upper limb and upper body 8%, Other 3%	3159 (84) COVID-19 positive: 1%	40–69 (63%)	Online questionnaire - Patient global impression of change scale - Patient health questionnaire-4 (PHQ-4) - Numerical rating scale (NRS) - Brief pain inventory (BPI) - Health-related quality of life (EQ-5D-5L) - Self-report questionnaire (COVID-19 impact) - Perceived stress scale-4 (PSS-4)	66% reported worsened pain and almost 50% reported moderate/severe levels of psychological distress. Higher levels of perceived pandemic-related risks, higher levels of stress, and changes in pain treatments correlated to worsened pain. Job loss was associated with lower likelihood of reporting worsened pain	34% of patients had changes to pharmacological treatments. 60% of patients had changes to physical/psychological treatments Facilitating the implementation of virtual stepped care for pain and mental health, access to self-management tools and creating centralized and interdisciplinary assessment, intake and care is necessary to optimize patient care
Macfarlane, 2020, UK	Retrospective cohort	axSpA 57%, regional musculoskeletal pain 28%, PsA 15%	1054 (45) COVID-19 positive: 2%	59	Online questionnaire - Quality of life (EQ-5D-5L) - Sleep quality (Jenkins sleep problem scale) - Fibromyalgia severity (FS) score - Questions in relation to COVID-19 - International physical activity questionnaire short form (IPAQ) - Patient-reported outcomes measurement information system (PROMIS)	Overall decrease in QoL related to worsened mental health and physical pain. Slight worsening of symptoms reported in fibromyalgia, axSpA, and PsA patients, but small improvement in sleep problems also reported in fibromyalgia patients	Addressing anxiety and providing enhanced support for self-management in the absence of normal healthcare is essential
Fallon, 2020, UK	Case control	Patient group ($n = 431$); healthy control group ($n = 88$); chronic pain, categorized according to the (ICD-11)^2 codes	519 (91)	44	Online questionnaire - VAS for pain, anxiety, loneliness, perceived change	Increased pain severity reported across patients. Greater increases in anxiety, depressed mood and loneliness, and reduced levels of physical exercise reported in patients compared to controls. Pain catastrophizing was correlated to higher levels of self-perceived pain and mediated the relationship between decreased mood and pain	Remote pain management to reduce pain catastrophizing and increase physical activity could be beneficial for this vulnerable population

Table 2 (continued)

Authors, year, country	Study design	Population	*N* analyzed (% female) COVID-19 (%)	Mean age or range, years	Methodology	Patient symptoms	Healthcare accessibility and author recommendations
Nieto, 2020, Spain	Cross-sectional	Primary pain 53%, Musculoskeletal pain 52% Headache and orofacial pain 27%, Other 26%, Neuropathic pain 20%, Visceral pain 13%, Postsurgical/posttraumatic pain 11%, Cancer pain 2%	502 (88) COVID-19 positive: 2%	30–59 (81%)	Online questionnaire - Self-report questionnaire (pain characteristics, changes in pain and pain-related outcomes associated with lockdown, pain-related coping strategies and triggers) - Patient global impression of change (PGIC) - Pain-specific impression of change (PSIC)	Increased pain severity, frequency of pain episodes, pain interference, distress caused by pain, and effects of pain on sleep and physical activity. Patients experienced reduced sleep quality and physical activity, and higher distress. Pain triggers included worries about the future, sleep problems, feelings of insecurity, negative thoughts, sadness, loneliness, sedentarism, and fear of suffering from COVID-19	More than half the patients reported changes in their way of managing their pain by resting (55%), stretching (48%) and increasing medication intake (47%) More than one third of patients reported starting to use Internet resources to cope with pain
Michaud, 2020, USA	Longitudinal	RA 61%, OA 11%, SLE 6%, other RMDs 23%	530 (84)	65	Online questionnaire - Self-reported questionnaire (COVID-19 symptoms, disease activity, new symptoms, changes in treatment plan in the previous 2 weeks)	Half of respondents reported new symptoms, including fatigue, anxiety, and muscle pain Canceled appointments independently correlated to increased disease activity	Of the 197 respondents reporting changes to healthcare, 48% reported canceled or postponed appointments, 24% switched to telemedicine appointments, 14% reported self-imposed changes to their medication list or dose, 11% reported physician-directed changes to their medication list or dose, 10% were unable to obtain their medication, and 4% were unable to reach their rheumatology office. Respondents with higher disease activity were more likely to have canceled or postponed appointments
Fernandez-Avila, 2021, 19 Latin American countries	Cross-sectional	RA 48%, SLE 29%, other RMDs 23%	3502 (89) COVID-19 positive: 3%		Online questionnaire - Self-report questionnaire (disease, medications use, COVID-19 infection, request for medical consultation or hospitalization)	Increase in self-rated disease activity and reduced medication adherence. 58% of patients reported increased emotional issues due to social isolation	30% of patients had issues with access to medical care or medication. 30% of patients reported canceling a medical appointment on their own and 43% were canceled by the provider. 23% of patients had anti-rheumatic treatments suspended

Table 2 (continued)

Authors, year, country	Study design	Population	*N* analyzed (% female) COVID-19 (%)	Mean age or range, years	Methodology	Patient symptoms	Healthcare accessibility and author recommendations
Zambelli, 2021, UK	Cross-sectional	OA 37%, FM 34%, other 29%	638 (87)	43	Online questionnaire - Hospital anxiety and depression scale (HADS) - Pittsburgh sleep quality index (PSQI) - Brief pain inventory (BPI)	Patients experienced small but significant improvements in global sleep quality, depression, and pain outcomes. Decreased ability to self-manage pain, restricted access to healthcare and increased dependence on others correlated with negative wellbeing outcomes related to sleep, anxiety and depression. Patients with canceled appointments reported higher levels of sleep problems, anxiety, and depression	375 patients reported canceled healthcare appointments and 138 patients reported changed appointments to online. 86 patients had no change in their appointments
Hruschak, 2021, USA	Cross-sectional cohort	Back pain 57%, FM 25%, persistent postsurgical pain 11%	150 (83) COVID-19 positive: 1%	41	Online questionnaire - Brief pain inventory (BPI) - Pain catastrophizing scale (PCS) - Perceived stress scale (PSS) - Patient-reported outcomes measurement information system (PROMIS)	Significantly increased pain severity and pain interference. Female sex, nonwhite race, lower education, disability, FM, and higher pain catastrophizing independently correlated with greater pain severity, while female sex and pain catastrophizing correlated with pain interference	Generally, participants reported decreased usage of pain management services and increased use of self-management techniques for pain 71% of patients endorsed the importance of treatment restrictions due to social distancing as an important reason for their pain worsening
Garrido-Cumbrera, 2021, 7 European countries[3]	Cross-sectional	axSpA 37%, RA 29%, FM 17%, OA 17%, other RMDs37%	1800 (80) COVID-19 positive: 1%	53	Online questionnaire - WHO Five wellbeing index (WHO-5) - Hospital anxiety and depression scale (HADS) - VAS for disease activity and pain	Patients experienced negative effects on their overall health, including 76% reporting elevated pain, 49% reporting poorer wellbeing, and 47% reporting their health changed for the worse. 57% were at risk of anxiety and 46% of depression. 45.6% were unable to exercise	Patients experienced major disruptions in access to healthcare services, with 59% of patients lacking appointments entirely. Of those with appointments, 58% had their in-person appointment canceled with only 54% of cancelations offered a virtual or telephone consultation in replacement. 16% of patients had their treatment plan changed due to COVID-19 concerns

Table 2 (continued)

Authors, year, country	Study design	Population	*N* analyzed (% female) COVID-19 (%)	Mean age or range, years	Methodology	Patient symptoms	Healthcare accessibility and author recommendations
Smith, 2021, UK	Longitudinal qualitative	RA 44%, OA 22%, CLBP 10%, FM 10%, PsA 9%, other14%	703 (82)	18 <	Online questionnaire - Self-report questionnaire (changes in symptoms, social isolation and loneliness, resilience, and optimism)	Deterioration in pain and symptoms, increased levels of social isolation and decreased optimism. Increased symptoms correlated to younger patients (18–60) and decreased physical activity. Lack of medication access increased symptoms in 63% of patients, medication changes increased symptoms in 71% of patients	12% of patients had difficulty in accessing medication, 15% had medications changes, and 44% required help accessing medications Promotion of physical activity, changing home-working practices and awareness of healthcare provision is important
López-Medina, 2021, Spain	Cross-sectional	PsA 50%, RA 19%, FM 14%, OA/osteoporosis 7%, other 9%	644 (74)	48	Online questionnaire - Self-report questionnaire (changes in symptoms, level of physical activity, treatment adherence, emotional status)	37% of patients reported worsened disease activity, and 76% of patients had a mood disorder during confinement. Worsened disease activity was independently associated with anxiety and sadness	10% spaced and 11% stopped their treatment, especially biologic therapies (20%). 64% changed treatment plan due to fear of developing COVID-19, 50% changed treatment plan without consulting a physician
Özsoy, 2021, Turkey	Retrospective cohort	18 years of age or older with ongoing musculoskeletal pain for at least 3 months	71 (75)	50	Questionnaires collected pre-pandemic, during isolation and controlled social life - VAS for pain - Coronavirus anxiety scale short form (CAS-SF) - IPAQ	Isolation negatively impacted pain severity, physical activity, and anxiety levels. Gradual deconfinement led to decreased pain intensity and anxiety and an increase in physical activity	Developing programs aimed at increasing physical activity and reducing anxiety in individuals with chronic musculoskeletal pain can be effective in pain management
Günaydın, 2022, Turkey	Cross-sectional	Patients aged 18–65 years with chronic musculoskeletal pain	100 (69)	43	- Perceived stress scale (PSS) - Pittsburgh sleep quality index (PSQI) - Nottingham health profile (NHP)	Increased pain severity and analgesic use, and deterioration in general wellbeing. Outcomes independent of history of COVID-19 infection	No discussion of healthcare accessibility

COVID-19 coronavirus disease-2019, *OA* osteoarthritis, *RA* rheumatoid arthritis, *FM* fibromyalgia, *CLBP* chronic low back pain, *SLE* systemic lupus erythematosus, *axSpA* axial spondyloarthritis, *PsA* psoriatic arthritis, *QoL* quality of life, *NSAIDs* non-steroidal anti-inflammatory drugs, *THA*, total hip arthroplasty, *TKA* total knee arthroplasty, *RMDs* rheumatic and musculoskeletal diseases, *ACR* American College of Rheumatology, *VAS* visual analog scale. [1]Role limitations due to physical problems. [2]The primary diagnosis was categorized according to the Classification of Diseases (ICD-11) of the World health Organization, derived from the main cause of pain. [3]UK, Spain, Portugal, France, Italy, Cyprus, Greece all correlated to significant decreases in quality of life among RA patients [29, 32]. Of the four studies, three discussed patients' inability to access healthcare resources despite having a clear need, with 53% of patients lacking the support of a healthcare professional [31], and 59–87% of patients reporting difficulty obtaining medications [29, 30]. Decreased healthcare access was associated with increased symptom severity in two studies [30, 31]. These studies suggest that the COVID-19 pandemic led to reduced access to medications and medical care and increased pain and disease activity of RA patients.

Fibromyalgia

Seven studies with 2471 participants evaluated the effect of the COVID-19 pandemic on patients with fibromyalgia [33–39]. The sample size ranged from 38 to 965; 86–100% of patients were female. The rate of COVID-19 positive tests was 5–7% in two studies [33, 37]. Two other studies excluded patients with a history of COVID-19 infection [35, 39].

Of the seven studies, four reported that fibromyalgia patients experienced increased pain and worsened mental health during the COVID-19 pandemic [33–35, 37]. During the lockdown, increased pain and worsened mental health correlated to higher pain catastrophizing scores [37] and lower levels of social support and optimism [34]. In a study from Turkey, pandemic-related psychological stress had a greater impact on fibromyalgia patients compared to healthy controls, negatively affecting symptom severity, sleep quality, and mood [35]. Two studies reported decreased quality of life and quality of sleep [33, 35]. Of note, a study by Salaffi et al. reported that fibromyalgia symptom severity was significantly worse in COVID-19 positive patients, including sleep quality, pain, stiffness, and fatigue [33]. Two studies reported reduced access to medical care [37] and medical cannabis, and discontinuation of complementary and alternative treatments [34].

Despite four of the seven studies finding worsened clinical outcomes, three studies from Europe found no changes or slight improvements in fibromyalgia patient outcomes during the pandemic [36, 38, 39]. Within these studies, positive outcomes were mostly attributed to effective patients' coping skills [39] and their adaptability, including positive reappraisal and refocusing [36].

Overall, individuals with fibromyalgia were susceptible to increased psychological stress during the COVID-19 pandemic, which had the potential to affect pain severity, sleep quality, and mental health. Importantly, by performing positive coping strategies during the pandemic, some patients reported no change or even improvements in symptoms.

Low Back Pain

Three studies with 555 participants evaluated the effect of the COVID-19 pandemic on patients with LBP [40–42]. The sample size ranged from 50 to 360; 52–66% of patients were female. The rate of COVID-19 positive tests was 6% in one study [40].

All three studies found decreased physical activity levels could worsen LBP during the pandemic [40–42]. One study correlated higher International Physical Activity Questionnaire (IPAQ) walking scores to lower VAS pain scores, while higher IPAQ sitting scores correlated to higher VAS pain scores [42]. Higher average hours of sleep during the pandemic also correlated to lower VAS pain scores [42]. Another LBP study reported pain improvement in 36% of patients and found that participation in home exercise was a good prognostic factor for improved LBP [41]. Increased consumption of analgesics occurred in LBP patients in two studies [41, 42]; one study found that 50% of patients increased their consumption of analgesics during the pandemic [41], and the other reported a significant increase in analgesic use compared to pre-pandemic period [42]. Analgesic use during the pandemic also positively correlated to VAS pain scores, and negatively correlated to IPAQ walking scores [42].

In general, decreased physical activity levels and lower amounts of sleep correlated to worse LBP during the COVID-19 pandemic, and some patients with LBP reported increased analgesic consumption.

Other Musculoskeletal Disorders and Chronic Pain Syndromes

Thirteen studies with 13,372 participants evaluated the effects of COVID-19 on patients with varied chronic musculoskeletal pain conditions [2, 8, 25, 43–52]. The sample size ranged from 71 to 3502; 45–91% of patients were female. The rate of COVID-19 positive patients was 1–3%, as reported in six studies [2, 8, 43, 45, 46, 48].

Twelve of the 13 studies reported increased pain severity and disease activity during the pandemic [2, 8, 25, 43–46, 48–52]. Decreased physical activity correlated to worsened pain in seven studies [2, 8, 25, 43–52]. High levels of psychological distress were common [2, 25, 43–46, 48–51] and poor mental health correlated to worsened pain in eleven studies [2, 8, 25, 43–46, 48–51]. A case–control study by Fallon et al. compared chronic pain patients to a healthy control group during the pandemic. Not only did patients with chronic pain experience increased pain severity but also greater increases in anxiety, depressed mood, and loneliness when compared to controls, which was mediated by pain catastrophizing [44]. One study from the UK found contrasting results reporting that their patients experienced small but significant improvements in anxiety, depression, and pain outcomes [47]. Sleep quality results varied across studies; two studies reported sleep disturbances during the lockdown that were associated with increased pain [8, 45], while three other studies reported improved sleep quality [2, 47] or no change [52]. Pandemic-related changes to pharmacological treatments affected 10–48% of patients [25, 43, 45, 46, 49]. Healthcare appointments were canceled or unavailable in 43–59% of patients [25, 46–48]. Evidently, the COVID-19 pandemic greatly impacted pain, physical activity, and psychological wellbeing in people with a variety of chronic musculoskeletal pain conditions.

Discussion

This is the first review to comprehensively evaluate the COVID-19 pandemic's impacts on pain severity, physical activity, psychological health, and treatment accessibility in a broad range of patients with chronic musculoskeletal pain, musculoskeletal disorders, and chronic pain syndromes. Overall, evidence shows that the COVID-19 pandemic had a significant impact on pain management and healthcare accessibility in many patients with chronic musculoskeletal pain, with canceled OA surgeries and difficulty obtaining medication in patients leading to significantly worsened pain and quality of life. Similarly, decreased physical activity associated with social isolation negatively affected pain levels and physical function, particularly in chronic LBP patients. Importantly, we found a concurrent worsening of psychological and physical symptoms in chronic musculoskeletal pain patients, with the severe impact of the COVID-19 pandemic on patients' mental health likely contributing to worsened physical symptoms [8, 32–35, 37, 43, 44, 47, 50]. Of note, positive coping strategies, including consistent physical activity, social support, refocusing, and positive reappraisal correlated with no change or improved outcomes, especially in fibromyalgia patients.

These findings are consistent with a prior review, which emphasized the impact of social isolation due to the COVID-19 pandemic on physical and mental health in geriatric chronic musculoskeletal pain patients, with loneliness correlated to worsened debility and pain interference [22•]. Although none of the papers in this review looked explicitly at loneliness, we consistently found the influence of decreased mood on the perception of pain, with higher pain catastrophizing [8, 37, 44], pandemic-related fear and stress [33, 35, 43], and anxiety and depression [47, 50], all associated with increased levels of pain. With a broader review of published literature and significantly more patient-reported outcomes, our review further emphasizes the role psychological health played in the wellbeing of chronic musculoskeletal pain patients during the COVID-19 pandemic.

Lockdown protocols during the COVID-19 pandemic further affected chronic pain management by severely limiting access to healthcare and alternative coping strategies. Individuals who experienced changes in healthcare during the pandemic reported increased anxiety [27, 28, 47], worsened disease status [25, 30, 31, 34, 43], sleep problems, and depression [47]. Our results also are consistent with two prior reviews that assessed the impact of COVID-19 pandemic-related cancelations or delays in elective joint replacement surgeries on OA patients. Although a temporary pause in surgical interventions may not lead to an immediate progression of knee OA, it can increase the risk of symptoms worsening, decrease quality of life, reduce mental health, and alter sleep [20•, 21]. Our results further confirm previous findings on reduced treatment access and worsened mental health, quality of life, and symptom severity. Additionally, we found that pandemic-related treatment restrictions broadly affected patients with numerous conditions associated with chronic pain, not just those with OA.

Along with appointment delays and cancelations, chronic musculoskeletal pain patients had trouble accessing various medications, including hydroxychloroquine (HCQ) and opioids. While HCQ was under investigation as a potential COVID-19 treatment, 42% of RA patients in one study reported a "striking difficulty" obtaining their HCQ prescription [30]. Meanwhile, chronic musculoskeletal pain patients taking opioid medications reported limited access to these drugs and concerns about future access [17, 34]. Other studies reported an increase in overall consumption of analgesics in patients during the lockdown across chronic pain conditions [27, 41, 42, 52]. Medication overuse may have the potential to cause a multitude of complications, including permanent morbidity and mortality. Furthermore, the limited access to medications may have resulted in withdrawal symptoms or exacerbation of pain.

Importantly, four studies highlighted the importance of positive coping strategies, including regular physical exercise, positive reappraisal, refocusing, and planning, and a high ability to self-manage pain. These coping methods helped mitigate the pandemic's impact on disease management, leading to an increase in wellbeing outcomes related to pain, sleep, anxiety, and depression [36, 39, 41, 47]. In another study showing symptom improvements in fibromyalgia patients, authors suggested that positive outcomes were attributable to reduced social constraints and work pressure [38]. Notably, none of these studies discussed healthcare accessibility; therefore, it is possible that healthcare accessibility was not as dramatically impacted when compared to other studies.

Our review emphasizes the importance of continuous medical care, even when in-person healthcare may not be an option. Patients most dramatically affected by the pandemic reported high levels of pain catastrophizing and psychological stress, as well as reduced physical activity and restricted access to healthcare and adjunctive therapies. Therefore, providers should consider online healthcare-mediated pain management programs, including online cognitive behavioral therapy and mindfulness meditation, to improve emotional and physical functioning in patients with chronic pain by encouraging positive coping strategies [21, 22•, 44]. Alongside psychological care, regular physical exercise is an effective strategy for controlling chronic musculoskeletal pain and can reduce the emotional and psychological components of pain [41, 57–62]. Consequently, encouraging patients to continue routine at-home exercise during the pandemic has been highly recommended [63]. Telehealth and online platforms remain potentially valuable resources for healthcare workers to facilitate ongoing patient–physician communication, remotely manage medications, reduce pain catastrophizing, and provide mental health services [21, 44]. Forward-planning with telehealth resources could help to prevent a repetition of the COVID-19 pandemic's dramatically negative impact on patients with chronic musculoskeletal pain.

Alongside recent evidence citing the high prevalence of unresolved symptoms following COVID-19 infection, termed Long Covid, our findings suggest that the COVID-19 pandemic has complicated the management of chronic conditions [19••]. The possibility of lasting new symptoms or the exacerbation of pre-existing chronic pain–related symptoms provides a notable new challenge for chronic pain management. Only one of the studies we reviewed discussed the negative impact of COVID-19 infection on fibromyalgia symptoms, and the long-term impact of infection on fibromyalgia pathology was not investigated [33]. Further studies investigating the long-term impact of COVID-19 disease on patients with pre-existing chronic pain are warranted.

Limitations of this research include the fact that we identified studies by searching only English databases, making it possible that not all studies related to chronic musculoskeletal pain management were identified. Studies also had heterogeneous conditions, including patients' characteristics such as age, sex, health status, disease states, and outcome measures, which made specific conclusions difficult. Moreover, several studies relied on patients to recall previous pain levels, which may have potential recall bias. However, a major strength of this study is the inclusion of a broad, representative sample of participants with chronic musculoskeletal pain, including adults with risk factors and comorbidities commonly associated with the disease conditions. These populations typically face limited treatment options due to ineffectiveness and contraindications. Our review emphasizes the importance of continuous medical care addressing both the physical and mental components of chronic musculoskeletal pain, especially in times of crisis.

Conclusion

The COVID-19 pandemic greatly affected pain severity, physical function, mental health, and quality of life in patients with chronic musculoskeletal pain. Patients experienced increased pain severity, decreased physical activity, and poorer mental health during the COVID-19 pandemic. Moreover, the pandemic significantly impacted treatment accessibility, preventing necessary care. However, positive coping strategies, including regular physical activity, refocusing, and positive reappraisal, as well as social support, can protect patients with chronic musculoskeletal pain from adverse consequences during the pandemic. Further research is needed to determine alterations in treatment plans and to explore effective coping strategies for patients while the pandemic continues and for future times of crisis. These findings support further prioritization of chronic pain patient care.

Acknowledgements We would like to thank Dr. Sharon Kolasinski for reviewing this manuscript.

Funding The study was supported by the National Institutes of Health (NIH, K24AT007323, R21AT011790, R34AT011547, R01AT006367, R01AT005521) and the Rheumatology Research Foundation Innovative Research Award.

Data Availability The data from this study will be made available upon request after publication of the study.

Declarations

Conflict of Interest The authors declare no competing interests.

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• Of importance
•• Of major importance

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