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Original article

Impact of quarantine on sleep quality and psychological status in COVID-19 suspected cases in Riyadh, Saudi Arabia

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ABSTRACT

Aim: The purpose of this study was to investigate into mental health outcomes such as stress, anxiety, and depression, as well as sleep quality in suspected COVID-19 quarantined cases.
Methods: This is a cross-sectional study that used an online survey to target suspected COVID-19 cases in quarantine facilities. Data were collected on several aspects of participants' sociodemographic characteristics, sleep disturbance, and mental health status. Depression, anxiety, stress scale and Pittsburgh Sleep Quality Index were used to measure both the psychological impact and mental health status.
Results: Of the 362 people who took the survey, 234 (64.6%) were men, and 148 were between the ages of 26–35. Poor sleep was found to be prevalent in 65% of study participants. The rates of individuals reporting severe depression, anxiety, and stress symptoms were 14.6%, 15%, and 15%, respectively. According to the findings, there were significant gender differences in depression and anxiety (p = 0.001). When compared to the other age groups, participants aged 26–35 reported the highest level of stress (p = 0.001). Being male [OR = −1.23, 95% CI (−2.75–1.95) P = 0.050], single [OR = 0.98, CI (0.15–4.20), P = 0.001], and a healthcare worker [OR = −2.20, 95% CI (−2.59–1.82), P = 0.001] were all associated with poor sleep quality.
Conclusion: Approximately-one-third of quarantine COVID-19 patients had poor sleep quality with mild-moderate depression. Both anxiety and stress scales were prevalent in nearly half of the studied samples.
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1. Introduction

Initially, pneumonia cases were started to document in Wuhan providence in China during December 2019 with symptoms of viral pneumonia. Later on, this respiratory track disease is confirmed as 2019 novel coronary virus disease (COVID-19). Similarly, cases were started to expand in China as well as all parts of the globe. COVID-19 was identified as infectious disease through close contacts and respiratory droplets (Lu et al., 2020; Singhal, 2020). Other cases have been discovered in other parts of China and abroad as the epidemic has spread. So far, the primary sources of infection have been patients with a new type of Coronavirus infection, which is primarily transmitted through respiratory droplets and close contact (Singhal, 2020). According to the World Health Organization's official website (World Health Organization [Internet], 2020), as of May 22, 2020, >4,995,996 people had been confirmed to have COVID-19 infection, with 327,821 deaths worldwide. According to current statistics, the total number of COVID-19 cases in Saudi Arabia exceeds 443.000, with approximately 7.278 deaths (Ministry of Health, 2020). Saudi Arabia announced the first case of COVID-19 on March 2, 2020 (Ministry of Healt, 2020). Saudi Arabia was the first country in the world responded towards the pandemic; start taking the precautionary measures as per WHO to control the COVID-19 infection from human-human transmission (Ebrahim and Memish, 2020; Sayed, 2021). The major measures included prohibiting international travel, temporary hold on religious acts, supermarkets, workplace deviations, and daunting curfews. All Saudi citizens and residents who arrived from countries with high rates of Covid-19 cases were quarantined in designated health care facilities for 14 days before being released (Sayed, 2021).

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Many accomplishments on COVID-19, including the availability of the vaccination from different sources. However, the vaccines were not available in Saudi Arabia until January 2021, prior to that people were quarantined. In addition, the current guidelines related to those suspected people or even vaccinated include home-quarantine recommendations (Li et al., 2020; Guan et al., 2019; Wang et al., 2020). As a result; patients who have been suspected or diagnosed with this disease must be treated in isolation. Following isolation treatment, many patients developed anxiety and sleep disturbances, according to clinical observations. Anxiety, as a type of psychological stress, will set off a chain of physiological events that will reduce immunity (Singhal, 2020). Irregular or insufficient sleep may be linked to an increased risk of morbidity and mortality (World Health Organization [Internet], 2020; Tamakoshi et al., 2004; Leng et al., 2015; Youngstedt and Kripke, 2004; Whinnery et al., 2014; Pappa et al., 2020; Wang et al., 2020). Documented studies confirmed both short and long sleeps are connected with increased morbidity and mortality (Tamakoshi et al., 2004; Leng et al., 2015; Youngstedt and Kripke, 2004). Different studies reported that age; mental health status; and income were significantly associated with short sleep duration in favour of older age; experiencing depression or anxiety symptoms, working night shifts and being separated from partner. All these factors were reported to exacerbate the sleep duration issue in quarantine situations (Whinnery et al., 2014).

Sleep disturbance has been linked to patients suspected or confirmed to have COVID-19, as well as decreased sleep quality in healthcare workers (Pappa et al., 2020). One of the previous studies from China has confirmed the effect of COVID-19 on sleep quality of health care workers and confirmed 38% of participants had sleep disturbance which was independently associated (Wang et al., 2020). Another study on nursing interns who were isolated in the hospital found that they experienced relatively high levels of anxiety and depression during the total lockdown, which affected their sleep quality (Sheng et al., 2020). One more cross-sectional study from Italy has confirmed 57.1% of poor sleep quality, 32.1% of high anxiety, 41.8% of high distress and 7.6% reported PTSD symptomatology associated with COVID-19 (Casagrande et al., 2020). People who are quarantined face a series of consequences. The fear and uncertainty towards COVID-19 has been a challenge to quarantined individuals. In addition, the incubation period and disturbance of social and familial roles increases additional stress to those isolated patients (Alkhamees et al., 2020). These aforementioned factors may lead to sleep disturbance and many negative thoughts which may cause anxiety and psychological distress. Furthermore, pandemic was grown up as one of the risk factors for sleeping disorders and psychological diseases. However, the effect of isolation and quarantine in Saudi Arabia, combined with being a suspected case of COVID-19, needs to be investigated. This will aid in the development of interventions to reduce the mental burden of quarantine and self-isolation, especially since this measure is still required despite the vaccination rollout. The purpose of this study was to look into the sleep quality and levels of stress, anxiety, and depression among suspected quarantined people in Saudi Arabia.

2. Methods

2.1. Study design

This study was carried out in Saudi Arabia between June-December 2020 as a cross-sectional in quarantine patients. During the crisis of pandemic, Saudi Arabia has implemented a strict lockdown to control the infection of COVID-19 after the approval from Ministry of health. Individuals were quarantined according to the guidelines that time for a period of two weeks. The survey was distributed at the end of quarantine period to each participant. Adults aged 18 and higher, suspected or confirmed to have COVID-19, able to fully understand and comprehend the questionnaire questions, and a Saudi citizen or resident of Saudi Arabia were eligible for this study. All quarantined individuals who met the inclusion criteria in the selected facilities were invited to participate. As statistical parameters, the study used a convenient sampling procedure, a margin of error of 5%, a confidence interval of 95%, and a significance value of 0.05. The final sample size was 362 people.

2.2. IRB

Ethical grant was approved for this study (No:20-327E).

2.3. Measures

For this study, we utilized a Google Forms questionnaire (Google LLC, Mountain View, California, USA). The self-administered survey has three sections: The first set of variables involved the individuals' age, gender, nationality, marital status, educational levels, smoking status, occupation, any medical history as sociodemographic features. In the second phase PSQ1 form was used to evaluate the quality of sleep in the second phase: The PSQI is a 19-item survey that evaluates the respondent's quality of life in the month prior to filling out the survey, including their subjective quality of life, sleep latency, sleep length, sleep efficiency, sleep disruptions, medication use, and daytime dysfunction. Most questions have a 4-point scale where answers range from 0 (not in the past month) to 3 (three or more times per week) or 0 (very good) to 3 (very awful). The global PSQI score is the sum of the seven component scores, each of which is derived following a set of predefined rules. Overall, poor sleep is indicated by a PSQI score closer to 21, and good sleep is indicated by a score of 0. Poor sleep was defined as a global PSQI score > 5 (Buysse et al., 1989). In this investigation, the approved and translated (Arabic) version created by Suleiman et al. (Suleiman et al., 2010) was employed. Finally, the online survey used the Arabic Depression, Anxiety, and Stress Scale-21 (DASS-21) to examine emotional distress (Moussa et al., 2017). Seven questions are provided for each of the DASS-21's three emotional constructs, for a total of 21 items. Each question has a 4-point scale from "did not apply to me at all" to "applied to me very much/most of the time over the previous week," with "3" representing the most common response. Higher sum scores for depression, anxiety, and stress imply higher degrees of emotional distress. The DASS manual (Lovibond and Lovibond, 1995) provides the thresholds for the various severity categories (normal, mild, moderate, severe, and extremely severe).

2.4. Statistical analysis

SPSS was used for statistical analysis (Version 23.0). Obtained data was represented as continuous and numerical data (Khan et al., 2019). Chi-Square test, multiple logistic regression model, 95% of odds ratio and confidence intervals was calculated. P value was confirmed as < 0.05 as statistically significant.

3. Results

The survey was completed by 362 people. Of them, 234 (64.6%) were males, and 148 were between the ages of 26 and 35. (Table 1). The majority of participants (N = 352, 97%) were Saudi nationals, and more than half (N = 206, 56.9%) were married. A bachelor's

Table 1
Demographic characteristics of the participants.

Characteristics	N = 362	%
Gender		
Male	234	64.6
Female	128	35.4
Age		
18–25	74	20.4
26–35	148	40.9
36–45	104	28.7
46–65	29	8
66 and above	7	1.9
Nationality		
Saudi	352	97.2
Non Saudi	10	2.8
Marital status		
Single	139	38.4
Married	206	56.9
Divorced	14	3.9
Widow	3	0.8
Educational attainment		
Less than high school	9	2.5
High school	32	8.8
Bachelor's degree	250	69.1
Masters or postgraduate degree	71	19.6
Employment status		
Student	64	17.7
Employed	235	64.9
Unemployed	41	11.3
Retired	22	6.6
Are you a Healthcare worker?		
Yes	126	34.8
No	236	65.2
Do you smoke?		
Yes	93	25.7
No	269	74.3
Do you have existing medical condition		
Yes	70	19.3
No	292	80.7
Depression		
Normal	196	54.1
Mild - Moderate	113	31.2
Severe	53	14.6
Anxiety		
Normal	147	40.6
Mild - Moderate	159	43.9
Severe	56	15.4
Stress		
Mild - Moderate	120	33.1
Severe	55	15.2

degree was held by nearly 70% of the participants, 8.8% held high school and 19.6% had received postgraduate degree. Approximately 235 (64.9%) participants were employed and 126 (34.8%) participants working as a healthcare worker or professionals. Additionally, 25% (N = 93) of the participants were smokers and 19% (N = 70) had an existing medical condition (either chronic, physical or mental). Exploring the quarantined participants' psychological health status revealed that over a quarter of respondents (31.2% n = 113) experienced mild to moderate depression, with 14.6% reporting severe symptoms of depression. Nearly half of the participants (43.9%, n = 159) reported anxiety symptoms and 15% of the participants experienced severe anxiety. Approximately 33% of sample respondents reported experiencing mild to moderate stress, with the 15% of the participants reporting severe stress symptoms.

The prevalence of sleep quality and component scores among suspected COVID-19 cases is shown in Table 2. According to the PSQI questionnaire, nearly half of the participants had a sleep duration of 5–6 h (N = 171, 47.2%) and more than half had an average sleep latency of 30–60 min (N = 198, 54.6%). Around 55 (15.2%) of the participants reported having a low habitual sleep efficiency

Table 2
Sleep quality and its components scores among suspected COVID 1–19 cases.

Variables (N = 362)	Value	Number	%
Sleep duration	> 7 h	22	6.1
	6–7 h	125	34.5
	5–6 h	171	47.2
	<5	44	12.2
Sleep latency	0	47	13
	1	84	23.2
	2	198	54.69
	3	33	9.11
Daytime dysfunction	0	51	14.0
	1	202	41.7
	2	112	30.9
	3	48	13.3
Sleep efficiency	>85%	69	19
	75–84%	148	40.8
	65–75%	90	24.9
	< 65%	55	15.2
Subjective sleep quality	Very Good	137	37.8
	Fairly Good	176	48.6
	Fairly Bad	22	6.1
	Very Bad	27	7.5
Sleep disturbance	0	51	14
	1	170	46.9
	2	76	20.9
	3	65	17.9
Use of sleep medication	Not during the past month	292	80.7
	Less than once a week	22	6.07
	Once or twice a week	33	9.11
	Three or more times a week	15	4.14
PSQI Sleep quality score	Good Sleep	236	65.19
	Poor sleep	126	34.80

(65%), while 176 (48.6%) reported having a fairly good subjective sleep quality. Approximately 80% of those who took part in the study never used sleep medication. Nearly half of the participants had component scores of 1–9 and 1–2 in the domains of sleep disturbance and daytime dysfunction, indicating only a minor problem.

The Pearson product-moment correlation coefficient was used to investigate the relationship between sleep quality (as measured by PSQI) and depression, anxiety, and stress (as measured by DASS-21) (Table 3). Almost all of the PSQI scale's subcomponents were significantly correlated with measures of depression, anxiety, and stress. Depression had a strong correlation with PSQI subcomponents such as daytime dysfunction (r = 0.256), sleep efficiency (r = 0.368), and sleep disturbance (r = 0.142) (p = 0.001). PSQI subcomponents of sleep latency (r = 0.206), daytime dysfunction (r = 0.273), sleep efficiency (r = 0.104, p0.05), and sleep disturbance (r = 0.383) (p0.001) were significantly correlated with anxiety scores of suspected COVID-19 cases (p0.001). Anxiety and PSQI subcomponents of subjective sleep quality (r = −0.388) and use of sleep medication (r = −0.287) were found to have a strong, negative correlation. All PSQI subcomponents and the overall PSQI

Table 3
Correlation between PSQI sub-component scores and DASS-21 sub-component score among suspected COVID-19 cases.

	Depression	Anxiety	Stress
Sleep duration	0.001	−0.022	0.315**
Sleep latency	−0.064	0.206**	0.324**
Daytime dysfunction	0.256**	0.273**	0.458**
Sleep efficiency	0.368**	0.104*	0.127*
Subjective sleep quality	0.029	−0.388**	−0.563**
Sleep disturbance	0.142**	0.383**	0.715**
Use of sleep medication	0.043	−0.287**	−0.154**
PSQI Sleep quality score	−0.032	0.129*	0.545**

* p < 0.05.
** p < 0.001.

Table 4
Difference between sociodemographic factors and sleep quality among suspected COVID 1–19 cases.

Characteristics	Total (N = 362)	Poor sleepers (N = 126)	Good Sleepers (N = 236)	P = value
Gender				**0.001**
Male	234 (64.6)	102 (43.6)	132 (56.4)	
Female	128 (35.4)	24 (18.7)	104 (81.2)	
Age				
18–25	74 (20.4)	24 (32.4)	50 (67.6)	0.628
26–35	148 (40.9)	38 (25.7)	110 (74.3)	
36–45	104 (27.7)	50 (48)	54 (52)	
46 and above	36 (9.9)	14 (39)	22 (61)	
Nationality				**0.022**
Saudi	352 (97.2)	120 (35.2)	231 (71.2)	
Non Saudi	10 (2.8)	4 (60.7)	5 (39.3)	
Marital status				**0.001**
Single	156 (43.1)	45 (28.8)	111 (71.2)	
Married	206 (56.9)	81 (39.3)	125 (60.7)	
Educational attainment				
Less than high school - High school	41 (11.3)	15 (36.6)	26 (63.4)	
Bachelor's degree and above	321 (88.7)	111 (34.6)	210 (65.4)	
Employment status				0.871
Student	64 (17.7)	19 (29.7)	45 (70.3)	
Employed	235 (64.9)	91 (38.7)	144 (61.3)	
Unemployed	63 (17.9)	16 (25.4)	47 (74.6)	
Are you a Healthcare worker?				**0.001**
Yes	126 (34.8)	39 (40)	87 (60)	
No	236 (65.2)	87 (36.9)	149 (63.1)	
Do you smoke?				**0.001**
Yes	93 (25.7)	50 (53.8)	87 (60)	
No	269 (74.3)	76 (28.2)	193 (71.7)	
Do you have existing medical condition				0.353
Yes	70 (19.3)	24 (34.2)	46 (65.7)	
No	292 (80.7)	102 (34.9)	190 (65.1)	

Note: Significant at < 0.05.

sleep quality score were significantly correlated with the participants' stress levels.

Table 4 shows the difference between poor and good sleepers, as well as the participants' demographic characteristics and health conditions. The analysis reveals a significant relationship between sleep quality and gender, marital status, nationality, being a healthcare worker, and smoking status (p 0.001). Furthermore, poor sleepers were more likely to be male (n = 102, 43.6 v n = 24,18.7%), married (n = 81, 39.3 v n = 45,28.8%), employed in healthcare (n = 39, 40% v n = 87,36.9%), and smokers (n = 50, 5.8% v n = 76,28.2%).

The relationship between demographic factors and depression Table 5 depicted anxiety and stress. According to the findings, there were significant differences in depression and anxiety in terms of gender, 15.8% (n = 37) of male participants experienced severe symptoms of depression compared to 12.3% of females (n = 16) (p = 0.001). In terms of anxiety, no severe anxiety was found in female compared to 23.9% of males (n = 56) who reported feeling of severe anxiety. In terms of age, participants between the ages of 26 and 35 reported the highest level of stress (p = 0.001). There was also a relationship between depression levels and nationality (p = 0.011), with Saudi nationals having higher levels of depression. In terms of marital status, the findings revealed statistically significant differences in anxiety (n = 31, 20% v n = 26, 16.2%) and stress (n = 31, 19.1% v n = 25, 14.8%) levels between study participants based on marital status in favor of single participants. In terms of educational qualification, the results revealed statistically significant differences in anxiety levels between participants with less than a high school diploma and those with a bachelor's degree or higher (p = 0.001). The findings revealed that participants' employment status had a significant difference in anxiety levels (p = 0.001). Working in healthcare was associated with depression (p = 0.031), anxiety (p = 0.028), and high stress levels (p = 0.001). Smokers had the highest level of anxiety (n = 49, 52.8% vs n = 24, 8.8%). There was a significant association (p = 0.001) between depression, anxiety, and stress levels and participants who had a chronic or non-chronic medical condition versus those who did not have a chronic or non-chronic medical condition. As shown in Table 6, gender, marital status, and being a healthcare worker were all significantly associated with poor sleep quality (P = 0.001). Being male [OR = −1.23, 95% CI (−2.75–1.95) P = 0.050], single [OR = 0.98, CI (0.15–4.20), P = 0.001], and being a healthcare worker [OR = −2.20, 95% CI (−2.59–1.82), P = 0.001].

4. Discussion

The current study estimated the prevalence of sleep disturbance among suspected COVID-19 quarantined cases in Saudi Arabia and examined the relationship between mental health outcomes such as stress, anxiety, and depression and sleep quality among suspected quarantined cases. The study's findings revealed that approximately-one-third of COVID-19 suspected patients had poor sleep quality, while the other two-thirds had good sleep quality. Furthermore, the findings revealed that the vast majority of participants slept for less than six hours, and a significant sleep latency, which is considered insufficient sleep duration and significantly high latency, this might in turn increase the likelihood of either mental or physical health problems. In addition, there was daytime dysfunctionality present among the great majority (30.9%, n = 11) of the participating COVID-19 suspected patients, and a low sleep efficiency rate. Furthermore, a significant proportion of the study participants had fairly bad and very bad subjective sleeping quality and showed a remarkable sleep disturbances occurrence. However, only a few percentages reported that they are using sleep medications.

Table 5
Difference between depression, anxiety, stress and sociodemographic factors among suspected COVID 1–19 cases.

Characteristics	Depression				Anxiety				Stress			
Gender	Normal	Mild to Moderate	Severe	p-value	Normal	Mild to Moderate	Severe	p-value	Normal	Mild to Moderate	Severe	p-value
Male	131 (55.9)	66 (28.3)	37 (15.8)	**0.001**	112 (47.8)	66 (28.3)	56 (23.9)	**0.001**	126 (53.9)	75 (32)	33 (14.1)	0.160
Female	65 (50.8)	47 (36.9)	16 (12.3)		35 (27.7)	93 (72.3)	0		61 (63.1)	45 (35.4)	22 (16.9)	
Age												
18–25	34 (12.3)	40 (87.7)	0	0.341	43 (58)	31 (42)	0	0.768	34 (45.8)	40 (54.2)	0	**0.001**
26–35	79 (52.6)	26 (13.1)	43 (34.3)		30 (35)	77 (30.7)	41 (34.3)		58 (48.2)	17	38 (16.8)	
36–45	65(55.7)	36 (32.8)	3 (11.4)		58 (55.7)	38 (37)	8 (8)		74 (71.1)	22 (21)	8 (8)	
46 and above	18 (50.8)	11 (29.8)	7 (19.3)		16 (44.2)	13 (36.2)	7 (19.6)		16 (55.8)	11 (29.8)	9 (14.6)	
Nationality												
Saudi	193 (60.2)	106 (25.8)	53 (15.4)	**0.011**	147 (46.5)	151 (32.8)	54 (20.6)	0.160	182 (53.2)	115 (31.4)	55 (15.4)	0.151
Non Saudi	3 (30)	7 (70)	0		0	10 (100)	0		5 (50)	5 (50)	0	
Marital status												
Single	84 (53.9)	47 (30.3)	25 (15.8)	0.124	60 (51.1)	66 (28)	31 (20.0)	**0.001**	80 (51.1)	46 (29.8)	31 (19.1)	**0.003**
Married	105 (50.8)	61 (29.8)	40 (19.3)		87 (45.8)	93 (38.0)	26 (16.2)		107 (53.5)	74 (31.6)	25 (14.8)	
Educational attainment				0.266				**0.001**				0.176
Less than high school – High school	21 (51.3)	12 (28.7)	8 (20)		17 (40.9)	20 (49.1)	4 (10)		24 (58.7)	11 (26.5)	6 (14.8)	
Bachelor's degree - postgraduate	175 (50)	1021 (31.8)	45(18.2)		173 (51)	44 (13.6)	104 (32.4)		161 (50.0)	114 (35.6)	46 (14.4)	
Employment status				0.852				**0.001**				0.152
Student	24 (37.2)	32 (50)	8 (12.8)		27 (42)	24 (37.5)	13 (20.5)		13 (20)	4434 (66.7)	7 (13.3)	
Employed	140 (59.7)	62 (23.7)	33 (16.5)		92(51.1)	112 (32.0)	40 (16.9)		139 (59.4)	57 (27.3)	39 (13.3)	
Unemployed	32 (50.8)	19 (29.8)	12 (19.3)		28 (44.2)	23 (36.2)	12 (19.6)		35 (55.5)	19 (29.8)	9 (14.6)	
Are you a Healthcare worker?				**0.031**				**0.028**				**0.001**
Yes	64 (50.8)	41 (31.3)	21 (16.9)		53 (42)	48 (38.2)	25 (19.8)		62 (49.5)	45 (35.5)	19 (15.1)	
No	145 (61.6)	61 (25.9)	29 (12.4)		115 (48.6)	121 (51.4)	0		175 (74.1)	36 (15.1)	26 (10.8)	
Do you smoke?				0.068				**0.001**				0.074
Yes	25 (27.0)	44 (47.2)	24 (25.8)		25 (27)	19 (20.2)	49 (52.8)		44 (47.2)	29 (31.5)	19 (21.3)	
No	158 (58.6)	65 (24.2)	46 (17.2)		134 (49.8)	111 (41.4)	24 (8.8)		157 (58.2)	79 (29.3)	34 (12.5)	
Do you have existing medical condition				**0.001**				**0.001**				**0.001**
Yes	36 (50.8)	21 (29.8)	14 (19.3)		26 (36.9)	29 (40.9)	16 (22.2)		39 (55.5)	21 (29.8)	10 (14.6)	
No	130 (44.4)	99 (33.8)	64 (21.9)		129 (44.2)	105 (36.2)	57 (19.6)		167 (57.2)	81 (27.8)	44 (15)	

Note: Significant at < 0.05.

Table 6
Demographic factors associated with sleep quality among suspected COVID 1–19 cases.

Variable	OR (95% CI)	P-value
Male		
Age (ref: 18–25)	−0.37 (−1.89 to 1.19)	0.783
Gender (ref: male)	−1.23 (−2.75 to 1.95)	**0.050**
Marital status (ref: Single)	0.98 (0.15–4.20)	**0.001**
Educational level		
ref: less than high school)	1.31 (−1.65 to 4.14)	0.896
Nationality (ref: Saudi)	−4.88 (−6.17 to 3.58)	0.493
Employment status		
student	1	0.165
Employed	1.19 (0.75–1.63)	
Unemployed	1.27 (0.32–2.73)	
Healthcare worker (ref: yes)	0.01 (−0.08 to 1.16)	0.805
Smoking status (ref: yes)	−2.20 (−2.59 to 1.82)	**0.001**
Have existing medical condition (ref: yes)	−1.59 (−1.71 to −1.48)	0.501

Note: OR = Odd ratio; CI = Confidence interval; *Significant at < 0.05.

Despite the differences in the study context and the nature of the study sample, previous study has shown the similar results with a poor quality of sleep among half of Jordanian university students due to COVID-19 quarantine (Saadeh et al., 2021). Idrissi *et al* studies were also reported a similar result found in our study as a significant reduction in sleep quality among Moroccans due to COVID-19 lockdown (Idrissi et al., 2020).

The current study found that mild to moderate and severe depression affected roughly half of the study participants. Mild to moderate and severe anxiety affected two-thirds of the study population, while mild to moderate and severe stress affected half of the study population. These outcomes could be attributed to the physiologic response; for example, muscle tension, fatigue in the body, sleep disturbance, or appetite disturbance are common physiological responses that are considered part of mental health stressors.

In general, stress is a state of an individual's body in response to an increase in the burden of psychological and physiological capacity caused by adversity (Shakya, 2020). Stress, anxiety, and depression are the sum of psychological and physiological responses to mental health disturbances. Stress, anxiety, and depression in quarantined people may be best viewed as a process, involving the interaction of stimulus and response (Mork et al., 2018). The findings of this study are consistent with those of Alkhamees *et al*, who found a significant prevalence of stress, depression, and anxiety among COVID-19 suspected patients subjected to involuntary institutional quarantine in Saudi Arabia (Sheng et al., 2020).

The current study found that almost all of the PSQI scale's subcomponents were significantly correlated with depression, anxiety, and stress measures. To interpret these results, a differentiation between diffuse stress, depression and anxiety that a lot of people could be suffering from and the unique stresses that are being placed on special groups at a specific time, such as quarantined COVID-19 suspected patients, should be highlighted. People had a high level of depression, anxiety, and stress during previous pandemics and outbreaks of emerging infectious diseases, and there are several reasons for this, including fear of infection, fear of death or job loss, financial concerns, and many other reasons related to social, health, or financial issues (Amsalem et al., 2021).

This is a health threat that is not visible to the naked eye; if you are sick, you may exhibit benign symptoms that mimic other types of diseases, leaving you unsure whether you have COVID-19, the flu, or a cold. At the same time, there is uncertainty, as well as changes in bodily habits, such as handwashing, disruptions in social relationships due to social distancing, and economic disruptions that place stresses. So, there are many reasons why almost every-one was worried and concerned because this was unfamiliar, it disrupted routines, and anyone or their loved one could become ill. As a result, there is a general sense of distress (Gao et al., 2020). The similar findings are documented by a couple of studies who has confirmed an association in between both sleep quality, stress, anxiety, depression and demonstrated high levels of are more likely to have poor sleep quality and sleep disturbances (Casagrande et al., 2020).

The difference between poor and good sleepers was found to be significant when the participants' demographic characteristics, health conditions, and gender, marital status, nationality, being a healthcare worker, and smoking status were considered (Batmaz et al., 2013). Poor sleepers were more likely to be male, married, work in healthcare, and smoke. These results might be attributed to that being a male in the Saudi community means having concerns related to the role as a household wage earner, which increases the additional stress and anxiousness (Wang et al., 2020). Being a married could impose more roles and responsibilities that increases the burden and add more concerns about the family in case there is a progression of the medical condition and the social consequences that could touch the family. The differences related to being a healthcare worker might be due to the job status of the quarantined COVID-19 suspected patient, such as the relation and communication with other colleagues within the work environment (Leitaru et al., 2019). Finally, the significant differences related to being a smoker might be interpreted to that being a nicotine addicted individual who is quarantined in a smoking free area is considered a stressful situation by itself, which significantly increases the mental health disturbances and the sleep quality of the COVID-19 patient, especially that one of the literature-reported reasons of smoking is to get rid of stress. All these factors might be stimulating the negative thoughts and ideas among the suspected COVID-19 patients, which will consequently affect their sleep quality (Leitaru et al., 2019).

The results of the present study showed that there were significant gender differences in depression and anxiety in favour of males, that contradicts the results reported by the national mental health survey that revealed higher levels of depression and anxiety among Saudi females (Al-Subaie et al., 2020). However, the context of the study is different as this study examines challenging situation, which is COVID-19 pandemic and being quarantined. In addition, the results indicated that medium age category (25–36 years) was significantly associated with higher levels of stress symptoms, which could be attributed to the concerns of young people about their disease and the sudden change in their lifestyle that was characterized by a full vital role to quarantined individual due to a limiting factor represented by COVID-19 suspect. This category of age is considered the more active age category in the community, especially in the Saudi community characterized by a high percentage of youth people. In addition, these results might be referred to the significant decline in youth physical activities and their daily life activities, which caused a sharp decline in their functional daily activities. The lack of daily functional activities was reported to be significantly associated with mental health disorders, especially among youth category (Rodriguez-Ayllon et al., 2019).

Interestingly, those with a Saudi nationality were associated with higher levels of depression. This result might be referred to that despite the close distance of the family and relatives, there is no sufficient social support for the quarantined COVID-19 patients. However, non-Saudi quarantined patients might be used to that situation, especially if they are residents in Saudi Arabia without their families (Liu et al., 2021). Furthermore, the results showed that there is a significant association between higher levels

of anxiety and lower educational level in favour of the category having less than high school. This might be due to the lack of knowledge and awareness of the nature of the diseases, its symptoms, treatment and the coping strategies to alleviate mental health disturbances. Besides, the results also found significant difference between depression, anxiety and stress levels and participants with existing medical condition, might be due to worries and concerns of disease progression and severity, especially in the presence of other medical conditions. This study's findings are consistent with those of Park et al, who discovered that younger age, gender, and caregiver status were associated with increased mental health disturbances during the COVID-19 pandemic (Park et al., 2020).

Some of the major limitations of this study includes the study's descriptive cross-section design could not determine causality, and the convenience sample could potentially exclude certain groups. Another limitation is that the data were derived from self-reports, which may have influenced bias; however, the survey tools were validated. In final with the low sample size the confirmation of sleep quality and psychological status of quarantined individuals in Saudi Arabia cannot be generalized. The current study, on the other hand, provides baseline data on sleep disturbances caused by an unprecedented and challenging situation that has not been seen in decades.

The research implications of this study include highlighting the association between COVID-19 quarantine, sleep quality, and mental health of the quarantined individuals, as well as the predicting factors of sleep quality among them, which guides other researchers and scholars to different research issues such as improving coping strategies among COVID-19 suspected patients in quarantine facilities and strategies to alleviate the levels of depression, a The findings of this study have a significant impact on the mental and physiological health of quarantined COVID-19 suspected patients.

In conclusion, about one-third of quarantine patients in Saudi Arabia has the poor sleep quality and mild-moderate depression levels. Both anxiety and stress were prevalent in nearly half of the study participants. Gender, marital status, and being a health care worker were found to be significant predictors of sleep quality in the study. Furthermore, the findings of the study would provide the stakeholders, decision makers, healthcare providers and facilities with needed data to develop and design interventional procedures that could improve the policies, procedures and regulations related to quarantine situations and sleep disturbances of public individuals. Increasing the public awareness regarding COVID-19 pandemic situation and providing youth categories with creative recreational activities during lockdown periods might reduce sleep disorders and mental health effects of quarantine individuals. Further studies are needed regarding the psychological health status among Saudi publics during and after the COVID-19 pandemic.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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