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# Work from home-related musculoskeletal pain during the COVID-19 pandemic: A rapid review

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ABSTRACT

*Objective:* This rapid review explores the prevalence of musculoskeletal pain symptoms associated with work from home conditions during the COVID-19 pandemic.
*Methods:* We conducted a rapid review across three databases (i.e., PubMed, Medline, and CINAHL) for observational studies that report on the musculoskeletal functions among individuals placed in a work from home setup due to the COVID-19 pandemic, published between December 2019–August 2021. Two independent review authors searched, appraised, and extracted data from the articles included in the final review. A descriptive approach was used to synthesize the narrative evidence.
*Results:* Forty-four articles were initially identified. A total of six (n = 6) studies met the full inclusion criteria and were included. Among them, there were five cross-sectional studies and one case-control study. The highest prevalence reported were neck pain (20.3–76.9%), low back pain (19.5–74.1%), and shoulder pain (3.0–72.9%). The most common instrument used was the Nordic Musculoskeletal Questionnaire. One of the common professions that report musculoskeletal pain symptoms associated with work from home conditions were individuals working in the academic sector.
*Conclusion:* The increased prevalence of musculoskeletal pain symptoms associated with work from home conditions during the COVID-19 pandemic is a concern that should be addressed to prevent negative neuromusculoskeletal outcomes.
*Systematic review registration:* This review is in the Open Science Framework registry (osf.io/vxs4w) and the PROSPERO database (CRD42021266097).
*Implications for practice:*

- A system in the workplace should be developed for the early detection of musculoskeletal pain.
- Apart from standard occupational safety and proper ergonomic, sustainable policies and programs that address the mental health issues of employees should also be addressed.
- Programs addressing musculoskeletal pain should be available online for employees to address accessibility and ubiquity.

## 1. Introduction

Musculoskeletal conditions refer to various health-related issues with underlying pathophysiology that concern the muscular and skeletal functions [1]. Examples of common musculoskeletal conditions include pain in the neck, back, leg, and different joint regions. Musculoskeletal conditions have been recognized as the most common cause of chronic pain and physical disability among hundreds of millions of individuals across age groups worldwide [2]. The causes of musculoskeletal conditions fall in a varied spectrum of pathophysiology, including inflammatory diseases, age-related functional decline, and, more commonly, occupational or activity-related reasons. Left alone without

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intervention, musculoskeletal conditions may progress to a disorder that compromises individuals' health, well-being, and function.

Work-related musculoskeletal disorders are a subtype of musculoskeletal disorders related to occupational exposure of risk. The prevalence of work-related musculoskeletal disorders may be as high as 14.90% in different work industries [3]. Specifically, occupations exposed to computer-related office work may be at a higher risk for musculoskeletal disorders of the neck and upper extremity due to repetitive movements, static and awkward posture, and manual tasks [4]. With the increasing use of handheld devices, the prevalence of associated musculoskeletal complaints may be as high as 67.80% [5]. Work-related musculoskeletal disorders present a pressing issue. In the UK, around 9.25 million days were lost [6], while Germany reports almost 29 million Euros lost [7] due to work-related musculoskeletal disorders. This brings global disability-adjusted life years of over 30,000 due to musculoskeletal disease [8]. Thus, the effects of work-related musculoskeletal disorders are not exclusive to the individual; rather, it extends to encompass their socio-economic contexts.

The COVID-19 pandemic has placed the global community in a state of lockdown and quarantine in place to control the spread of the virus. One of the most common public health strategies is enforcing a "work from home" setup [9]. The shift to a work from home status places some professions that are typically not desk-based confined in a make-shift office [10]. For example, teachers who are typically classroom or laboratory-based have been forced to deliver their lectures and activities seated in front of a computer for hours on end. Thus, current work demands and resource limitations have likewise shifted, and affected workers are exposed to additional physical and occupational stress. Recent findings suggest that individuals who work from home have higher reported musculoskeletal pain [11].

Additionally, there is initial evidence that as much as 86.30% of individuals who have worked from home experience musculoskeletal disorders [12]. The extant literature on the effects of the COVID-19 pandemic work from home setup on musculoskeletal functions has been fragmented or, at best, yet to be reviewed. With the known health and socio-economic effects of work-related musculoskeletal disorders, there is a need to rapidly review the existing relevant literature to inform decision-making towards immediate programs and policies that address the health and well-being of individuals who are continuously working from home. In this review, we are keen on reviewing the prevalence of musculoskeletal pain, and not the specific disorders associated with it, among a subset of the population who worked from home due to the quarantines imposed by the COVID-19 pandemic. Thus, this rapid review aimed to explore musculoskeletal pain symptoms associated with work from home conditions during the COVID-19 pandemic.

## 2. Materials and Methods

### 2.1. Rapid review question

This rapid specifically aims to answer the question, "What is the prevalence of musculoskeletal pain symptoms associated with work from home conditions during the COVID-19 pandemic?"

### 2.2. Protocol and registration

A rapid review was chosen due to the urgent need to support decision-making on preventing and addressing the possible effects on the musculoskeletal functions due to the work from set up during the COVID-19 pandemic. The methods in this rapid review were informed by the World Health Organization's practical guide on rapid reviews [13], and we used the Selecting Approaches for Rapid Reviews (STARR) Decision Tool [14] to address possible methodological limitations. The reporting of this protocol is adapted from the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) Protocols [15]. This protocol is in the Open Science Framework registry (osf.io/vxs4w) and the PROSPERO database (CRD42021266097). A published version of the rapid review protocol is currently in press [16].

### 2.3. Eligibility criteria

The inclusion and exclusion criteria adopted in this rapid review considered peer-reviewed published observational studies, including epidemiological studies, prospective and retrospective cohort studies, case-control studies, cross-sectional studies, case series, case studies, or reports for inclusion, published starting from December 2019–August 2021. The studies must include adult workers ages 20–65 in different industries who, because of the COVID-19 pandemic, were forced to work from home. The outcomes to be reviewed include musculoskeletal conditions, disorders, or pain.

### 2.4. Information sources

Following the recommendations of the STARR Decision tool, the initial search strategy was developed by members of the review team who have been trained in the Cochrane and JBI evidence-based practice models. The following databases were searched: PubMed, MEDLINE, and CINAHL. This review did not include grey literature searching.

### 2.5. Search strategy

Table 1 summarizes the keywords and alternative terms strung together to search for the articles considered for this rapid review. The last date searched was on August 31, 2021.

### 2.6. Data management and selection process

A three-step search and selection strategy were utilized in this review. We searched through the identified information sources using combinations of our search strategies. The first level of study selection involved screening the title and abstracts of the potential studies. The second screening level involved a full-text review of articles that have passed through the first level of screening. Thirdly, the reference list of all identified articles was searched for additional studies. Studies published in English, or have an available English translation, were considered for inclusion in this review. After an initial review workshop, two independent review authors accomplished the search and screening process. A consensus meeting ensued to finalize the decision in case of unresolved issues. The study selection and screening process summary are presented in the PRISMA flow diagram.

### 2.7. Risk of bias assessment

Two independent reviewers assessed articles selected for retrieval for methodological validity before inclusion in the review using study design-specific standardized critical appraisal instruments from the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) [17]. Any disagreements that arose between the reviewers were resolved through discussion for a consensus.

**Table 1**
Search strategy.

| Keyword | Other terms |
|---|---|
| COVID-19 | COVID-19 pandemic *OR* pandemic *OR* COVID |
| work from home | work-from-home *OR* home-based *OR* home |
| musculoskeletal | musculoskeletal function* *OR* musculoskeletal pain *OR* musculoskeletal condition *OR* musculoskeletal disorders *OR* musculoskeletal* |

### 2.8. Data extraction

Quantitative data were extracted from papers included in the review using study design-specific standardized data extraction tools from JBI-MAStARI, purposely built into an MS Excel spreadsheet. The data extraction form (included as a supplementary file) was tested on n = 5 articles for data validation and reviewer validity. The data extracted included specific details about the context, populations, study methods, and outcomes of significance to the review-specific objectives (e.g., prevalence rate, type of pain, pain site, musculoskeletal condition). Two review authors extracted the data, with a third author adjudicating any unresolved inconsistencies.

### 2.9. Data synthesis and analysis

Due to clinical heterogeneity, quantitative meta-analysis was not considered. A narrative synthesis was performed to describe the reviewed evidence in tables and figures. Nevertheless, we summarized the quantitative data using basic descriptive statistics.

## 3. Results

### 3.1. Study selection

Our initial search yielded 44 primary studies across the three databases searched (n = 44) and through other sources, such as reference and relevant articles forward-searching (n = 5). After removing one duplicated article, the screening process of titles and abstracts excluded 30 studies that did not fit into our rapid review criteria. After a full-text review, seven additional articles were likewise excluded for similar reasons. The included six articles' reference list was manually searched; however, no additional articles were added (Fig. 1).

### 3.2. Study characteristics

Six articles are included in this rapid review [11,12,18–21]; five articles have a cross-sectional study design (Level IV evidence), and one article uses a case-control design (Level III-3 evidence). A total of n = 2835 participants were recruited spread over the six articles; however, only n = 1720 were sampled to have worked from home during the quarantine period of the pandemic. These participants came from four countries: Turkey, Indonesia, Saudi Arabia, and the Philippines. Age ranged from 20 to 64 years. The nature of work varied across studies; however, one of the more common professions was those working in the academe (i.e., teacher, academic), as reported in four articles. All articles reported the prevalence of musculoskeletal-related pain for the following body parts: neck, shoulder, upper back, lower back, elbow, wrist/hands, hips/thighs, knees, and ankles/feet. The most common instrument used to report the prevalence of musculoskeletal-related pain was the Nordic Musculoskeletal Questionnaire [22] used in three studies; the rest used different instruments. All instruments were administered electronically. Three studies reported on work-related factors associated with musculoskeletal-related pain due to working from home.

### 3.3. Risk of bias within studies

The critical appraisal scores, reflecting risks of bias, ranged from 4 to 9 out of 9, with a mean score of 6.0. Only one study was able to score a perfect rating. The most common limitation was the inappropriate recruitment (i.e., report on the sampling method and design is lacking) of participants (four studies). All studies used valid methods for

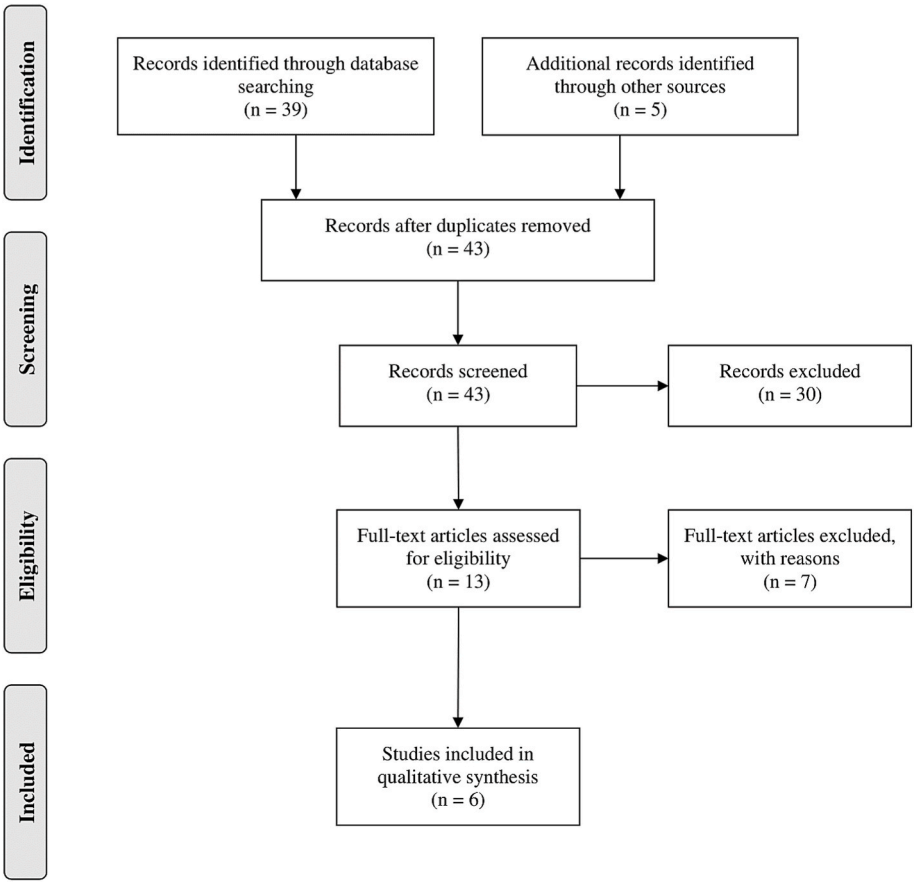


**Fig. 1.** PRISMA flow diagram.

identifying the condition's prevalence. Interestingly, some limitations were due to unclear findings (i.e., authors were not clear in explicitly reporting how internal and external biases were addressed in their methods) instead of a clear methodological caveat (three studies).

### 3.4. Synthesis of results

Due to clinical heterogeneity, a meta-analysis was not possible. Hence, we report the synthesis of results in a narrative form supplemented by a summary table (Table 2).

#### 3.4.1. Prevalence of musculoskeletal pain due to work from home conditions during the COVID-19 pandemic

Nine common body parts reported to have experienced musculoskeletal pain related to work from home conditions during the pandemic quarantine were reported in all six articles: neck, shoulder, upper back, lower back, elbow, wrist/hands, hips/thighs, knees, and ankles/feet. The highest prevalence reported was for neck pain (20.3–76.9%), low back pain (19.5–74.1%), and shoulder pain (3.0–72.9%). The lowest pain prevalence recorded was elbow pain (1.3–17.6%). Fig. 2 summarizes the ranges of pain prevalence.

#### 3.4.2. Instruments used in measuring musculoskeletal pain due to work from home

The most common instrument used to measure musculoskeletal pain was the Nordic Musculoskeletal Questionnaire [22], reported in three studies. The remaining studies used varied instruments: Numerical Rating Scale [23], COVID-19 and Back Pain Questionnaire [19], and the Cornell Musculoskeletal Discomfort Questionnaire [24]. All studies utilized electronic versions of the instruments. In three studies, the authors used translated versions of the instruments (i.e., citing studies that established their psychometric properties in the target language). Two studies used the original English versions, while one study used an instrument developed specifically using the target language.

#### 3.4.3. Professions disposed to musculoskeletal pain due to work from home

There were varied professions and occupations reported in the six included articles for rapid review. These included professionals, self-employed, students, housewives, and retired individuals. The more common profession observed was individuals working in the academic sector (i.e., academics and teachers). Four studies did not explicitly report on the professions of their participants; however, two of these indicated that they were related to academia; one study included white-collar professionals; one study recruited those that used computers in their work.

#### 3.4.4. Work-related factors associated with musculoskeletal pain due to work from home

Three studies reported on factors associated with musculoskeletal pain symptoms. Increased musculoskeletal pain was found to be significantly correlated with workstation ergonomic suitability. Back pain is significantly correlated with time spent sitting during work from home, weekly frequency of physical inactivity, and perceived stress due to the pandemic. Specifically, low back pain significantly correlated with disabling effects on daily living activities and fear of movement, and neck pain significantly correlated with disabling effects on daily living activities.

#### 3.4.5. Musculoskeletal pain in pre and post-pandemic contexts

While not originally part of the review aims of this study, changes in the reported musculoskeletal pain were reported in some of the studies we have reviewed. We found three studies that compared musculoskeletal pain symptom differences among the included six studies reviewed. One study found a significantly higher occurrence of lower back pain ($p < 0.05$) among individuals who stayed and worked from home (73%) than those who continued working status quo (35%) during quarantine periods [11]. Low back pain was significantly ($p = 0.001$) higher during the quarantine period (43.8%) than during pre-pandemic (38.8%) times, as reported in one study [19]. The severity of musculoskeletal pain significantly intensified among those who worked from home.

## 4. Discussion

The rapid review provided evidence on the prevalence of musculoskeletal pain from a small subset of population, specifically, among those working from home due to the COVID-19 pandemic. While limitations in the number of samples reviewed, this rapid review showed that the most common areas of pain are the neck, back, and shoulder, which was significantly higher during the pandemic than in the pre-pandemic period. However, the ranges of the prevalence of musculoskeletal pain were wide. These results may be due to sampling methods performed by the studies, which were convenient sampling and snowballing. This method is a result of the COVID-19 lockdown. Furthermore, the diverse professionals and occupations may also contribute to the results. Care in interpreting and generalizing the results of this rapid review is suggested.

This rapid review found the highest prevalence of self-reported musculoskeletal pain in the neck and lower back regions. Prior to the pandemic, the estimated prevalence rate for neck pain was postulated at 16.2% [25], while we found prevalence estimates for neck pain at 20.3–76.9% during the initial quarantine periods of the pandemic. For low back pain, pre-pandemic estimates suggest a prevalence of 11.9% [26], however, this review found estimates for low back pain prevalence at 19.5–74.1% during the pandemic's initial quarantine period. Roughly, there has been at least a 20–30% increase in the prevalence of self-reported musculoskeletal pain symptoms for the neck and lower back regions, respectively. It is possible that work from home conditions during the quarantine periods associated with physical, occupational, and socio-emotional factors, among others, may have contributed to this.

The putative factors associated with musculoskeletal pain development have heightened during the pandemic. Three factors associated with the increase of low back pain were identified: prolonged sitting, stress, and decreased physical inactivity [19]. This is due to the work from home situation where all activities are technology-based [11]. Furthermore, during the lockdowns, the general population was not allowed to participate in exercises outdoors. Gyms were closed because it is an area where there is an increased amount of respiratory aerosol particle production and inhalation, increasing the incidence of COVID-19 transmission [27].

An extended period of sitting with the trunk in flexion causes inactivation of lumbar muscles, which places the load on passive structures like the ligaments and intervertebral discs [28]. This has been postulated to be the cause of low back pain in prolonged sitting. However, the systematic review of Swain et al. [29] showed no sufficient evidence of the relationship between prolonged sitting with low back pain. Nevertheless, one of the tasks performed during prolonged sitting is taking a break. Waongenngarm et al. [30] classified breaks into four: active break with or without postural change, passive break, and standing break with doing computer work. The review showed that active break with postural change had a positive break in pain reduction. One of the gaps in the papers included in this review is that there was no question about the type, duration, and frequency of participants' breaks during the prolonged sitting.

The systematic review of Sitthipornvorakul et al. [31] concluded that there is insufficient evidence of the association of physical inactivity with neck and low back pain. At the same time, the systematic review of Ramond et al. [32] concluded that only two out of the seven studies which studied psychological distress showed its association with low back pain [32–34]. However, one caveat of their study is that only one factor associated with musculoskeletal pain has been studied.

**Table 2**
Summary of reviewed studies.

| Study ID | Author | Year | Setting/ Country | NHMRC Level of Evidence | Study Design | Subject Characteristics | Instruments | MSKD Prevalence n/N (%) | Site of the pain | Factors associated with MSK pain |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Celanay | 2020 | Turkey | Level III-3 | Case-control study | *n* = 686 (375 (54.7%) subgroup of participants that stayed at home during lockdown)<br>*Age*: Median = 32<br>*Gender*: Male = 296 (78.9%)<br>*Ethnicity*: Turkish<br>*Occupation*: Student, teacher, engineer, medical staff, officer, employee, private sector, retired, academician, housewife | Nordic Musculoskeletal Questionnaire<br>Covid-19 Phobia Scale<br>Jenkins Sleep Scale<br>*Electronic<br>**Used Turkish version of the instruments | Neck: 76/375 (20.3%)<br>Upper back: 70/375 (18.7%)<br>Lower back: 73/375 (19.5%)<br>Shoulder: 60 (16.0%)<br>Elbow: 5 (1.3%)<br>Wrist/hand: 16 (4.3%)<br>Hip/Thigh: 21 (5.6%)<br>Knee: 36 (9.6%)<br>Ankles/feet: 24 (6.4%) | Neck, shoulders, elbows, wrists/hands, upper back, lower back, hips/thighs, knees, ankles/feet | |
| 2 | Condrowati | 2020 | Indonesia | Level IV | Cross-sectional study | *n* = 95<br>Age: Mode = 20–30 yrs (67, 70.50%)<br>*Gender*: Male = 35 (36.8%)<br>*Ethnicity*: Indonesian<br>*Occupation*: Academics, employees (government, company), teacher, State-owned enterprise, entrepreneur | Nordic Musculoskeletal Questionnaire<br>*Electronic<br>**Language version of the instrument was not explicitly reported | Neck: 51/95 (54%)<br>Shoulder: 35/95 (36.5%)<br>Lower back: 33/95 (34.9%)<br>Upper back: 30/95 (31.7%)<br>Ankle: 21/95 (22.2%)<br>Hip: 17/95 (17.4%)<br>Knee: 17/95 (17.4%)<br>Wrist: 15/95 (15.9%)<br>Elbow: 6/95 (6.3%)<br>*Incomplete data reported (for n); manually computed | Neck, shoulders, elbows, wrists/hands, upper back, lower back, hips/thighs, knees, ankles/feet | |
| 3 | Ozdemir | 2021 | Turkey | Level IV | Cross-sectional study | *n* = 101<br>*Age*: 33.95 ± 5.99 (24–57)<br>*Gender*: Male = 42 (41.6%)<br>*Ethnicity*: Turkish<br>*Occupation*: White-collar workers | Numerical Rating Scale<br>Oswestry Disability Index<br>Utrecht Work Engagement Scale<br>Tampa Scale of Kinesiophobia<br>International Physical Activity Questionnaire Short form<br>*Electronic<br>**Researcher-developed questionnaire previously reported elsewhere<br>***Used Turkish version of the instruments | LBP: 57/101 (56.4%)<br>Neck: 40/101 (39.6)<br>Leg: 5/101 (5%)<br>Widespread: 3/101 (3%)<br>Shoulder: 3/101 (3%)<br>Arm: 1/101 (1%)<br>Chest: 2/101 (2%)<br>Coccydynia: 1/101 (1%) | Back, neck, leg, shoulder, arm, chest, coccyx | LBP intensity was significantly correlated with disabling effects on daily living activities and fear of movement.<br>Neck pain was significantly correlated with disabling effects on daily living activities. |
| 4 | Sagat | 2020 | Saudi Arabia (Riyadh) | Level IV | Cross-sectional study | *n* = 463<br>*Age*: 35.68 + 9.84 (18–64 yrs)<br>*Gender*: Male = 259 (55.94%)<br>*Ethnicity*: Saudi | COVID-19 and Back Pain Questionnaire<br>*Electronic<br>**Researcher-developed | Neck: 140/463 (30.3%)<br>Shoulders: 108/463 (23.3%)<br>Thoracic area: 107/463 (23.2%) | Neck, shoulders, thoracic area, low back, legs | Back pain is significantly correlated with time spent sitting, weekly frequency of physical |

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**Table 2** (*continued*)

| Study ID | Author | Year | Setting/ Country | NHMRC Level of Evidence | Study Design | Subject Characteristics | Instruments | MSKD Prevalence n/N (%) | Site of the pain | Factors associated with MSK pain |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Citizen = 330 (71.27%), Foreign = 133 (28.73%) *Occupation*: Not explicitly reported (academic and work-related) | questionnaire ***Used the original English version of the instruments | Low back: 203/463 (43.8%) Legs: 64/463 (13.9%) *Incomplete data reported (for n); manually computed | | inactivity, and perceived stress |
| 5 | Sengul | 2020 | Turkey | Level IV | Cross-sectional study | *n* = 1138 (WFH = 686 (60.3%)) *Age*: 35.69 + 11.6 *Gender*: Male = 650 (57.1%) *Ethnicity*: Turkish *Occupation*: Not explicitly reported (academic and work-related) | Cornell Musculoskeletal Discomfort Questionnaire *Electronic **Used Turkish version of the instruments | Neck: 875/1138 (76.9%) Shoulders: 820/1138 (72.1%) Back: 856/1138 (75.2%) Between shoulder and elbow: 703/1163 (61.8%) Waist: 678/1138 (72.8%) Forearm: 680/1138 (59.8%) Wrist: 678/1138 (59.6%) Fingers: 666/1138 (58.5%) Hip: 691/1138 (60.7%) Upper leg: 672/1138 59.1%) Knee: 709/1138 (62.3%) Lower leg: 665/1138 (58.4%) Feet: 682/1138 (59.9%) *Considered all participants working or not working from home and those within areas with and without lockdowns **Pain is due to inactivity related to decrease in daily exercise, sports, or routine activities ***Prevalence based on total of the pain strength level | Neck, shoulders, back, between shoulder and elbow, waist, forearm, wrist, fingers, hip, upper leg, knee, lower leg, feet | |
| 6 | Seva | 2021 | Philippines (Manila) | Level IV | Cross-sectional study | *n* = 352 *Age*: Median = 33 (21–64) *Gender*: Male = 134 (38.07%) *Ethnicity*: Filipinos *Occupation*: Employees that use computers | Nordic Musculoskeletal Questionnaire Workstation Suitability (Researcher-Adapted) Computer Workstation Ergonomics: Self-Assessment Checklist Recovery Experience Questionnaire (Psychological Detachment items) | Neck: 239/352 (67.9%) Shoulder: one = 88/352 (25%); both = 149/352 (42.3%) Elbow: one = 62/352 (17.6%); both = 39/352 (11.1%) Wrist: one = 165/352 (46.9%); both = 56/352 (15.9%) Upper back: 200/352 (56.3%) Lower back: 261/352 (74.1%) | Neck, shoulders, elbows, wrists/hands, upper back, lower back, one or both hips/thighs, one or both knees, one or both ankles/ feet | Workstation ergonomic suitability was significantly correlated with musculoskeletal symptom but not workstation suitability. Musculoskeletal symptoms had no significant effect on productivity. |

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**Table 2** (*continued*)

| Study ID | Author | Year | Setting/ Country | NHMRC Level of Evidence | Study Design | Subject Characteristics | Instruments | MSKD Prevalence n/N (%) | Site of the pain | Factors associated with MSK pain |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Copenhagen Psychosocial Questionnaire (Stress)<br>*Electronic<br>**Used the original English version of the instruments | Hips/thighs: 139/352 (39.5%)<br>Knees: 101/352 (28.7%)<br>Ankles/feet: 76/352 (21.6%)<br><br>*Reported pain in on or both sides for shoulder, elbow, and wrist | | |

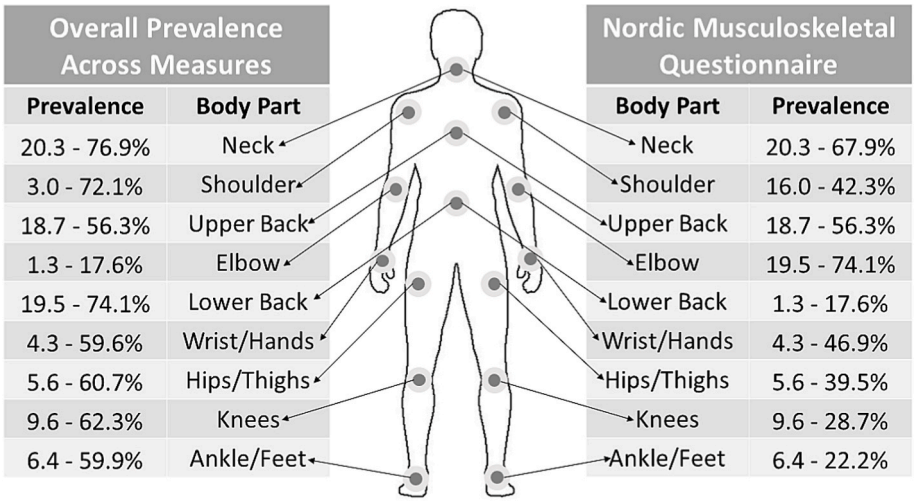


**Fig. 2.** Summary of pain prevalence.

Because of the uncertainties and health risks brought about by COVID 19-pandemic, psychological stress has increased among the population. A meta-analysis of 14 studies showed that posttraumatic syndrome was 23.88% (95% CI: 14.01, 33.76) and psychological stress was 24.84% (95% CI:11.75,37.92) [35]. A global survey across 57 countries showed that there was increase in moderate stress with a mean score of 19.8 ± 7.17 using the Perceived Stress Scale −10. This was higher prior to the pandemic where scores were 12.89, 15.81, 15.05 in Germany, Mexico, and the United States, respectively [36] but was almost similar to other counties (India:19.25, China: 19.2 and United Kingdom: 19.79). The lockdown brought about by the COVID pandemic has become a fertile ground for psychological stress. The term 'corona-phobia' has been coined which is defined as "an emerging phobia specific to COVID-19 leading to accompanied excessive concern over physiological symptoms, significant stress about personal and occupational loss, increased reassurance and safety seeking behaviors, and avoidance of public places and situations" [37]. The conceptual model of Arora [38] has included seven risk factors associated with corona-phobia which are: 1) unending uncertainties about SARS-Cov-2, 2) unforeseen reality of lockdowns, quarantine, and self-isolation, 3) acquiring new practices and avoidance behavior, 4) statements from international organizations which provide a realistic but gloomy predictions on the course of the pandemic, 5) failure of developed countries in effectively addressing the crisis, 6) leaders and famous celebrities infected by COVID- 19, and 7) infodemia becoming infodemic. The study of Celanay [11] which used the Covid-19 Phobia Scale (C19P–S) that have psychological, psychosomatic, economic, and social subscales showed that participants who stayed at home had a significantly higher scores in the total and subscales scores. However, the study did not correlate musculoskeletal pain with coronophobia. The results of Sagat et al. [19] showed that the there was a higher level of stress during the pandemic lockdown as compared to before the lockdown (50.42% vs 22, 41%). Those with moderate or severe stress had a higher low back pain intensity of 2.73 during quarantine as compared to pre-pandemic which was 1.96. This study used a validated self-administered questionnaire.

Many factors such as ergonomic, psychological, anatomical, and social factors may contribute to musculoskeletal pain, and these factors are interrelated to each other. There are no firm boundaries that exist among these factors. Therefore, these factors must be investigated, whether in work from home or onsite setup, and the best model to predict musculoskeletal pain be developed.

There are several limitations in our rapid review. Due to the focused and temporal-sensitive nature of rapid reviews, certain occupational and ergonomic factors may not have been explored. While the occupations varied across the studies we have reviewed, their work from home setup and hours may be similar. Evidence on MSK-related pain between individuals working from home and those who continued working onsite will need to be compared. While our review provides initial evidence on the possible increase in the prevalence of MSK-related pain among individuals who have worked from home during the COVID-19 pandemic, further investigations are needed to determine whether such exposure may explain this phenomenon. Thus, caution in interpreting the synthesized findings in this rapid review is warranted. Given the rapid review methodology adopted in this study, the scope of evidence searched may have been limited. Nevertheless, the findings synthesized herein warrant further investigations on an updated, wider and deeper review

of evidence to encompass other information sources (i.e., databases and grey literature). The authors recommend that a full and up-to-date systematic review may be needed to update the evidence. Future review authors will need to expand the search timeline (i.e., 2020 up to the present) and strategy to include region-specific pain symptoms (i.e., low back pain, neck pain).

## 5. Conclusion

There is initial evidence that the prevalence of musculoskeletal pain may have increased because of the COVID-19 lockdown. We assume that work from home setup will most likely continue with our current situation. Thus, strategies on how to prevent its occurrence should be one of the employers' concerns so that professionals will be able to cope with the challenges of the COVID-19 lockdown. It is suggested that a system in the workplace be developed in order that musculoskeletal pain will be detected earlier. Policies and programs not only for sustainable occupational safety and proper ergonomics but also programs that address the mental health issues of employees should also be addressed. Furthermore, programs should also be available online for easy access of employees. Further introspection is needed to update the evidence base on this topic, and a full systematic review with an up-to-date timeline is needed.

## Conflict of interest

The authors declare no conflicting or competing interests.

## Data availability statement

All relevant data associated with this rapid review has been reported in the tables and figures.

## Author contributions

All authors contributed equally to the completion of this rapid review.

## Funding sources

This review is not funded by any organization.

## Ethical approval details

This is a review article, hence an ethical approval is not applicable.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijosm.2022.12.001.

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