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Prevalence of post-traumatic stress disorder post-COVID-19 pandemic among healthcare workers in the Pediatric Emergency Department in Maternity and Children Hospital in Alqassim

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ABSTRACT

Objective: This study aimed to determine the prevalence of post-traumatic stress disorder (PTSD) post-coronavirus disease 2019 pandemic among healthcare workers (HCWs) in Pediatric Emergency Departments (PEMs) in Maternity and Children Hospital in Al-Qassim, Saudi Arabia.

Methods: This cross-sectional study was conducted among HCWs working in the PEM in the Maternity and Children Hospital in Al-Qassim Region, Saudi Arabia. A self-administered questionnaire was distributed among the HCWs using an online survey. The questionnaire included socio-demographic characteristics, the Pittsburgh Sleep Quality Index (PSQI) to measure sleep quality and the Impact of Event Scale to measure HCWs' PTSD.

Results: Of the 107 HCWs, 87.9% were females and 56.1% were aged between 25 and 35 years. Around 29% of pediatric emergency HCWs were considered to have PTSD symptoms. Poor sleep quality was detected in 61.7% of HCWs. There was a significant association between PTSD symptoms and all domains of PSQI, including the total PSQI score. However, no significant relationship was observed between the level of PTSD and all socio-demographic variables.

Conclusion: The prevalence of PTSD symptoms among pediatric emergency HCWs was 29%. PTSD greatly influences sleep quality, but there was no relevance with HCWs demographic profiles. Further longitudinal studies are necessary to establish the prevalence of PTSD and its effect on the sleep quality of HCWs in the study region.

Keywords: PTSD, sleep quality, healthcare workers, COVID-19 pandemic, prevalence.

Introduction

Anybody who has been exposed to stressful events, such as military combat, assault, or natural disaster, could experience stress reactions which is a normal response for such events, and usually, they fade over time. Other people might have a more severe reaction to trauma which does not diminish as time passes. Those people keep thinking about their experience, which could be a tell-tale sign of mental health problems. Manifestation of those problems varies for different age groups. For instance, common mental health problems among adults after exposure to stressful events are adjustment disorders, depression, posttraumatic stress disorder (PTSD), anxiety disorders, and non-specific somatic [1].

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There are two acceptable international definitions for PTSD. The first is by the International Classification of Disease 10 (ICD-10) and the other by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). ICD-10 defines PTSD as an anxiety disorder that is stimulated by an experience of intense horror while facing a traumatic condition. The disorder's symptoms are present for at least 1 month, including images of the traumatic event, intrusive recurring thoughts, reduction in emotional responses or hyperarousal, and avoidance of anything related to the event. PTSD usually lasts for long term [2].

PTSD could be acute, however when symptoms last for upward of 3 months after the stressful events that triggered them, then they are chronic. Delayed reactions might exist as well [3]. PTSD could be classified as primary when the victim is exposed directly to the stressful event and secondary when a helper is indirectly exposed to the stressful event [4]. PTSD could be assessed through National Stressful Events Survey PTSD Short Scale.

Besides PTSD, which results from maladaptation and inability to cope with stressful events, there is acute stress disorder (ASD). ASD is described in DSM-5 (but not in ICD-10) as an impermanent disease that develops in a person with no apparent mental illness as a response to exceptional psychological and physical stress and usually declines within hours to days. It is limited to the first month, and its severity is directly related to personal vulnerability and coping capacity [5].

Having ASD following a stressful event places the patient at a higher risk for developing PTSD. For instance, data that were collected following Hurricane Katrina 2005 found that 62% of victims had ASD, wherein 38%-49% of them would have PTSD after 2 years from this stressful event [6]. In other words, ASD is an indicator but not definitive in predicting PTSD [7].

In general, about 3% of population at any given time suffers from PTSD [8]. Epidemiological studies that have been conducted after man-made stressful events detect higher PTSD percentages among both victims and helpers compared to the general population. Moreover, those studies found a higher prevalence among victims (25%-75%) than among helpers (5%-40%) [9]. For example, after September 11, 2001, around 44% of adults and 33% of children in the US had at least one symptom consistent with PTSD [10]. Many people who develop PTSD also have depression, anxiety, or substance abuse [11]. The persistence of PTSD would affect personal life and career [4].

Healthcare professionals (HCPs) are exposed to many stressful events during their routine care, such as experiencing patients' death and caring for the critically ill, particularly those who are working in the emergency department [12,13]. For instance, one study showed that as residents in training at emergency rooms experience more traumatic cases, the levels of PTSD symptoms increase [14]. Another study showed that compared with all other nurses, emergency room nurses have the highest PTSD prevalence (33%) [15].

Coronavirus disease 2019 (COVID-19) is a new communicable disease caused by the new strains of severe acute respiratory syndrome coronavirus [16]. In Saudi Arabia, the first COVID-19 case was reported on March 7; at that time, increasing numbers were seen all over the world, with the majority of confirmed cases currently in the United States, Brazil, and Russia [17]. Exposure to COVID-19 could lead to psychiatric illnesses such as anxiety, depression, and panic disorders. The negative psychological effect of COVID-19 might last for years after the pandemic [18,19].

Healthcare personnel are the frontline fighters against COVID-19; therefore, they were at increased risk of developing psychological problems due to this fight against COVID-19. Healthcare providers might become worried about getting an infection or transferring it to their families. They were also concerns due to the increase in workload, quarantine, and stigmatization due to infection [19]. Thus, this study aimed to determine the prevalence of post-traumatic stress disorder (PTSD) post-COVID-19 pandemic among healthcare workers (HCWs) in Pediatric Emergency Departments (PEMs) in Maternity and Children Hospital in Al-Qassim, Saudi Arabia.

Subjects and Methods

This study was a quantitative survey targeting HCWs in the PEM at Maternity and Children Hospital in Al-Qassim, including doctors, nurses, and medical technicians working in the department. The study period was 30 days, between March 1 and March 30, 2022. Participation of HCWs was voluntary. Also, completing the questionnaire was anonymous and online. Any HCW older than 18 years old was included. The exclusion criteria were being outside of the PEM department and time in bed less than actual sleep time.

In reference to the study published by Alshehri and Alghamdi [20], which reported a prevalence of PTSD among HCWs at 14.9%, this prevalence was applied to find the optimal sample size. Using the categorical sample size formula of $N = Z^2 (pq)/e^2$; where N = sample size; Z = confidence level (1.96); p = estimated proportion of the event (taken from the previous study); $q = 1 - p$; e = margin of error (0.05), the sample size required to detect a statistically significant result with 95% levels of confidence and 0.5 margins of error assuming a two-tailed statistical test should be 194.

The Pittsburgh Sleep Quality Index (PSQI) was used in this study to assess the sleep quality of HCWs. It is a self-administered scale composed of 19 items and includes 7 dimensions; these dimensions include sleep quality, duration, latency, efficiency, and disturbances, as well as the use of sleep medications and daytime dysfunction. The global scoring of the PSQI ranges from 0 to 21. Scores >7 indicate poor sleep quality [21]. Another questionnaire used was the Impact of Event Scale (IES-R), a tool that will be used to investigate stress initiated by traumatic events. This scale involves 22 items and contains 3 subscales; intrusiveness, avoidance, and hyperarousal. The scoring of the scale ranges from 0 to 88; a total score higher than 33 reflects PTSD symptoms [22].

Descriptive statistics were presented by numbers and percentages for all categorical variables, while means and standard deviations were used to present all continuous

variables. The relationship between the level of PTSD regarding the socio-demographic characteristics and the level of sleep quality has been performed using the chi-square test. In addition, the association between the level of PTSD and PSQI domains has been conducted using the independent sample *t*-test. A *p*-value of 0.05 was considered statistically significant. All data analyses were performed using the Statistical Packages for Software Sciences version 26 Armonk, NY, IBM Corporation.

Results

A total of 107 HCWs met the inclusion criteria giving an overall response rate of 55.2%. Around 56.1% were aged between 25 and 35 years, with females being dominant (87.9%). Most of the HCWs were of Saudi nationality (81.3%). With respect to years of working experience, 50.5% indicated 5 years or less working experience. Approximately 73.8% were married, and 60.7% had 2-5 children. Nearly half of them (48.6%) indicated that their youngest children were of approximately more than 2 years of age. With regard to education, 47.7% were postgraduate degree holders, with most of them being nurses (75.7%) (Table 1).

It can be observed that in the PSQI domains, the mean scores for sleep duration, sleep latency, subject sleep quality, sleep disturbance, daytime dysfunction, and sleep efficiency were 2.05, 1.89, 1.42, 1.33, 1.31, and 0.79, respectively. The overall mean score of PSQI was 8.78 (SD 3.73). Based on the overall score, 61.7% of the HCWs were categorized as having poor sleep quality, and the rest were normal (38.3%). Regarding IES-R, the overall mean score was 15.4 (SD 14.6), with 29% considered as having positive PTSD and 71% considered normal (Table 2).

When measuring the association between the level of PTSD and the sleep quality of the HCWs, it was found that a positive PTSD was more associated with having a higher score in sleep latency ($p < 0.001$), subject sleep quality ($p < 0.001$), sleep duration ($p = 0.017$), sleep efficiency ($p = 0.048$), sleep disturbance ($p < 0.001$), daytime dysfunction ($p < 0.001$), and the overall score of PSQI ($p < 0.001$) (Table 3).

A chi-square test was used to determine the relationship between the level of PTSD in terms of socio-demographic variables and the level of sleep quality. The results showed that the prevalence of PTSD positive was significantly more common among HCWs with poor sleep quality ($p < 0.001$). However, other socio-demographic variables did not show a significant relationship with the level of PTSD ($p > 0.05$) (Table 4).

Discussion

This study investigated the prevalence of PTSD among HCWs, post-COVID-19 pandemic, in the PEM of Maternity and Children Hospital in Al Qassim, Saudi Arabia. The findings of this study revealed that there was a high prevalence of PTSD among HCWs. Based on the IES-R criteria, the prevalence of positive PTSD was 29%, and the rest were negative (71%). IES-R's mean score was 15.4 (SD 14.6). This is almost consistent with the report of Alshehri et al. [23].

Table 1. *Socio-demographic characteristics of HCWs (n = 107).*

Study variables	*N* (%)
Age group	
<25 years	02 (01.9%)
25-35 years	60 (56.1%)
36-45 years	35 (32.7%)
>45 years	10 (09.3%)
Gender	
Male	13 (12.1%)
Female	94 (87.9%)
Nationality	
Saudi	20 (18.7%)
Non-Saudi	87 (81.3%)
Years of experience	
≤5 years	54 (50.5%)
6-10 years	19 (17.8%)
>10 years	34 (31.8%)
Marital status	
Unmarried	28 (26.2%)
Married	79 (73.8%)
Number of children	
One	41 (38.3%)
2-5	65 (60.7%)
>5	01 (0.90%)
If you have children, what is the age of the last child?	
<1 year	49 (45.8%)
1-2 years	06 (05.6%)
>2 years	52 (48.6%)
Educational level	
Diploma holder	07 (04.6%)
University degree	51 (47.7%)
Postgraduate	51 (47.7%)
Which of the following best describes your current occupation?	
Nurses	81 (75.7%)
Doctors	24 (22.4%)
Medical technicians	02 (01.9%)

Table 2. *Descriptive statistics of PSQI and IES-R (n = 107).*

PSQI domain	Score Mean ± SD
Sleep duration	2.05 ± 0.95
Sleep latency	1.89 ± 1.00
Subject sleep quality	1.42 ± 0.95
Sleep disturbance	1.33 ± 0.69
Daytime dysfunction	1.31 ± 1.04
Sleep efficiency	0.79 ± 1.12
Total PSQI	8.78 ± 3.73
Level of sleep quality	*N* (%)
Poor	66 (61.7%)
Normal	41 (38.3%)
IES-R	15.4 ± 14.6
Level of PTSD	*N* (%)
Positive	31 (29.0%)
Negative	76 (71.0%)

Table 3. *Association between PSQI and PTSD (n = 107).*

PSQI domain	Level of PTSD		*p*-value §
	Positive Mean ± SD	Negative Mean ± SD	
Sleep latency	2.52 ± 0.77	1.63 ± 0.98	<0.001**
Subject sleep quality	1.97 ± 0.87	1.20 ± 0.89	<0.001**
Sleep duration	2.39 ± 0.67	1.91 ± 1.01	0.017**
Sleep efficiency	1.13 ± 1.28	0.66 ± 1.03	0.048**
Sleep disturbance	1.74 ± 0.63	1.16 ± 0.65	<0.001**
Daytime dysfunction	2.16 ± 0.82	0.96 ± 0.92	<0.001**
Total PSQI	11.9 ± 2.95	7.51 ± 3.25	<0.001**

§ *p*-value has been calculated using an independent sample *t*-test.

** Significant at $p < 0.05$ level.

Table 4. *Relationship between the level of PTSD according to the socio-demographic characteristics and level of sleep quality of HCWs (n = 107).*

Factor	Level of PTSD		*p*-value §
	Positive *N* (%) (*n* = 31)	Negative *N* (%) (*n* = 76)	
Age group			
≤35 years	18 (58.1%)	44 (57.9%)	0.987
>35 years	13 (41.9%)	32 (42.1%)	
Gender			
Male	02 (06.5%)	11 (14.5%)	0.249
Female	29 (93.5%)	65 (85.5%)	
Nationality			
Saudi	07 (22.6%)	13 (17.1%)	0.510
Non-Saudi	24 (77.4%)	63 (82.9%)	
Years of experience			
≤5 years	12 (38.7%)	42 (55.3%)	0.297
6-10 years	07 (22.6%)	12 (15.8%)	
>10 years	12 (38.7%)	22 (28.9%)	
Marital status			
Unmarried	09 (29.0%)	19 (25.0%)	0.667
Married	22 (71.0%)	57 (75.0%)	
Age of the last child			
≤2 years	18 (58.1%)	37 (48.7%)	0.378
>2 years	13 (41.9%)	39 (51.3%)	
Educational level			
University or diploma	16 (51.6%)	40 (52.6%)	0.924
Postgraduate	15 (48.4%)	36 (47.4%)	
Current occupation			
Nurses	23 (74.2%)	58 (78.4%)	0.641
Doctors	08 (25.8%)	16 (21.6%)	
Level of sleep quality			
Poor	28 (90.3%)	38 (50.0%)	<0.001**
Normal	03 (09.7%)	38 (50.0%)	

§ *p*-value has been calculated using the chi-square test.

** Significant at $p < 0.05$ level.

The study employed three methods (PTSD cutoff score, criteria, and combined). Applying the three methods, they found PTSD prevalence compromising 22.63%, 24.8%, and 19.6%, respectively. Among HCWs in Jeddah [20], PTSD prevalence was detected in 14.9%, which was slightly lower than the current report. Contradicting these reports, in Egpyt [24,25], more than half of the medical staff and HCWs had some degree of PTSD and psychological distress during COVID-19. These reports underscore the importance for healthcare authorities

to monitor the extent of workplace-related stress and PTSD symptoms in their staff. Refining the workplace environment could help in decreasing the prevalence of PTSD symptoms among our HCWs.

Studies suggest that gender females were affected by PTSD higher than their male counterparts [23,26,27]. This does not coincide with the current reports as no significant difference between the level of PTSD and all socio-demographic variables was found including gender, age, nationality, years of experience, marital status, age of the last child, educational level, current occupation, and position (all $p > 0.05$).

In a study conducted among physicians and nurses [20], it was discovered that compared to nurses, the rate of probable PTSD was statistically significantly higher in physicians. Also, they detected that increased anxiety and depression levels, being infected with COVID-19, and having an additional chronic disease were predictors of high PTSD symptom severity in physicians. This has been concurred by the study of Pan et al. [28]. They reported that suffering from chronic disease was also identified as an independent risk factor for PTSD among Chinese HCWs along with social isolation and job dissatisfaction, despite all these risk factors, the study noted that good family function, obtaining COVID-19-related information at an appropriate frequency, and working in well-prepared mobile cabin hospitals determined as the protective factors for PTSD during COVID-19 pandemic.

By employing the PSQI questionnaire, it was found that nearly two-thirds of HCWs (61.7%) were considered to have poor sleep quality, and the rest were normal (38.3%). Among PSQI domains, sleep duration showed the highest mean (mean score: 2.05), followed by sleep latency (mean score: 1.89), subject sleep quality (mean score: 1.42), sleep disturbance (mean score: 1.33), and daytime dysfunction (mean score: 1.31), while the least of them was sleep efficiency (mean score: 0.79). The overall mean PSQI score was 8.78 (SD 3.73). A higher prevalence of poor sleep quality had also been documented among medical staff in Egypt [25], with a prevalence of 67%. Being front liners during the global pandemic was tagged as the primary reason for lack of sleep. A program to address the sleep problems of current study front liners is imperative so that they could be able to deliver quality healthcare service, especially during this time of the global outbreak.

One of the hallmark findings of this study was about the link between PTSD and sleep quality. Data in the current study indicates that mean scores of PSQI domains, such as sleep latency, subject sleep quality, sleep duration, sleep disturbance, and daytime dysfunction, along with the overall PSQI score, were statistically significantly higher in positive PTSD. Likewise, it was discovered that HCWs with positive PTSD were significantly associated with poor sleep quality. Consistent with current findings, a study carried out among medical staff in Egypt [24] detected a significant positive correlation between PTSD score and insomnia score.

Although previous reports have proven the link between lack of sleep and PTSD, in Canada [15], interpersonal conflict positively influences PTSD symptoms. Nearly 70% of the respondents believed they received a lack of support from hospital administrators following the traumatic incident, and as a result, some nurses and ED personnel (20%) considered changing jobs. Furthermore, social support has been mentioned as a protective factor for PTSD as reported by Skogstad et al. [12] that the deterrence for work-related PTSD includes a sound organizational and psychosocial work environment, social support from colleagues and managers, systematic training of employees, and proper monitoring of employees after a traumatic event.

This study has some limitations. First, a reasonable response rate resulting in a smaller sample size ($n = 107$) was not presented which might not represent a true population. It could be interesting to see a bigger sample that could generate better results which could provide a clearer view of the relation between PTSD and sleep quality among HCPs post-COVID-19-era. Gender distribution was not equally collected. Thus, generalized pairwise comparisons between males and females could not be achieved. Also, an online survey is prone to answering bias that might not be a true representative of factual basis. Finally, being cross-sectional is prone to disadvantages, including cause-and-effect relationships, and prone to bias.

Conclusion

Posttraumatic stress disorder post-COVID-19 pandemic among pediatric emergency HCWs was high. This high prevalence leads to sleep disorders among the study front liners. These findings highlight the importance for hospital administrations to be aware of the extent of workplace stress and PTSD symptoms in their employees. In addition, improving the interpersonal climate in the workplace might be beneficial in decreasing the prevalence of PTSD symptoms.

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List of abbreviations

χ^2	Chi-squared test
HCP	Healthcare professionals
SD	Standard deviation

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent to participate

Written informed consent was obtained from all the participants.

Ethical approval

Ethical approval for the study was obtained from the MCH Hospital Research Committee. register number 1443-199931, dated: 16 August 2022.

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