



Prevalence of Musculoskeletal Symptoms in Post-COVID-19 Patients

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ABSTRACT

Background: Coronavirus disease 2019 can affect several body systems, and musculoskeletal symptoms may persist after recovery from the acute infection. Pain and other musculoskeletal complaints can create additional challenges during the post-COVID-19 recovery period. **Objective:** To determine the frequency and distribution of musculoskeletal symptoms among post-COVID-19 patients. **Methodology:** This observational cross-sectional study was conducted from June to September 2021 after ethical approval from the Lyallpur Institute of Management Sciences, using purposive sampling to recruit 120 individuals with previous COVID-19 infection, of whom 70 met the eligibility criteria. Participants were aged 30 to 55 years, had recovered from COVID-19 with a negative test, reported musculoskeletal symptoms, and had manual muscle testing grades 1–3, while smokers, those with autoimmune conditions, those >55 years, and participants still positive or under quarantine were excluded. Data were collected through a demographic form, self-developed screening questionnaire, 0–5 verbal pain scale, Musculoskeletal Health Questionnaire, and Standardised Nordic Musculoskeletal Questionnaire, administered through face-to-face interviews. The Musculoskeletal Health Questionnaire assessed overall musculoskeletal health (0–56), while the Nordic Questionnaire identified symptoms across different anatomical regions. Descriptive statistics, including frequencies, percentages, and appropriate measures for numerical variables, were used to summarize demographic characteristics, pain intensity, Musculoskeletal Health Questionnaire scores, and musculoskeletal symptoms. **Results:** Of the 70 participants, 50 (71.4%) reported very severe pain, 14 (20%) reported the worst possible pain, and 6 (8.6%) reported severe pain. Neck and shoulder symptoms were reported by all participants (100%), followed by upper-back symptoms (98.6%) and lower-back symptoms (94.3%). Knee symptoms were reported by 81.4% of participants, while ankle, elbow, and wrist symptoms were reported by 68.6%, 57.1%, and 54.3%, respectively. Hip symptoms were reported by 42.9% of participants. **Conclusion:** Musculoskeletal symptoms were frequently reported among the post-COVID-19 patients included in this study, particularly in the neck, shoulder, upper-back, and lower-back regions. These findings highlight the importance of assessing musculoskeletal complaints during post-COVID-19 follow-up. Larger prospective studies incorporating objective functional assessments are needed to determine symptom progression and rehabilitation needs. **Keywords:** Coronavirus Disease 2019, Musculoskeletal Pain, Musculoskeletal Symptoms, Post-COVID-19 Survivors, Quality of Life

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INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The disease was first identified in Wuhan, China, in late 2019 and rapidly spread across the world. Although the respiratory system is the primary site affected during acute infection, COVID-19 can involve several other body systems. Early clinical evidence showed that patients could present with fever, cough, fatigue, myalgia, and other systemic symptoms, while laboratory abnormalities such as lymphopenia and raised inflammatory markers were also frequently reported.¹

The clinical effects of COVID-19 are not always limited to the acute stage of infection. Some individuals continue to experience symptoms or develop new health problems after recovery from the initial illness. The World Health Organization describes post-COVID-19 condition as a state in which symptoms usually occur three months after the initial infection, last for at least two months, and cannot be explained by another diagnosis.²

Commonly reported problems include fatigue, musculoskeletal pain, sleep disturbances, breathlessness, and cognitive difficulties. These symptoms can affect physical functioning and may interfere with routine activities, work, and social participation. Musculoskeletal involvement has received increasing attention because pain, weakness, fatigue, and reduced physical capacity are frequently reported during and after COVID-19. A systematic review and meta-analysis found that neurological and musculoskeletal manifestations were common among patients with COVID-19, with myalgia being one of the frequently reported complaints.³ Another clinical study reported that musculoskeletal symptoms could persist following hospitalization for COVID-19, demonstrating that these problems may continue beyond the acute phase of infection.⁴

The development of musculoskeletal problems after COVID-19 is likely to have several contributing factors. Acute systemic inflammation may influence muscle and connective tissue function, while prolonged physical inactivity, bed rest, hospitalization, and reduced mobility can contribute to muscle wasting and physical deconditioning. A review of the musculoskeletal consequences of COVID-19 highlighted the

potential effects of prolonged illness and inactivity on muscle strength, physical performance, and overall musculoskeletal function.⁵ However, the mechanisms responsible for persistent symptoms are complex and may differ between individuals. A systematic review of musculoskeletal manifestations of COVID-19 reported fatigue, myalgia, arthralgia, back pain, muscle weakness, and reduced physical performance among the problems described during the post-acute period.⁶ These findings suggest that recovery from COVID-19 should not be considered solely in terms of resolution of respiratory symptoms, particularly when patients continue to experience pain or functional limitations.

Joint and muscle complaints may also remain present after the acute infection has resolved. A systematic review examining post-acute COVID-19 joint pain and rheumatic manifestations found that joint pain and other musculoskeletal complaints had been reported after SARS-CoV-2 infection, although their frequency varied considerably between studies and populations.⁷ Differences in disease severity, follow-up duration, assessment methods, and participant characteristics may partly explain this variation.

The burden of post-COVID-19 musculoskeletal symptoms is important because pain, stiffness, weakness, and reduced mobility can affect everyday functioning. Patients may experience difficulty performing household activities, maintaining occupational responsibilities, participating in exercise, sleeping comfortably, or returning to their previous level of physical activity. Recent evidence from a systematic review and meta-analysis has shown that muscle pain, joint pain, and muscle weakness remain relatively common among individuals with post-acute sequelae of SARS-CoV-2 infection.⁸

The recognition of these symptoms is therefore important for physiotherapists and other rehabilitation professionals. Assessment of the location, frequency, and severity of musculoskeletal complaints can help identify patients who may require further physical and functional evaluation. Rehabilitation may need to address pain, muscle weakness, reduced mobility, impaired physical capacity, and limitations in daily activities. The wide range of symptoms reported after COVID-19 also emphasizes the need for individualized assessment rather than focusing only on respiratory recovery.⁹ Previous research

on severe respiratory viral infections has also demonstrated that prolonged illness can be associated with substantial muscle weakness and reduced exercise capacity during recovery.¹⁰ These findings support the importance of evaluating physical and musculoskeletal consequences in patients recovering from COVID-19. Nevertheless, the pattern and frequency of musculoskeletal symptoms may vary between populations, and local evidence remains important for understanding the rehabilitation needs of post-COVID-19 patients.

Therefore, this study aimed to determine the frequency of musculoskeletal symptoms among post-COVID-19 patients and to identify the different musculoskeletal symptoms experienced by COVID-19 survivors. Understanding the frequency and distribution of these symptoms may assist healthcare and rehabilitation professionals in recognizing persistent musculoskeletal problems and planning appropriate assessment and rehabilitation strategies.

METHODOLOGY

This observational cross-sectional study was conducted to determine the frequency of musculoskeletal symptoms among post-COVID-19 patients. Ethical approval was obtained from the Lyallpur Institute of Management Sciences in June 2021. Data collection was conducted over four months from June to September 2021. A purposive sampling technique was used to recruit participants from the target population. Initially, 120 individuals with a previous history of COVID-19 were approached. All participants underwent screening using a self-developed screening questionnaire containing demographic information and questions based on the predefined inclusion and exclusion criteria.

Following screening, 70 participants were found eligible and included in the study, whereas 50 individuals were excluded. The excluded individuals had a previous history of COVID-19 but were not considered eligible because of autoimmune pathologies, smoking, or an age above 55 years, as these factors were considered potential influences on musculoskeletal symptoms and could affect the interpretation of the findings. Participants were eligible if they had recovered from COVID-19 and had a negative COVID-19 test result at the time of assessment, reported musculoskeletal symptoms, and were between 30

and 55 years of age. Participants with muscle strength grades 1, 2, or 3 on Manual Muscle Testing (MMT) were included. Individuals reporting pain ranging from mild to the worst possible pain on the verbal pain intensity assessment were also eligible. Individuals with a positive COVID-19 test result or those who were still under quarantine were excluded. Participants outside the specified age range, those with autoimmune pathologies, and smokers were also excluded. Before participation, each eligible participant was informed about the purpose and procedures of the study. Written informed consent was obtained from all participants, and they were assured that the information collected would be used solely for research purposes and that their personal information would remain confidential.

Data were collected using a demographic data form, a self-developed screening questionnaire, a verbal pain intensity assessment, the Musculoskeletal Health Questionnaire (MSK-HQ), and the Standardised Nordic Musculoskeletal Questionnaire. The MSK-HQ is a validated patient-reported measure developed to assess musculoskeletal health across different musculoskeletal care pathways and conditions.¹¹ It assesses several aspects of musculoskeletal health, including pain, physical function, psychological and social impact, and related health problems, with a total score ranging from 0 to 56. The Standardised Nordic Musculoskeletal Questionnaire was used to identify musculoskeletal symptoms in specific anatomical regions. It was developed as a standardized instrument for recording musculoskeletal symptoms and can be administered through either self-completion or interview.¹²

Pain intensity was assessed using the verbal pain intensity categories specified in the study protocol. Participants were asked to describe their pain using a six-level scale ranging from 0 to 5, where 0 represented no pain, 1 mild pain, 2 moderate pain, 3 severe pain, 4 very severe pain, and 5 worst possible pain. Verbal rating scales are established methods for assessing pain intensity using ordered verbal descriptors, although the number and wording of categories may vary between instruments.¹³ The present study used the specified 0-5 categories during data collection. The demographic form was used to record participant characteristics, while the screening questionnaire was used to determine eligibility according to the predefined criteria.

The MSK-HQ was scored by summing the individual item responses to obtain the overall musculoskeletal health score, with a maximum possible score of 56. The Standardised Nordic Musculoskeletal Questionnaire was used to record the presence of musculoskeletal symptoms in different anatomical regions, including the neck, shoulders, upper back, lower back, elbows, wrists and hands, hips and thighs, knees, and ankles and feet. All questionnaires were administered through face-to-face interviews to ensure that participants understood the questions and that responses were recorded consistently.

The collected data were entered into Microsoft Excel and subsequently analyzed using IBM SPSS Statistics version 22. Descriptive statistics were used to summarize the demographic characteristics, pain intensity, MSK-HQ findings, and frequency of musculoskeletal symptoms. Frequencies and percentages were calculated for categorical variables, while appropriate descriptive measures were used for numerical variables. The results were presented according to the frequency and distribution of musculoskeletal symptoms reported by the post-COVID-19 participants.

RESULTS

A total of 120 individuals with a previous history of COVID-19 were initially approached for participation. Following screening according to the predefined eligibility criteria, 50 individuals were excluded, and 70 participants were included in the final analysis. The analysis therefore comprised 70 post-COVID-19 participants. The findings focused on pain intensity and the frequency of musculoskeletal symptoms reported in different anatomical regions.

Pain intensity was assessed using the verbal pain intensity categories specified in the study protocol. Among the 70 participants, 50 (71.4%) reported very severe muscular pain, while 14 (20.0%) reported the worst possible pain and 6 (8.6%) reported severe pain. No participant was classified in the mild or moderate pain categories. Thus, all participants included in the analysis reported pain within the severe-to-worst range (Table 1).

The Standardised Nordic Musculoskeletal Questionnaire showed a high frequency of symptoms in the neck, shoulder, and upper-back regions. Neck and shoulder symptoms were

reported by all 70 participants (100%). Upper-back symptoms were reported by 69 participants (98.6%), while 1 participant (1.4%) reported no upper-back symptoms. These findings indicate that the neck and shoulder regions were affected in the entire study population, with upper-back symptoms reported by almost all participants (Table 2).

Participants also reported musculoskeletal symptoms in the elbow and wrist regions. Elbow symptoms were present in 40 participants (57.1%), whereas 30 participants (42.9%) reported no elbow symptoms. Wrist symptoms were reported by 38 participants (54.3%), while 32 participants (45.7%) reported no wrist symptoms. Thus, symptoms involving the elbow and wrist were less frequent than those reported in the neck, shoulder, and upper-back regions (Table 3).

Table 1: Verbal pain intensity distribution of participants

Pain Intensity	Frequency (n)	Percentage (%)
Severe pain	6	8.6
Very severe pain	50	71.4
Worst possible pain	14	20.0
Total	70	100.0

Table 2: Frequency of musculoskeletal symptoms in the neck, shoulder and upper back

Anatomical region	Yes Frequency (%)	No Frequency (%)	Total
Neck	70 (100.0)	0 (0.0)	70
Shoulder	70 (100.0)	0 (0.0)	70
Upper back	69 (98.6)	1 (1.4)	70

Table 3: Frequency of musculoskeletal symptoms in the elbow and wrist

Anatomical region	Yes Frequency (%)	No Frequency (%)	Total
Elbow	40 (57.1)	30 (42.9)	70
Wrist	38 (54.3)	32 (45.7)	70

Table 4: Frequency of musculoskeletal symptoms in the lower-body regions

Anatomical region	Yes Frequency (%)	No Frequency (%)	Total
Lower back	66 (94.3)	4 (5.7)	70
Hip/thigh	30 (42.9)	40 (57.1)	70
Knee	57 (81.4)	13 (18.6)	70
Ankle	48 (68.6)	22 (31.4)	70

Among the lower-body regions assessed, 66 participants (94.3%) reported lower-back symptoms, while 4 (5.7%) reported no lower-back symptoms. Knee symptoms were reported by 57 participants (81.4%), whereas 13 (18.6%) reported no knee symptoms. Ankle symptoms were present in 48 participants (68.6%), while 22 (31.4%) reported no ankle symptoms. Hip symptoms were reported by 30 participants (42.9%), with 40 participants (57.1%) reporting no hip symptoms. Lower-back symptoms were therefore the most frequently reported lower-body complaint, followed by knee and ankle symptoms (Table 4).

Overall, the findings demonstrated that musculoskeletal symptoms were common among the post-COVID-19 participants, with the highest reported frequencies observed in the neck and shoulder regions (100%), followed by the upper back (98.6%) and lower back (94.3%). Knee symptoms were reported by 81.4% of participants, while ankle, elbow, and wrist symptoms were reported by 68.6%, 57.1%, and 54.3%, respectively. Hip symptoms were reported by 42.9% of participants. The pattern of findings indicates that musculoskeletal complaints were reported across both upper- and lower-body regions, with symptoms particularly frequent in the spinal and proximal regions.

DISCUSSION

The present study found a high frequency of musculoskeletal symptoms among post-COVID-19 patients aged 30-55 years. The most frequently reported symptoms were in the neck and shoulder, followed by the upper back and lower back. Knee and ankle symptoms were also common, while elbow, wrist, and hip symptoms were reported less frequently. In addition, most participants reported

severe or very severe muscular pain, with 71.4% reporting very severe pain and 20.0% reporting the worst possible pain. These findings indicate that musculoskeletal problems may remain an important part of the recovery experience after COVID-19 and should not be overlooked when patients are assessed after the acute infection. The pattern observed in this study is consistent with previous research showing that musculoskeletal pain can persist after recovery from COVID-19. In a large multicenter study of 1,969 hospitalized COVID-19 survivors, 45% reported musculoskeletal post-COVID pain approximately eight months after discharge, and most of these patients developed new pain rather than only worsening of previous symptoms.¹⁴ Another study reported that patients who experienced myalgia during the acute infection were more likely to develop persistent musculoskeletal pain after recovery.¹⁵

These findings support the clinical relevance of the high symptom frequency observed in the present sample. However, the very high frequencies found in our study should be interpreted in relation to the study population, inclusion criteria, and sampling approach rather than being considered representative of all post-COVID-19 survivors. The distribution of symptoms in the present study also suggests that post-COVID musculoskeletal problems may involve several body regions rather than a single localized area. Neck and shoulder symptoms were reported by all participants, while almost all participants reported upper-back symptoms and 94.3% reported lower-back symptoms. Knee and ankle symptoms were also frequent.

A descriptive study from Türkiye found that prolonged musculoskeletal pain could continue for several months after COVID-19, with patients reporting different pain locations and, in some cases, associated neuropathic symptoms.¹⁶ A broader review has similarly described fatigue, myalgia, arthralgia and back pain among the common musculoskeletal manifestations of post-COVID-19 condition.¹⁷ The widespread distribution of symptoms in our participants therefore supports the need for a broader musculoskeletal assessment rather than focusing only on the site of the patient's main complaint.

The findings are also relevant from a functional rehabilitation perspective. Musculoskeletal pain, stiffness and weakness can interfere with

movement and may make routine physical activities more difficult. Although the present study was descriptive and did not directly measure changes in muscle strength, functional capacity, or quality of life using objective performance tests, the high frequency of symptoms indicates a substantial need for clinical assessment. Evidence from rehabilitation studies suggests that post-COVID-19 rehabilitation can improve functional capacity and several patient-reported outcomes. A systematic review and meta-analysis of 14 trials involving 1,244 adults with post-COVID-19 condition found that rehabilitation interventions were associated with improvements in functional exercise capacity and quality of life, although uncertainty remained regarding some safety outcomes.¹⁸

Another meta-analysis involving 23 studies and 1,579 participants reported improvements in fatigue, depression, exercise-related outcomes, and quality of life following physical exercise-based rehabilitation.¹⁹ These findings provide support for considering rehabilitation as part of post-COVID-19 care, while recognizing that rehabilitation should be individualized according to symptoms and clinical status.

Fatigue and reduced physical capacity are particularly important when considering rehabilitation after COVID-19. A recent systematic review and meta-analysis found that pulmonary rehabilitation improved exercise capacity and reduced fatigue in patients with post-COVID-19 syndrome, although evidence for some outcomes remained limited.²⁰ Similarly, a 2024 systematic review reported improvements in physical function, quality of life, and psychological outcomes following pulmonary rehabilitation, although the effect on fatigue was not consistent across analyses.²¹ These findings suggest that rehabilitation should not be limited to pain management alone. Assessment of physical capacity, fatigue, functional limitations, and the patient's ability to perform daily activities may provide a more complete understanding of post-COVID-19 rehabilitation needs.

Sleep and general well-being are also relevant to the recovery process. Although the present study did not provide separate numerical results for sleep quality or psychological outcomes, these areas were included in the broader assessment of the participants' post-COVID experience. Previous research has shown that sleep disturbance can

remain common after COVID-19 and may be associated with poorer physical and mental quality of life.²² This is important because persistent pain, fatigue, poor sleep and reduced activity may interact with one another and contribute to greater difficulty in returning to normal daily routines. Therefore, a patient presenting with persistent musculoskeletal symptoms may require assessment beyond the painful body region alone.

Current evidence also supports a cautious and individualized approach to post-COVID rehabilitation. A 2025 systematic review and meta-analysis of randomized trials found that pulmonary rehabilitation can improve physical capacity, health-related quality of life, and fatigue in people with long COVID, with benefits varying according to the type and duration of rehabilitation.²³ Physical exercise-based rehabilitation has also shown potential benefits for fatigue, dyspnea, physical function and quality of life, but the available studies remain heterogeneous, and many have relatively short follow-up periods.¹⁹ These findings support the role of physiotherapy within multidisciplinary post-COVID care, but they do not justify assuming that one exercise programme will be suitable for every patient.

The sample was relatively small and was selected through purposive sampling, which limits the generalizability of the findings to the wider post-COVID-19 population. Participants were restricted to 30-55 years of age; therefore, the findings may not represent younger adults or individuals older than 55 years, who may have different comorbidities and rehabilitation needs. Smokers and individuals with autoimmune pathologies were excluded, so the findings cannot be extended to these groups. The study was cross-sectional and descriptive; therefore, it cannot establish whether the reported musculoskeletal symptoms were directly caused by COVID-19 or whether they represented persistence or worsening of pre-existing symptoms.

The study also relied on self-reported questionnaire data and did not include objective follow-up measurements of muscle strength, range of motion, or physical performance. Data collection during the pandemic was affected by restricted access to healthcare facilities and difficulties in maintaining follow-up with recovered patients. Finally, the absence of longitudinal follow-up means that symptom duration and progression

could not be determined. These limitations should be considered when interpreting the high symptom frequencies observed in this study.

CONCLUSION

This study found a high frequency of musculoskeletal symptoms among post-COVID-19 patients. Severe to very severe muscular pain was reported by all participants, with very severe pain reported by 71.4% and the worst possible pain by 20%. Neck and shoulder symptoms were reported by all participants, followed by upper-back symptoms (98.6%) and lower-back symptoms (94.3%). Knee and ankle symptoms were also frequent, while elbow, wrist, and hip symptoms were reported less often. These findings indicate that musculoskeletal symptoms can remain an important component of the post-COVID-19 recovery period and warrant systematic assessment during follow-up.

Future studies should prospectively follow post-COVID-19 patients from the end of the acute recovery period to determine the duration and progression of musculoskeletal symptoms. Studies should also include objective measures of joint range of motion, muscle strength, functional performance, and physical activity alongside symptom questionnaires. Larger samples should include adults older than 55 years and smokers to determine whether symptom patterns differ across these groups. Intervention-based studies should specifically evaluate individualized physiotherapy programmes targeting the frequently affected cervical, shoulder, thoracic and lumbar regions, with outcomes assessed over both the short and longer term.

DECLARATIONS

Ethics approval and consent to participate: Ethical approval was obtained from the Institutional Ethics Committee of Lyallpur Institute of Management Sciences (LIMS), Pakistan. Written informed consent was obtained from all participants.

Availability of data and materials: The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Competing interests: The authors declare no competing interests.

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Reporting guidelines: The study was conducted and reported as an observational cross-sectional study.

AUTHOR CONTRIBUTIONS

MA: Conceptualization, Methodology, Supervision, Investigation, Data Curation, Formal Analysis, Writing - Original Draft Preparation.

AM: Conceptualization, Methodology, Writing - Review & Editing, Validation.

All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

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