



Original article

Prevalence of post-traumatic stress disorder during the COVID-19 pandemic in Saudi Arabia

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ABSTRACT

Background: The coronavirus diseases of 2019 (COVID-19) pandemic was classified as one of the worst pandemics in the 21st century. Its rapid transmission, unpredicted mortality rate, and the uncertainty surrounding its transmission method have evoked additional fear and anxiety. Nonetheless, to the best of our knowledge, no prior study has explored PTSD prevalence three months after the start of the quarantine procedures in Saudi Arabia nor has examined PTSD prevalence by three different methods.

Objective: This observational cross-sectional study aimed to identify the prevalence, severity, and influencing factors of PTSD in different regions of Saudi Arabia three months after the onset of the quarantine procedures related to the COVID-19 pandemic.

Methods: Through the month of June 2020, 1374 people (49.05% men and 50.95% women) completed a 35-item, 10-minute online. The prevalence of PTSD was measured using PCL-S (specific for COVID-19) that assesses the 17 symptoms of PTSD. Resilience was measured using 2-items Arabic version of the Connor-Davidson Resilience Scale 2 (CD-RISC 2).

Results: We calculated the prevalence by three methods, namely, PTSD cut-off score, criteria, and combined, and the prevalence was 22.63%, 24.8%, and 19.6%, respectively. Female participants showed higher prevalence than male. As well, participants who were either tested positive or suspected of having been infected with COVID-19 showed higher PTSD prevalence. Higher resilience was associated with lower PTSD prevalence.

Conclusions: This was the first study to report PTSD prevalence by three differential methods three months after the onset of the quarantine procedures related to the COVID-19 pandemic in Saudi Arabia. We observed a significant impact of the COVID-19 pandemic in the Saudi population; therefore, great attention should be performed in implementing new procedures that deal with the highlighted risk factors, especially in vulnerable groups, to overcome the psychological impact of the COVID-19 pandemic.

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1. Introduction

Many Saudis still remember the psychological trauma caused by the Middle East respiratory syndrome-related coronavirus (MERS-CoV) outbreak in 2012, especially survivors and those who had direct contact with infected patients (Zaki et al., 2012). Several studies have reported that MERS-CoV survivors suffered social stigmatization and traumatic fear (Almutairi et al., 2018). The general public also showed higher levels of distress and anxiety attributable to susceptibility to infection (Al Najjar et al., 2016). Correlatively, the novel coronavirus disease of 2019 (COVID-19) presented a new global threat owing to its dangerous characteristics (e.g., rapid transmission, unpredictable mortality rate, and the

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uncertainty about its transmission method, incubation period, and manifestation), which rapidly evoked fear and anxiety in the Saudi population and worldwide. As a safety measure to deal with the COVID-19 pandemic, the Saudi government imposed several precautionary rules to the entire country (e.g., quarantine, 24-hour curfew, and lockdown) to reduce the fast spread of the contagious disease (Al-Tawfiq & Memish, 2020; Yezli & Khan, 2020). Logically, these precautionary measures and the COVID-19 pandemic have a significant impact on mental health, leading to widespread fear, stress, anxiety, and depression (Al Sulais et al., 2020; AlHumaid et al., 2020). Together, these factors could increase the prevalence of post-traumatic stress disorder (PTSD) caused by the quarantine and experiences related to the COVID-19 pandemic.

Cumulative reports have found that natural disasters can be significant traumatic stressors, causing survivors to experience PTSD (Galea et al., 2005; Neria et al., 2008; Sprang & Silman, 2013). In 2003, the Severe Acute Respiratory Syndrome (SARS) outbreak was defined as a bio-disaster, having a severe impact on survivors owing to the traumatic situations they have experienced (Cheng et al., 2006; Chong et al., 2004). A study measured PTSD incidence related to the SARS outbreak, showing that the numbers were equivalent to those reported for natural disasters (Hawryluck et al., 2004). Another study showed that SARS survivors faced traumatic experiences related to dealing with a new deadly infection, witnessing unknown adverse events, an uncertain prognosis, and high risk of intensive care unit admission (Wu et al., 2005b). SARS survivors reportedly presented PTSD symptoms (i.e., increased anxiety and depression) in the early stages of recovery (Cheng et al., 2004; Wu et al., 2005b). Moreover, societal stigma was reported, with people tending to avoid and socially exclude SARS survivors (Lee et al., 2005). Additionally, a study examining SARS survivors' psychological characteristics 30 months after recovery reported that they had long-term PTSD symptoms, further confirming it as the most prevalent long-term psychiatric condition in this population (Mak et al., 2009). In SARS survivors, PTSD symptom severity was correlated with quarantine length (Hawryluck et al., 2004). Moreover, studies show that other disease outbreaks have caused similar effects; for example, Ebola survivors reportedly had a risk of developing PTSD owing to having been exposed to severe traumatic events related to distress thoughts about having a higher mortality rate (Hugo et al., 2015).

Several studies have suggested that most individuals experience trauma have a psychological balance that prevents and protects the overall mental health (Bonanno, 2004; Bonanno et al., 2006). Therefore, researchers have dedicated great attention to exploring the correlation of individual strengths and adaptational responses facing environmental adversity and trauma (Russo et al., 2012; Wu et al., 2013). Resilience is known as the ability to adapt to trauma, tragedy, or extreme threats (Charney, 2004). In fact, resilience is an essential part of coping, and adjustment experience in trauma recovery process (Anderson & Danis, 2006). A wide range of studies suggested that individuals with higher resilience traits are less susceptible to PTSD symptoms (Bensimon, 2012; Lepore & Revenson, 2006; Levine et al., 2009). Then, suggesting that if an individual experienced extreme stressor or trauma and did not show any PTSD symptoms, resilience is present. Consequently, the adaptability against trauma and extreme stressor such as COVID-19 pandemic is an essential factor that needs to be investigated.

Given the background above and the characteristics of the COVID-19 pandemic, it is reasonable to infer that it may evoke traumatic stressors similar to those related to the SARS epidemic. Untreated PTSD symptoms are unlikely to disappear and can contribute to drug abuse, depression, and sleep problems, all of which negatively influence people's communication and productivity (Dansky et al., 1998; Goenjian et al., 2005; Kobayashi et al.,

2007). Several sociodemographic factors have been suggested to play an essential role in developing PTSD. For instance, gender has a significant role in this matter, with higher chances of developing PTSD-related symptoms in females as compared to males in response to severe stressful experiences (Luxton et al., 2010; Norris et al., 2002; Olff et al., 2007). As well, healthcare providers who work in close contact with MERS and SARS patients were at higher risk of developing PTSD (Lee et al., 2018; Su et al., 2007). Similarly, patients with a history of psychiatric conditions are at high risk of developing PTSD than healthy individuals (Kmett Danielson et al., 2010; Naeem et al., 2011; Oh et al., 2016). Due to the lack of previous research studies exploring the impact of COVID-19 pandemic on mental health and PTSD; this study aimed to identify the prevalence, severity, and influencing factors of PTSD in different regions of Saudi Arabia three months after the onset of the quarantine procedures related to the COVID-19 pandemic.

2. Methods

2.1. Questionnaire

This cross-sectional study was conducted through the whole month of June 2020; namely, approximately three months after the onset of the quarantine procedures in Saudi Arabia related to the COVID-19 pandemic. The PTSD symptoms usually begin within the first three months after experiencing stressful trauma; however, the degree of severity can differ from one individual to another (Carty et al., 2006; Dunmore et al., 1999; Mayou et al., 2002; Sadeghi-Bazargani et al., 2011). We distributed a survey through different social media platforms. Participants consent was completed at the beginning of the survey. The study inclusion criteria were: Being aged 18 years or older and be currently living in Saudi Arabia. Respondents were asked to complete a 10-minute online survey through the Survey Monkey platform (<https://www.surveymonkey.com>) regarding the following topics in the context of the COVID-19 pandemic: Sociodemographic data, Psychological impact, PTSD symptoms, and resilience. The significant impact of the COVID-19 pandemic in the Saudi population was investigated among different variables identified as risk factors, such as gender, family death, social stigma toward COVID-19 patients/survivors/suspected patients, marital status, chronic illness such as diabetes mellitus, hypertension, cancer or pulmonary diseases, and current/previous psychiatric condition. In total, 1374 people completed a 35-item questionnaire.

2.2. Instruments

We used a specific version of the PTSD checklist in the Diagnostic and Statistical Manual of Mental Disorders (DSM) survey (PCL-S) was used as a self-report tool to measure the 17 PTSD symptoms described in the DSM-V (Weathers et al., 1993). The PCL-S is a widespread and validated screening tool for making a provisional PTSD diagnosis for a specific event (Boals & Schuettler, 2011). We utilized a version that was translated from English to Arabic and compared it to a validated PCL-C Arabic version (Alhalal et al., 2017). Participants were asked to rate their experiences with the COVID-19 pandemic during the last month. Participants responded through a 5-point scale, ranging from 1 (Not at all) to 5 (Extremely). Their scores were calculated by different methods, which are described hereinafter.

The first method is named PTSD cut-off score; it measures participants' symptomatic severity through a score range of 17–85. Prior researches show that a cut-off score of 45 or higher should be used when measuring PTSD symptoms through the PCL-S score because it minimizes false-positive diagnoses (Blanchard et al.,

1996); thus, we utilized this well-established cutoff score to determine if participants were within the severity threshold of a PTSD diagnosis.

The second method is named PTSD criteria; it was used to check whether participants met the DSM-V symptom criteria for PTSD. Namely, participants must have had at least one symptom from the B category (items 1–5), three from the C category (items 6–12), and at least two from the D category (items 13–17) to meet the criteria. Responses in the range of 3–5 denoted that patients had the symptom described in each of the aforementioned items; participants who had scores for all the aforementioned items in the range of 3–5 were deemed as having the symptomatic pattern of a PTSD diagnosis.

The third method is named PTSD combined; to ensure result reliability, we combined the first and second methods, in that participants had to meet both the severity threshold and the symptomatic pattern described above to be diagnosed with PTSD. All three methods were approved and validated by the National Center for PTSD (Weathers).

We measured resilience using the Arabic version of the Connor-Davidson Resilience Scale 2 (CD-RISC 2) (Vaishnavi et al., 2007); we obtained the Arabic version with the permission from Dr. Jonathan R.T. Davidson. Resilience was scored with a total of two items, on a five-point scale from 0 (rarely true) to 4 (true nearly all of the time). The 2-item CD-RISC 2 includes two statements; ('Able to adapt to change') and ('Tend to bounce back after illness or hardship') with a higher score of 8 reflecting greater resilience. The shortened version CD-RISC 2 was introduced to the reduced time needed to complete the scale and therefore increased total usages by participants.

2.3. Statistical analysis

We reported participants' descriptive statistics as frequencies and percentages. We applied a Chi-square test to examine the association between sociodemographic data and PTSD cut-off score, criteria and combined. We used stepwise multivariable logistic regression analyses to explore whether the four aforementioned variables were predictors of PTSD. The models were adjusted for several predictor variables including: age, gender, education level, monthly income, marital status, employment, working outside home during COVID-19, location, lockdown neighbors, infected with COVID-19, quarantine, and family death. We calculated the odds ratio (OR) and 95% confidence interval (CI) by the probability of having PTSD based on the three analysis methods. We set statistical significance as $P < 0.05$ for all analyses, and these were performed using SAS software.

3. Results

3.1. Sociodemographic data

Participants' sociodemographic data are shown in Table 1. Among the 1374 participants, we observed similar distributions by gender (49.05% men and 50.95% women). Most participants were aged between 25 and 34 years (37.05%), married (53.28%), worked in governmental jobs (38.72%), and had a university or college degree (61.86%). The survey sample showed a diversity regarding participants monthly income, with higher percentage of participants reported lower income than 1000 SAR monthly (37.48%). Participants were divided into five categories by resident location in Saudi Arabia (i.e., East, Middle, North, South, and West), and most resided in the West (54.37%). Regarding quarantine measurements, (2.77%) of participants reported living in complete lock-

Table 1
Sociodemographic data and quarantine related psychosocial variables.

Variables	All sample			
	N	%		
Age	18–24	342	24.89	
	25–34	509	37.05	
	35–44	348	25.33	
	45–55	138	10.04	
	More than 55	37	2.69	
Gender	Male	674	49.05	
	Female	700	50.95	
Education level	Below high school	31	2.26	
	High school	225	16.38	
	University or college	850	61.86	
Monthly income	Postgraduate or above	268	19.51	
	Less than 1000 SAR	515	37.48	
	1000–5000	195	14.19	
	5001–10,000	217	15.79	
	10,001–20,000	305	22.20	
Marital status	More than 20,000	142	10.33	
	Single	595	43.30	
Employment	Married	732	53.28	
	Divorced/ Widowed	47	3.42	
	Government	532	38.72	
Did your work outside your home during COVID 19?	Private	173	12.59	
	Freelancer	30	2.18	
	Student	275	20.01	
	Retired	30	2.18	
	Unemployed	334	24.31	
Location	Yes	382	27.8	
	Eastern Region	90	6.55	
	Middle Region	241	17.54	
	North Region	157	11.43	
	South Region	139	10.12	
Living in total lockdown isolated neighbors	Western Region	747	54.37	
	Yes	38	2.77	
	Confirmed	51	3.71	
	No / Don't know	1296	94.32	
	Suspected	27	1.97	
Are you, or have you been, infected with COVID-19?	Did you infect others with COVID-19	Yes	13	0.95
	Confirmed	514	37.41	
	No / Don't know	826	60.12	
	Suspected	34	2.47	
	Yes	165	12.01	
Do you know people in your immediate social environment who are or have been infected with COVID-19?	Death related to COVID-19 in family or friends	Yes	132	9.61
	Have you been isolated because of COVID-19 pandemic?	Yes	55	4.00
	Previous psychiatric condition before COVID-19	Yes	174	12.66
	Do you have a chronic illness such as DM, HTN, Cancer or pulmonary disease	Yes	174	12.66

down areas, and (9.61%) were isolated from others due to COVID-19 related safety measurements. Approximately 3.71% positive test for COVID-19, (1.97%) were suspected; however, most participants have not been infected with COVID-19 (94.32%). Moreover, 4% of the participants reported previous psychiatric conditions, whereas 12.66% reported a history of chronic health illnesses such as DM, HTN, cancer, or pulmonary diseases.

Table 2
Sociodemographic data and PTSD scoring using PCL-S.

Variables	PTSD cut-off score		PTSD cut-off score		P value	PTSD criteria		PTSD criteria		P value	PTSD combined		PTSD combined		P value				
	Yes	No	Yes	No		Yes	No	Yes	No		Yes	No							
Age	Less than 18	N	%	N	%	0.62	N	%	N	%	0.708	N	%	N	%	0.72			
	18–24	77	24.76	265	24.93		87	25.51	255	24.69		64	23.7	278	25.18				
	25–34	125	40.19	384	36.12		133	39	236	36.4		107	39.63	402	36.41				
	35–44	76	24.44	272	25.59		84	24.63	264	25.56		70	25.93	278	25.18				
	45–55	26	8.36	112	10.54		28	8.21	110	10.65		22	8.15	116	10.51				
More than 55	7	2.25	30	2.82	9	2.64	28	2.71	7	2.59	30	2.72							
Gender	Male	140	45.02	560	52.68	0.017	163	47.8	537	51.98	0.18	126	46.67	574	51.99	0.11			
	Female	171	54.98	503	47.32		178	52.2	496	48.02		144	53.33	530	48.01				
Education level	Below high school	7	2.25	24	2.26	0.94	7	2.05	24	2.32	0.83	6	2.22	25	2.26	0.97			
	High school	49	15.76	176	16.56		61	17.89	164	15.88		46	17.04	179	16.21				
	University or college	197	63.34	653	61.43		206	60.41	644	62.34		164	60.74	686	62.14				
	Postgraduate or above	58	18.65	210	19.76		67	19.65	201	19.65		54	20	214	19.38				
Monthly income	Less than 1000 SAR	123	39.55	392	36.88	0.16	133	39	382	36.98	0.70	103	38.15	412	37.32	0.57			
	1000–5000	55	17.68	140	13.17		53	15.54	142	13.75		46	17.04	149	13.5				
	5001–10,000	43	13.83	174	16.37		51	14.96	166	16.07		39	14.44	178	16.12				
	10,001–20,000	61	19.61	244	22.95		74	21.7	231	22.36		57	21.11	248	22.46				
	More than 20,000	29	9.32	113	10.63		30	8.8	112	10.84		25	9.26	117	10.6				
Marital status	Single	134	43.09	461	43.37	0.01	147	43.11	448	43.37	0.015	114	42.22	481	43.57	0.11			
	Married	158	50.8	574	54		174	51.03	55	54.02		139	51.48	593	53.71				
	Divorced/Widowed	19	6.11	28	2.63		20	5.87	27	2.61		17	6.3	30	2.72				
Employment	Government	107	34.41	425	39.98	0.123	119	34.9	413	39.98	0.34	96	35.56	436	39.49	0.11			
	Private	40	12.86	133	12.51		46	13.49	127	12.29		34	12.59	139	12.59				
	Freelancer	10	3.22	20	1.88		10	2.93	20	1.94		10	3.7	20	1.81				
	Student	57	18.33	218	20.51		66	19.35	209	20.23		46	17.04	229	20.74				
	Retired	6	1.93	24	2.26		6	1.76	24	2.32		6	2.22	24	2.17				
	Unemployed	91	29.26	243	22.86		94	27.57	240	23.23		78	28.89	256	23.19				
Did your work outside your home during COVID 19?	Yes	75	24.12	236	75.88	0.099	81	23.75	260	76.25	0.054								
Location	Eastern Region	29	9.32	61	5.74	0.0589	31	9.09	59	5.71	0.135	26	9.63	64	5.8	0.04			
	Middle Region	64	20.58	177	16.65		65	19.06	176	17.04		56	20.74	185	16.76				
	North Region	34	10.93	123	11.57		33	9.68	124	12		28	10.37	129	11.68				
	South Region	26	8.36	113	11.57		36	10.56	103	9.97		20	7.41	119	10.78				
	Western Region	158	50.8	589	55.41		176	51.61	571	55.28		140	51.85	607	54.98				
Living in total lockdown isolated neighbors	Yes	9	2.89	302	97.11	0.875	11	3.23	330	96.77	0.55	8	2.96	262	97.04	0.82			
Are you, or have you been, infected with COVID-19?	Confirmed	12	3.86	39	3.67	0.074	14	4.11	37	3.58	0.29	12	4.44	39	3.53	0.14			
	No / Don't know	288	92.6	1008	94.83		317	92.96	979	94.77		249	92.22	1047	94.84				
	Suspected	11	3.54	16	1.51		10	2.93	17	1.65		9	3.33	18	1.63				
Did you infect others with COVID-19	Yes	1	0.32	310	99.68	0.319	3	0.88	338	99.12	0.88	1	0.37	269	99.63	0.48			
	Confirmed	136	43.73	378	35.56		0.003	144	42.23	370		35.82	0.004	116	42.96		398	36.05	0.003
	No / Don't know	163	52.41	663	62.37		183	53.67	643	62.25		142	52.59	684	61.96				
Do you know people in your immediate social environment who are or have been infected with COVID-19?	Suspected	12	3.86	22	2.07	0.0005	14	4.11	20	1.94	0.002	12	4.44	22	1.99	0.0002			
	Yes	55	17.68	256	82.32		57	16.72	284	83.28		50	18.52	220	81.48				
	Yes	38	12.22	273	87.78		0.075	43	12.61	298		87.39	0.03	34	12.59		236	87.41	0.0633
Previous psychiatric condition before COVID-19	Yes	31	9.97	280	90.03	<0.0001	31	9.09	310	90.91	<0.0001	30	11.11	240	88.89	<0.0001			
Do you have a chronic illness such as DM, HTN, Cancer or pulmonary disease	Yes	45	14.47	266	85.53	0.276	49	14.37	292	85.63	0.274	42	15.56	228	84.44	0.11			

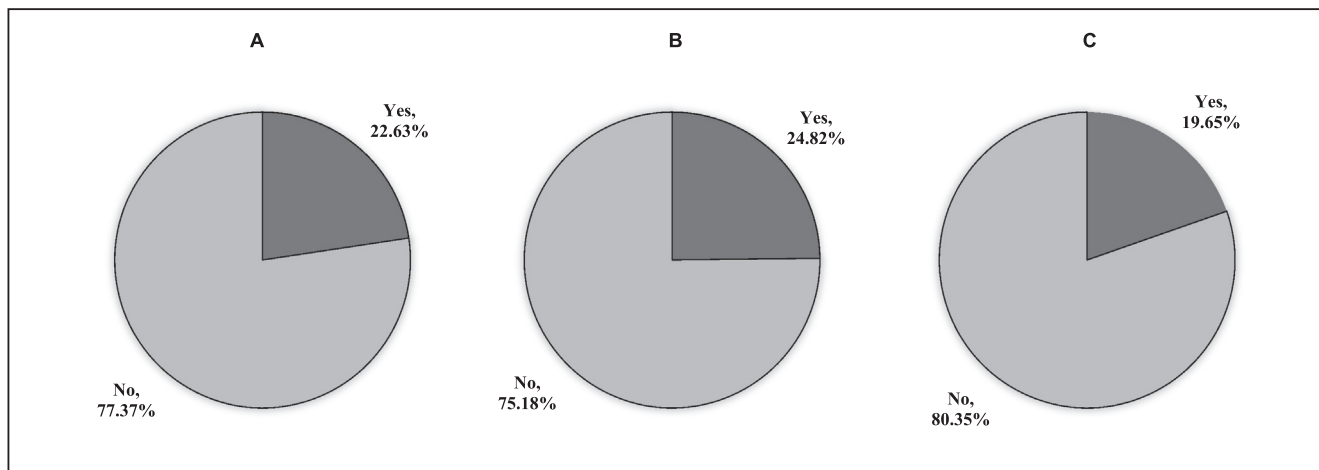


Fig. 1. The prevalence of PTSD according to three different scoring parameters. A) The prevalence of PTSD as calculated with cut-off score of 45, B) The prevalence of PTSD as calculated with specific criteria as described participants must have had at least one symptom from the B category (items 1–5), three from the C category (items 6–12), and at least two from the D category (items 13–17) to meet the criteria, C) The prevalence of PTSD combined as calculated the first and second methods.

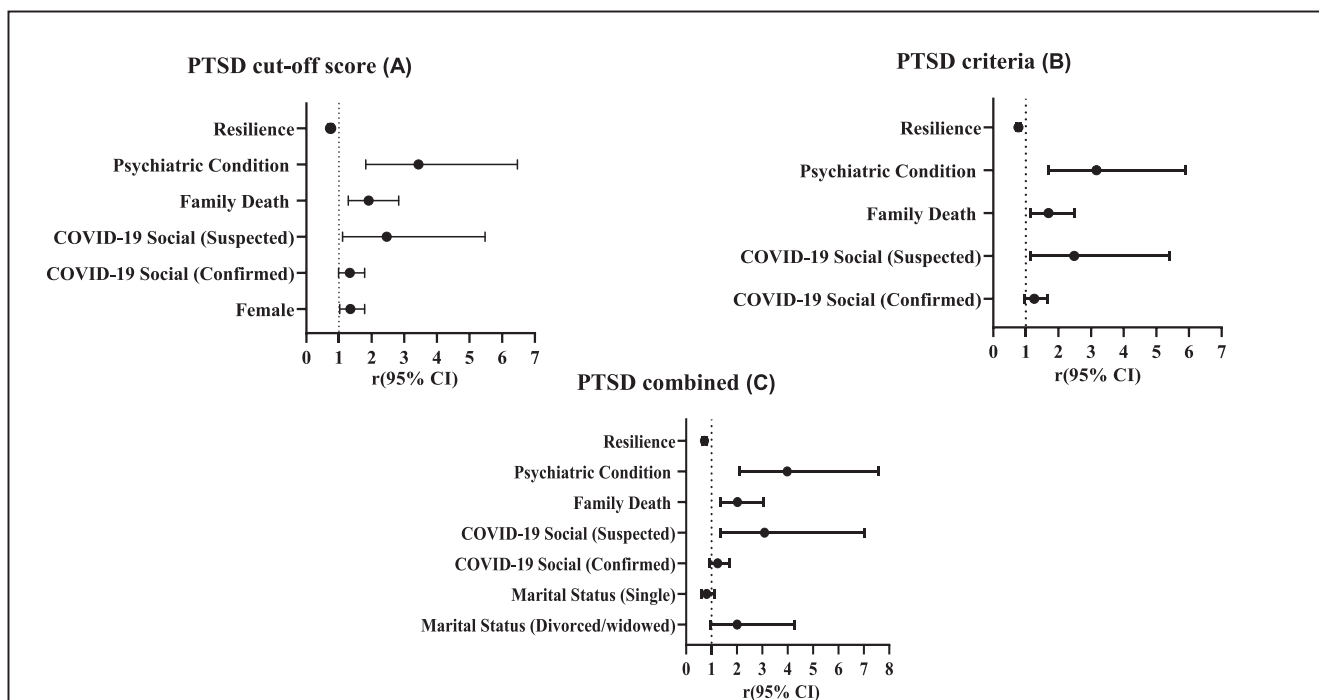


Fig. 2. Forest plot of odds ratio and 95% confidence interval. A) represents several predictors associated with PTSD as calculated with cut-off score of 45, B) represents several predictors associated with PTSD as calculated with specific criteria as described participants must have had at least one symptom from the B category (items 1–5), three from the C category (items 6–12), and at least two from the D category (items 13–17) to meet the criteria, C) represents several predictors associated with PTSD combined the first and second methods.

3.2. PTSD prevalence

The overall prevalence of PTSD cut-off score, criteria, and combined were 22.63%, 24.8%, and 19.6%, respectively (Fig. 1). Table 2 shows the association between sociodemographic data, predictor variables, and PTSD prevalence, and Fig. 2 shows the results of the regression analysis. We observed a significant association between gender and PTSD prevalence: Females participants showed higher prevalence than males (coefficients; $P \leq 0.05$). Moreover, participants who were either confirmed or suspected of having been infected with COVID-19 showed higher PTSD prevalence (coefficients; $P \leq 0.05$) than their non-confirmed/suspected

counterparts (coefficients; $P \leq 0.05$). Single participants showed a higher PTSD prevalence (coefficients; $P \leq 0.05$) compared to their divorced/widowed counterparts (coefficients; $P \leq 0.05$). Participants who experienced a family member die owing to COVID-19 (coefficients; $P \leq 0.05$) and who had previous psychiatric conditions (coefficients; $P \leq 0.05$) showed higher PTSD prevalence compared to their counterparts (i.e., participants without family member deaths: coefficients; $P \leq 0.05$; without psychiatric conditions: coefficients; $P \leq 0.05$). Conversely, participants with high resilience scores showed lower PTSD prevalence (coefficients; $P \leq 0.05$) compared to their lower resilience counterparts (coefficients; $P \leq 0.05$).

4. Discussion

This study aimed to investigate the prevalence, severity, and influencing factors of PTSD in different Saudi Arabia regions three months after the onset of the quarantine procedures related to the COVID-19 pandemic. Our results showed that the prevalence by the three methods of PTSD cut-off score, criteria, and combined were 22.63%, 24.8%, and 19.6%, respectively. Several studies using PTSD cut-off score to report on PTSD prevalence showed similar or higher results: In the USA (31.8%) (C. H. Liu et al., 2020), Italy (29.5%) (Forte et al., 2020), and Spain (15.8%) (González-Sanguino et al., 2020); others have reported lower prevalence, such as in China, in which it ranged from 2.7% to 12.8% (Liang et al., 2020; N. Liu et al., 2020; Tang et al., 2020). These differential results could be explained, for example, by shorter periods between the onset of the COVID-19 outbreak and data collection, different sample sizes, or even a different method of analysis. Nonetheless, our study stressed a negative influence of the quarantine owing to the COVID-19 pandemic in Saudi Arabia on people's psychological health, specifically regarding PTSD symptoms. Correlatively, in the Lebanese population, it was reported that PTSD symptoms were correlated with quarantine length (Fawaz & Samaha, 2020).

Our results emphasized that women had a greater propensity to experience PTSD symptoms than men. Confirming, several studies have reported that disease outbreaks have a higher effect on women than on men, demonstrating that women are at higher risk of developing PTSD symptoms (Lai et al., 2020; N. Liu et al., 2020; Mak et al., 2010). Further, reports have shown that women respond differently to extremely stressful events compared with men: Women with PTSD experience greater brainstem activation in response to threats (i.e., they may respond more intensely and abruptly and less reflectively under these conditions), while men showed greater capacity to contextualize fear-related stimuli (Felmingham et al., 2010). Others have justified gender differences by hormones, in that estrogen—which is generally less present in men than in women—could be a great influencing factor of women's responses to trauma and to PTSD symptoms (Glover et al., 2012; Lebron-Milad et al., 2012). However, regardless of the several studies that have provided evidence on these influencing factors, they are not sufficient to explain why women have presented higher risk of developing PTSD symptoms than men in our study; thus, further research is warranted to explore this topic.

Our results also demonstrated a higher prevalence of PTSD in COVID-19 survivors/suspected patients. Correlatively, the COVID-19 infection made patients and survivors experience psychological outcomes associated with PTSD symptoms (Bo et al., 2020). Similar experiences have been reported for SARS survivors: A study highlighted that they reported increased anxiety, depression, and PTSD symptoms owing to the epidemic (Wu et al., 2005a), and another that they had higher stress levels one year after the SARS outbreak (Lee et al., 2007). Therefore, COVID-19 survivors may be at higher risk of developing PTSD, possibly owing to experiences related to prolonged stress and fear.

Our results also demonstrated that family death owing to COVID-19 was a substantial risk factor for PTSD. Generally, family death or loss of a loved one can cause depression in family members close to the deceased (Pochard et al., 2005). The funeral process and receiving grieving support were both shown to help family members in their recovery and healing process (Gamino et al., 2000). However, owing to the COVID-19 pandemic and social distancing requirements, funeral practices have been restricted internationally and in Saudi Arabia (Yezli & Khan, 2020); in addition to such hindrances and their consequent limited social sup-

port, people have also had to endure the enforcement of quarantines around the world. Several studies have shown that the quarantine, in itself, can increase psychological stress and aggravate mental health (Brooks et al., 2020; Lei et al., 2020; Picaza Gorrochategi et al., 2020). As highlighted by our study results, all of these factors add insult to injury and may exacerbate PTSD prevalence. Therefore, grieving support and proper communication opportunities should be provided for families who lost a loved one during the COVID-19 pandemic.

In the literature, people's ability to recover from trauma, and extremely stressful experiences has been measured by different resilience scales (Connor & Davidson, 2003; Waaktaar & Torgersen, 2010). In our study, participants who had positive acclimatization to stressful life experiences (e.g., a pandemic) were shown to be at a lower risk of developing PTSD symptoms. Conceptualizing, resilience is a dynamic process that can act as a defense mechanism against mental health disturbances (Rutten et al., 2013). Cumulative reports have suggested that resilience is linked to many variables, such as genetics, environment, and social interactions (Bonanno et al., 2001; Brown & Westaway, 2011; Feder et al., 2009). Moreover, people have different nervous systems that thereby respond differently toward similar stressful stimuli, which denotes that resilience may also be affected by it; for example, a study measuring the cortisone levels of participants who experienced an acute stressor (i.e., a public speech task) revealed a strong association between activity in the hypothalamic-pituitary-adrenal axis (which plays an essential role in response to stress), cortisone levels, and resilience (Mikolajczak et al., 2008). Thus, many researchers/clinicians are trying to develop new strategies to identify risk factors of diminished resilience and preventable measures to enhance it (Horn et al., 2016; Horn & Feder, 2018; Iacoviello & Charney, 2014). We believe that resilience may be vital in preventing PTSD due to disease outbreaks, so we suggest that studies focus on resilience in future researches.

Several limitations could affect the interpretation of the study. The recruited sample in this study does not represent the entire population of Saudi Arabia. Social media was used to recruit the participants because of the exceptional circumstance of COVID-19 and strict government measurements to ensure personal distancing. However, individuals with no internet access and no social media accounts, cell phones, or computers cannot participate; thus, the sample does not represent the whole population of Saudi Arabia. The survey was distributed in the Arabic language, which neglected non-Arabic speakers. The recruited sample in this study was collected as a convenience sample, and a substantial consideration should be given not to generalize these data to the broader population other than Saudi Arabia. The study did not examine young individuals less than 18. As well, the study did not examine older adults (over the age of 55) due to limited responses. Also, self-report surveys itself has limitations, as a misinterpretation of the questions could happen. Further studies are still warranted to cover most of these limitations.

Concluding, this was, to the best of our knowledge, the first study to report on PTSD prevalence in Saudi Arabia during the COVID-19 pandemic. Our results demonstrated a significant impact of the COVID-19 pandemic in the Saudi population, and those multiple variables were identified as risk factors, such as gender, family death, social stigma toward COVID-19 patients/survivors/suspected patients, marital status, and psychiatric condition. We suggest that officials in the Ministry of Health in Saudi Arabia implementing new procedures that deal with the highlighted risk factors, especially in vulnerable groups, to overcome the psychological impact of the COVID-19 pandemic.

Authorship and copyright

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Ethics approval

The Biomedical Committee of Research Ethics at the faculty of medicine at Umm Al-Qura University approved the study (Approval no. HAPO-02-K-012-2020-06-394).

Author contribution

Fahad Alshehri, Yasser AlAtawi, Badrah Alghamdi, Abdullah Alhifany, Adnan Alharbi participated protocol design, data collection and in conducting the study. Fahad Alshehri wrote the manuscript. Yasser AlAtawi analyzed the data. All authors reviewed the approved the final manuscript.

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Declaration of Competing Interest

No potential competing interest was reported by the authors.

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