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Prevalence of musculoskeletal disorders among health care workers during covid-19 pandemic in the western region of Saudi Arabia

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ABSTRACT

Background: During the period of COVID-19 and as number of cases increase، shortages in healthcare workers (HCWs) is a concern. Subsequently, the workload of HCWs may be substantial. *Objective:* to assess prevalence of Musculoskeletal disorders among health care workers during COVID-19 pandemic in the western region of Saudi Arabia. *Methods:* A cross-sectional design of the study was steered between July 2020 and July 2021 at Western region in Saudi Arabia. It was permitted by the research ethics committee unit of Taif University. An online questionnaire was used. *Results:* In our study, 19.3% of HCWs reported MSDs after COVID-19 duty. The prevalence of MSDs in HCWs who change their work shift due to COVID-19 duty (71.6%) and also not due to COVID-19 (60%) was comparatively more than who didn't change their work shift at all (27.7%) that showed a statistically significant association ($p<0.001$). It was reported that 34.1% of HCWs treated an excess number of patients as a result of COVID-19 duty had an incidence of MSDs compared to those who didn't treat an excess number of patients (7.1%) and who treated excess number not attributable to COVID-19 (17.5%). Insufficient breaks during workdays due to COVID-19 duty were reported by 39.1% of HCWs. *Conclusion:* COVID-19 duty had put some extra workload on many HCWs, which lead to the development of work-related MSDs. Significant predictors included change in work shift due to COVID-19, working in awkward and cramped positions as a matter of COVID-19 duty and lifting heavy materials/equipment during COVID-19.

Keywords: Prevalence, Musculoskeletal Disorders, Health Care Workers, Covid-19 Pandemic, Western Region of Saudi Arabia

1. INTRODUCTION

Coronaviruses are a group of viruses known to cause illnesses that shift between the common cold and more severe diseases to consist of SARS (severe acute respiratory syndrome) and Middle East respiratory syndrome (MERS) (Abd El-Aziz & Stockand, 2020). In December 2019, the novel coronavirus was determined in Wuhan city, China and the virus now is known as coronavirus disease 2019 (COVID-19) (Chan et al., 2013). In the era of COVID-19 and as number of cases increase shortages in healthcare workers (HCWs) is a concern. Subsequently, the workload of HCWs may be substantial and might leads to many health issues for this group. One of the commonest problems experienced by HCWs is musculoskeletal complaints. Musculoskeletal disorders (MSDs) are predominant in working populations around the globe (Shreffler et al., 2020).

MSDs are characterized by complaints, symptoms, or pains to the musculoskeletal system, which can range from mild and intermittent to severe and chronic causing morbidity (El-Tallawy et al., 2021). Health care work is known as a high-threat job for MSD. All MSDs rates among HCWs are high compared to other occupational groups (Yasobant et al., 2021). MSDs comprise harms in muscles, joints; cartilage, nerves, ligaments, and the vertebral column are aggravated in developing nations (Almutlq et al., 2021; Alwatban et al., 2021). These diseases cause bodily, emotive, and communal effects and they are also cost effective on healthcare people and their families (McPhail, 2016). Work-related musculoskeletal disorders involved all disorders that are caused or get worse by work and associated working conditions (Soares et al., 2021).

Long-term and severe musculoskeletal conditions might affect quality of the workers lives, lower the productivity of work, rising sickness leave, reduce work life and cause chronic work injury and establish a main health challenge for people and medical care system over the world (Daneshmandi et al., 2017).

Study objective

This study is carried out to assess prevalence of musculoskeletal disorders among health care workers during COVID-19 pandemic in the western region of Saudi Arabia.

2. METHODOLOGY

A cross-sectional design was followed between July 2020 and July 2021 at Western region in Saudi Arabia. It was permitted in the research ethics committee unit of Taif University with application number 42-0054. An online questionnaire was obtained voluntarily from 355 of the Health care workers in western region of Saudi Arabia. The questionnaire inquired about demographic information such as residence, gender, age, and city. We also asked about specialty, working shift , history of musculoskeletal disorder, work scheduled overtime during Covid-19, ache, pain discomfort, work positions or postures changed during Covid-19, lifting or moving heavy materials or equipment during COVID-19, primary objective is asses prevalence of MSDs among HCWs during Covid-19. Collected data was coded and examined using SPSS program, version 23. Descriptive and analytic statistics was examined. Chi-Square tests were employed to show the association between categorical variables. P values ≤0.05 was measured statistically substantial.

Validation of questionnaire

The drafts of our initial questionnaire was made, which had 19 items that included sociodemographic characteristics, job related questions and experiences on MSDs during Covid-19. This initial questionnaire was subjected to a pilot testing on 20 doctors for validity and reliability. We checked the content validity and face validity of the questionnaire by expert evaluation and focused group discussion. An investigative factor analysis was done to show the construct rationality of the form. Items with correlation coefficient >0.7 were removed. For reliability analysis, the items with 'un certain' answers were marked as negative answers. The internal consistency was measured using Cronbach's alpha and test-retest reliabilities between the initial and the final questionnaires for each item were calculated using kappa statistics. A Cronbach's α value >0.7 was considered for the form to be internally reliable. The sensitivity, specificity, and positive predictive value of the screening questionnaire were calculated using both scoring methods. Thus the final questionnaire had 16 items to collect data from the participants.

3. RESULTS

The sociodemographic data presented that the study contributers had 55% females and 45 males that belonged to the following age groups: 24-20 years (38.2%), 31-35 years (23.2%), 36-40 years (14.4%), 41-45 years (13.3%) and 46-50 years (6.5%). The nationality of the participants showed that 70.3% were Saudi citizens and the remaining 29.7% were non-Saudis. All the characteristics of the studied populace are given in Table 1. When we analyzed the incidence of MSDs according to sociodemographic characteristics,

there was no association observed except for the nationality of HCWs. The prevalence of MSDs was comparatively more seen in Saudi citizens (22.6%) than non-Saudis (11.4%) (p=0.015) (Table 2).

The analysis showed that 52.4% (n=185) of the HCWs have musculoskeletal pain or discomfort (MSDs) before COVID-19. In our study, 68 HCWs reported the incidence of MSDs after COVID-19 duty (19.3%) (Figure 1). When we analyzed the self-reported work-related characteristics and changes in it during COVID-19, it was found that 45.2% of the HCWs had reported change in work shift due to COVID-19 and this was reported more in doctors (38.9%) and nurses (31.5%) more than other HCWs that showed a statistically noteworthy relationship (p<0.001). The prevalence of MSDs in HCWs who change their work shift due to COVID-19 duty (71.6%) and also not due to COVID-19 (60%) was comparatively more than who didn't change their work shift at all (27.7%) that showed a statistically momentous link (p<0.001) (Table 3).

Table 1 Sociodemographic details of the participants

Parameters	Responses	No.	%
Age	24-30	135	38.2
	31-35	82	23.2
	36-40	51	14.4
	41-45	47	13.3
	46-50	23	6.5
	More than 50	15	4.2
Gender	Female	194	55.0
	Male	159	45.0
Nationality	Non- Saudi	105	29.7
	Saudi	248	70.3
Region	Al Qunfudhah	101	28.6
	Jeddah	86	24.4
	Makkah	30	8.5
	Medina	12	3.4
	Taif	75	21.2
	Yanbu	49	13.9
Profession	Doctor	113	32.0
	Nurse	97	27.5
	Pharmacist	27	7.6
	Physiotherapist	41	11.6
	Radiologist	28	7.9
	Lab worker	42	11.9
	Others	5	1.4

Table 2 Incidence of MSDs and its link with sociodemographic features

Items	Responses	Incidence of MSDs		Total	Chi-Square value	P value
		No	Yes			
Age	24-30	116	19	135	8.011	0.156
		85.9%	14.1%	38.2%		
	31-35	59	23	82		
		72.0%	28.0%	23.2%		
	36-40	39	12	51		
		76.5%	23.5%	14.4%		
	41-45	40	7	47		
		85.1%	14.9%	13.3%		
	46-50	18	5	23		
		78.3%	21.7%	6.5%		

	>50	13	2	15		
		86.7%	13.3%	4.2%		
Gender	Female	160	34	194	0.836	0.360
		82.5%	17.5%	55.0%		
	Male	125	34	159		
		78.6%	21.4%	45.0%		
Nationality	Non- Saudi	93	12	105	5.899	0.015
		88.6%	11.4%	29.7%		
	Saudi	192	56	248		
		77.4%	22.6%	70.3%		
Profession	Doctor	87	26	113	9.524	0.146
		77.0%	23.0%	32.0%		
	Nurse	76	21	97		
		78.4%	21.6%	27.5%		
	Pharmacist	25	2	27		
		92.6%	7.4%	7.6%		
	Physiotherapist	30	11	41		
		73.2%	26.8%	11.6%		
	Radiologist	24	4	28		
		85.7%	14.3%	7.9%		
	Lab worker	38	4	42		
		90.5%	9.5%	11.9%		
	Others	5	0	5		
		100.0%	0.0%	1.4%		

Table 3 Work related characteristics and Incidence of MSDs

Items	Responses	MSDs		Total	Chi-Square value	P value
		No	Yes			
Change in work shift (reason	Yes, due to COVID-19 duty	114	48	162	28.657	<0.001
		70.4%	29.6%	45.9%		
	Yes, Not due to COVID-19	38	12	50		
		76.0%	24.0%	14.2%		
	No	133	8	141		
		94.3%	5.7%	39.9%		
Treat excess number of patients	Yes, due to COVID-19 duty	89	46	135	33.92	<0.001
		65.9%	34.1%	38.2%		
	Yes, Not due to COVID-19	52	11	63		
		82.5%	17.5%	17.8%		
	No	144	11	155		
		92.9%	7.1%	43.9%		
Insufficient rest breaks or pauses during the workday	Yes, due to COVID-19 duty	90	48	138	40.070	<0.001
		65.2%	34.8%	39.1%		
	Yes, Not due to COVID-19	46	11	57		
		80.7%	19.3%	16.1%		
	No	149	9	158		
		94.3%	5.7%	44.8%		
Change in work positions or postures	Yes, due to COVID-19 duty	85	47	132	40.345	<0.001
		64.4%	35.6%	37.4%		
	Yes, Not due to	42	10	52		

	COVID-19	80.8%	19.2%	14.7%		
	No	158	11	169		
		93.5%	6.5%	47.9%		
Work in difficult and restricted situations	Yes, due to COVID-19 duty	79	41	120	33.929	<0.001
		65.8%	34.2%	34.0%		
	Yes, Not due to COVID-19	49	15	64		
		76.6%	23.4%	18.1%		
	No	157	12	169		
		92.9%	7.1%	47.9%		
Work overtime	Yes, due to COVID-19 duty	53	31	84	25.389	<0.001
		63.1%	36.9%	23.8%		
	Yes, Not due to COVID-19	46	13	59		
		78.0%	22.0%	16.7%		
	No	186	24	210		
		88.6%	11.4%	59.5%		
Lift or move heavy materials or equipment	Yes, due to COVID-19 duty	27	26	53	39.630	<0.001
		50.9%	49.1%	15.0%		
	Yes, Not due to COVID-19	77	20	97		
		79.4%	20.6%	27.5%		
	No	181	22	203		
		89.2%	10.8%	57.5%		

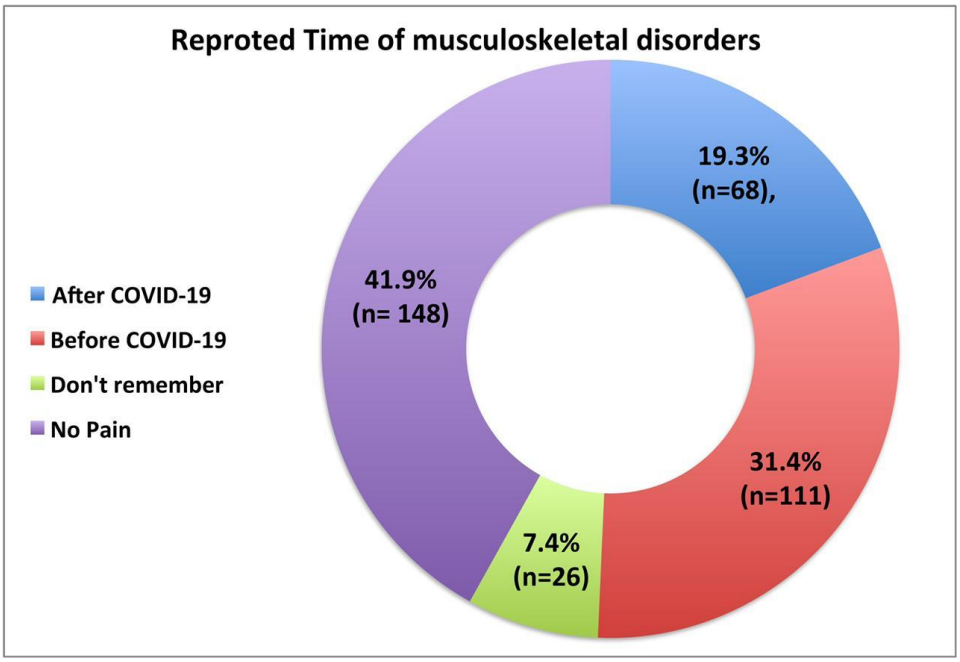

Figure 1 reported time of musculoskeletal disorders among the studied HCWs

It was described that 34.1% of HCWs treated an excess number of patients due to COVID-19 duty had an incidence of MSDs compared to those who didn't treat an excess number of patients (7.1%) and who treated excess number not attributable to COVID-19 (17.5%). This association showed a statistically significant relationship ($p<0.001$) (Table 3). Insufficient breaks or pauses during workdays due to COVID-19 duty was reported by 39.1% of HCWs and the incidence of MSDs was observed to be suggestively greater among these HCWs (34.8%) that showed an important connotation ($p<0.001$). It was conveyed that 37.4% of HCWs change in work positions or postures due to COVID-19 duty and 18.1% had changed not due to COVID-19 that showed statistically important link ($p<0.001$). Similarly, HCWs who worked in difficult and restricted situations because of COVID-19 duty and non-COVID-19 experienced more incidences of MSDs (34.2% and 23.4%) than others who didn't work in difficult and restricted

situations (7.1%), which showed a statistically momentous relation (p<0.001). It was likewise described that HCWs who lifted or moved heavy materials or equipment, both due to COVID-19 and non-COVID-19 duty experienced more incidence of MSDs than others who didn't lift or move (p<0.001) (Table 3).

We assessed the self-reported pain in HCWs who had an incidence of MSDs because of COVID-19 duty (n=68), which is depicted in Figure 2. Incidence of pain that occurred more than once daily was seen in 9.7%, 5.4%, 8.1%, 3.8%, 8.6%, 2.2%, and 7.5% in relation to leg/foot, hips/thigh, arms, shoulders, lower back, upper back, and neck respectively. The self-reported discomfort in HCWs who had an incidence of MSDs after COVID-19 duty is depicted in Figure 3. It was established that low back besides leg/foot had reported very uncomfortable' discomfort of 9.9% and 9.1% respectively that was followed by upper back (6.8%) and neck (6.8%).

Multivariate logistic regression was completed to calculate the predictive risk factors for MSDs considering the incidence of MSDs. It was found that age>40 years [OR=2.07 (1.17-3.78), p=0.017], change in work shift [OR=3.09 (1.77-5.42), p<0.001], treating excess number of patients [OR=2.22 (1.17-4.21), p=0.015], Working in difficult and restricted situations [OR=2.32 (1.21-4.47), p=0.012], lifting or moving heavy materials and/or equipment [OR=2.66 (1.13-6.27, p=0.025] were found as independent risk factors for MSDs during COVID-19 (Table 4).

Table 4 Multivariate Logistic regression

Parameters	Odd Ratio (OR)	95% Confidence Interval		P value
		Lower	Upper	
Age >40 years	2.07	1.14	3.78	0.017
Gender (female)	0.69	0.41	1.18	0.179
Saudi nationality	1.22	0.69	2.15	0.499
Nurse	3.01	1.54	5.82	0.004
Doctor/Physician	3.43	0.26	45.40	0.350
Pharmacist	3.96	0.27	58.08	0.315
Physiotherapist	8.08	0.58	112.81	0.12
Radiologist	3.79	0.26	55.05	0.329
Lab worker	4.19	0.30	58.29	0.286
Change in Work shift during COVID-19	3.10	1.77	5.42	<0.001
Treat excess patients during COVID-19	2.22	1.17	4.21	0.015
No rest breaks during COVID-19	1.39	0.71	2.72	0.331
Posture change during COVID-19	0.96	0.50	1.84	0.901
Work in difficult and restricted situations during COVID-19	2.32	1.21	4.45	0.012
Work Overtime during COVID-19	0.78	0.39	1.56	0.482
Lift heavy materials/equipment during COVID-19	2.66	1.13	6.27	0.025

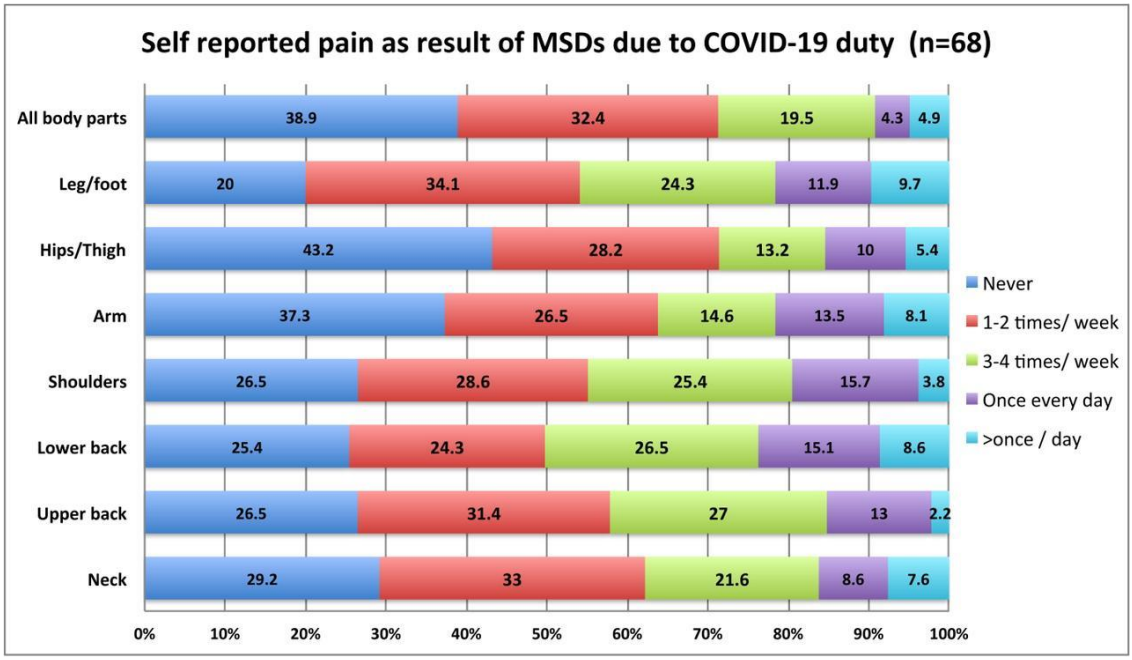

Figure 2 self-reported site of pain due to musculoskeletal disorders among the studied HCWs

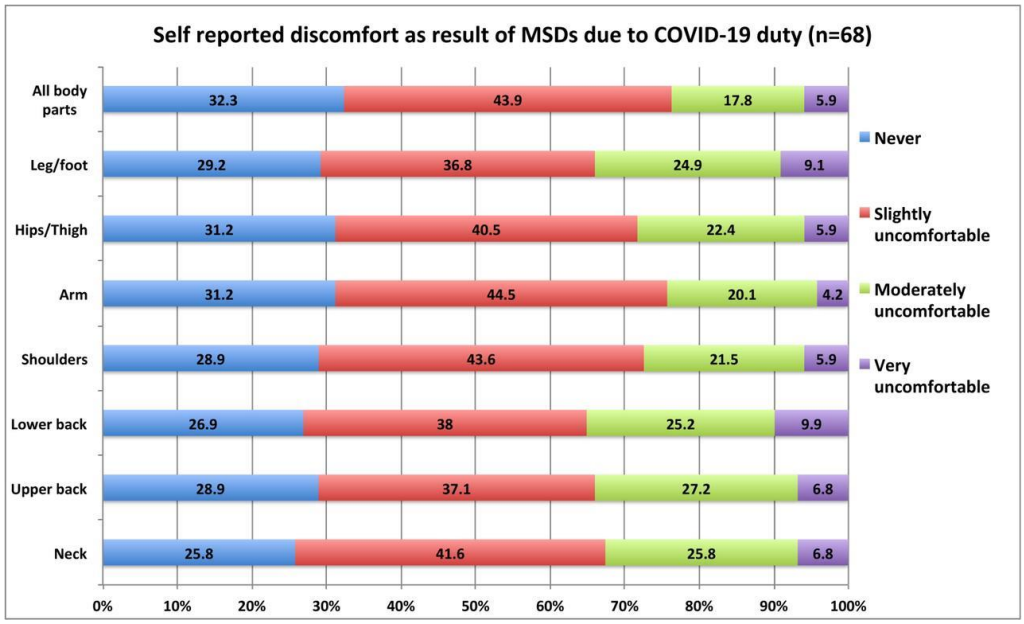

Figure 3 self-reported site of discomfort due to musculoskeletal disorders among the studied HCWs

4. DISCUSSION

The occurrence of SARS-CoV-2 in 2020 was the world's worst major health threat since the so-called Spanish Flu in 1918. Nearly every country in the world has been hit by the epidemic, which has resulted in 100 million confirmed cases, more than 2 million fatalities, and a considerable decrease in global GDP (Nicola et al., 2020). The unexpected and rapid increase in the figure of COVID-19 cases has placed an extra burden on decision-makers, healthcare workers (HCWs), and the public in Saudi Arabia (Sayed, 2021). Thousands of HCWs, including physicians and nurses, are being pressed to work overtime as reports of fatigue after the pandemic increase (Iacobucci, 2021), which can cause mental stress, anxiety, and other ergonomics-related problems such as musculoskeletal disorders (MSDs). HCWs are at risk for MSDs because of their demanding physical and psychosocial work environments, which may involve manual handling, long and irregular work schedules, including night shifts, a large workload, and stress. These working circumstances may get worsened due to the occurrence of COVID-19 pandemic. Although several studies have reported occupational burnout among HCWs (AlJhani et al., 2021; Al-Mansour, 2021; Arafa et al., 2021), no studies have assessed the influence of COVID-19 on HCWs' physical disability and other musculoskeletal symptoms.

The endings of the current study showed that about 19.3% of the contributors described MSDs as a result of changing work patterns due to COVID-19. HCWs aged over 40 years, nurses, change in work shift from pre-COVID-19, treating excess patients during COVID-19, in work in difficult and restricted situations, and lifting heavy materials/equipment were independently associated with incidence MSDs. Our findings are in accordance with the literature, which shows an increased risk of MSDs as age increases (Luan et al., 2018; Oakman et al., 2016). Age-related degenerative changes in older HCWs, other than a decline in functional performance, may have contributed to this relationship (Loeser, 2016).

In ours, study nurses experienced more MSDs during COVID-19 duty compared to other HCWs. Clinical nursing is a physically challenging profession since nurses must care for patients while also meeting technical requirements. Over time, the physiological workload of nursing might contribute to work-related MSDs (WMSDs). The previous literature revealed that nurses, who are one of the frontline HCWs, experienced higher work engagement throughout the COVID-19 contagion (Alsolami, 2021; Zhang et al., 2021). Reports show that the patient inflow has increased both in the inpatient and outpatient departments of hospitals. This crowding could have caused exceeding demands, workload, and longer duration of hospital stay for HCWs, including nurses (Af Ugglas et al., 2021; Vollmer et al., 2021), which influenced the increased incidence of MSDs among nurses.

In our survey, about 38.2% and 34.8% of HCWs reported that they treated an excess number of patients and had insufficient rest breaks or pauses during the workday, respectively, due to COVID-19 duty. It was documented that taking short rest breaks or pauses during the day can assist workers in recovering from fatigue and minimize their risk of developing MSDs (Nagasu et al., 2007). Prolonged static postures are believed to trigger a cascade of proceedings that could lead to discomfort, wound, or career-ending issues (Lavine et al., 2004). It was reported that HCWs who worked multiple shifts had a greater hazard of developing WMSDs than those who worked for single shifts (Shafiezadeh et al., 2011). A report from Saudi Arabia shows that some HCWs, especially nurses, had to work extra hours or multiple-shift every day during COVID-19 (Abo-Ali et al., 2021). Day shifts are found to have a lower accident rate than night shifts, and early start times are related to increased fatigue and sleepiness (Akerstedt et al., 2009). However, the current study did not assess the duration of shifts or the times of shifts.

Our study found that HCWs who reported that they operated in difficult and restricted situations due to COVID-19 duty had comparatively more MSDs than others. Also, it was reported by 15% of participants that they lifted or moved heavy objects or equipment during COVID-19 duty, which they were not used to doing pre-COVID times, and it stood established that these people had significantly reported a higher prevalence of MSDs than others who were used to do such activities during pre-COVID times. One of the challenges in assessing WMSD pain is the difficulty of determining if the pain is caused by work, age, general health, or a combination of these characteristics. The finest method toward integrate the multilevel prevention of WMSDs, especially due to increased workload during public health emergencies such as COVID-19, remains a big challenge for stakeholders. Hospital managers should pay close attention to the workload and other influences accompanying the occurrence of WMSDs among their HCWs. Additionally, they must check the musculoskeletal status of HCWs repeatedly and concentrate on certain body sites depending on their specialty.

Furthermore, on-the-job training for new and young HCWs may need to integrate the findings from this study to ensure that HCWs are aware of the injuries resulting from their daily tasks. Precautionary procedures as monitored physical activity, especially strength exercises, and work-related interventions are vital for our frontline HCWs' wellness. This is the chief cross-sectional study that assessed the influence of COVID-19 duty on WMSDs among HCWs. However, there are certain limitations that should be addressed before generalizing the findings. First of all, the design of the study does not assume causality. Secondly, we used a self-reported questionnaire, which may have subjected to some degree of recall bias.

Our logistic regression model was unable to include many factors that potentially affect MSDs, such as seniority at the workplace, break time during work, physical activity and/or strength exercises division of departments with high working intensity, and inappropriate working postures, etc. Musculoskeletal symptoms are multifaceted, including both bodily and emotional aspects, and in the current study, we did not investigate the psychosocial aspects of COVID-19 and presence of other health issues on WMSDs.

5. CONCLUSION

The findings showed that COVID-19 duty had put some extra workload on many HCWs, which is established to have a title role in the occurrence of work-related MSDs. Significant predictors included HCWs' age more than 40 years, the nursing profession, change in work shift due to COVID-19, work in difficult and restricted situations as a matter of COVID-19 duty, lifting heavy materials/equipment during COVID-19. Current findings warrant the consideration of appropriate supportive and preventive measures for HCWs when they are employed for extra duties in the occurrence of public health emergencies.

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Author Contributions

All the authors equally and positively contributed to the manuscript work and final production.

Ethical approval

The study was approved by the Medical Ethics Committee of Taif University with application number 42-0054.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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