

Research Article

Post-Traumatic Stress Disorder among Nurses Who Provided Care for Patients with COVID-19 in Sri Lanka: A Descriptive Cross-Sectional Study

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Abstract

Background: Nurses, as front-line health workers, faced significant psychological health challenges during the COVID-19 pandemic, which led to post-traumatic stress disorder (PTSD). This study assessed the prevalence of PTSD and its associated factors among nurses at the end of the third wave of COVID-19 in Sri Lanka.

Methods: A descriptive cross-sectional study was conducted among 384 nurses working in state sector hospitals in Sri Lanka from 18th August 2021 to 17th October 2021. A convenience sample of nurses who provided care to patients with COVID-19 for at least one week was included. Data were collected using a self-administered questionnaire comprising the Sinhala version of “Impact of Event Scale” and the Sinhala version of “Depression Anxiety and Stress Scale-21”. Data analysis involved descriptive statistics, Chi-square tests, and Mann-Whitney U-tests, with significance set at $p < 0.05$. The ethical committee of the Faculty of Medicine, University of Colombo, Sri Lanka, approved the study.

Results: From the invited nurses, 66.9% ($n=257$) completed the survey. Most of the participants (89.5%) were female, and 44% were aged between 36-45 years. The prevalence of the PTSD manifestations among nurses was 40.10%. Depression, anxiety, stress ($p < 0.001$), marital status ($p = 0.03$), information acquisition ($p = 0.02$), psychological well-being ($p = 0.005$), and death of a family member due to COVID-19 ($p = 0.04$) were significantly associated with the manifestation of PTSD.

Conclusions: A substantial proportion of Sri Lankan nurses experienced PTSD during the COVID-19 pandemic, with personal factors, inadequate mental well-being, and stress emerging as major contributing factors. These findings highlight the urgent need for mental health support systems and targeted interventions to address the psychological and social needs of front-line nursing staff in future healthcare crises.

Keywords: COVID-19, post-traumatic stress disorder, nurses, Sri Lanka

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Introduction

The new Coronavirus (COVID-19) infection has been a worldwide outbreak since late 2019 and was recognised as one of the most extensive public health threats over the last years (Pollard et al., 2020). After COVID-19 was declared a pandemic by the World Health Organisation (WHO) in 2020, it caused a significant impact on healthcare systems around the world. It also affected all aspects of human life, including general health, psychological health, social structure, and economic well-being (Xiong et al., 2020). Nurses represent the forefront of the healthcare system. Their contribution during the pandemic was heavily focused on patient care and public health initiatives. They were at increased risk for developing psychological health problems, including depression, anxiety, and cumulative stress due to their close interactions with infected patients, witnessing severe illness in others, fear of disease, and long working hours (Billings et al., 2021; Nagel et al., 2022). Additionally, several factors contributed to the development of emotional and psychological strain on nurses, including fear of contracting the virus, the responsibility of caring for critically ill patients, and isolation from family (Galanis et al., 2023; Musio et al., 2025). These cumulative stressors not only affected their professional performance but also placed them at risk of long-term psychological burdens, including post-traumatic stress disorder (PTSD) (Billings et al., 2021; Johansen et al., 2022; Nagel et al., 2022; Wild et al., 2023).

PTSD is defined as a mental disorder that develops due to the consequences of

traumatic events such as natural disasters, combat situations, or medical crises (Kolk, 2000). PTSD is on the rise among healthcare workers who are exposed to emotionally distressing and “life-threatening” professional situations (Johansen et al., 2022; Wild et al., 2023). During the COVID-19 pandemic, the risk factors for PTSD among nurses were magnified (Moreira et al., 2023). Nurses who worked in high-stress work environments, such as intensive care or COVID-19 units, where traumatic episodes like sudden death or rapid deterioration occurred, were at higher risk for developing PTSD (Moreira et al., 2023). The combination of personal vulnerability, professional duty, and societal expectations puts nurses at risk for PTSD (Mealer et al., 2009). Recent literature supports that the prevalence of acute stress disorders, anxiety, depression, and PTSD was higher among nurses and other healthcare workers during the COVID-19 pandemic (Andhavarapu et al., 2022; Marcomini et al., 2021; Mealer et al., 2009; Ripoll et al., 2020).

Since PTSD directly affects nurses’ psychological well-being, it also contributes to poor social well-being and includes negative coping strategies, including potential drug abuse (Yu-Chin et al., 2023). Furthermore, PTSD contributes to the development of negative perceptions among colleagues, leading to workplace conflicts and disagreements (Mealer et al., 2009). Although several studies have examined PTSD among nurses globally (Andhavarapu et al., 2022; Dorrington et al., 2014; Marcomini et al., 2021; Mealer et al., 2009), there is a paucity of evidence regarding PTSD prevalence among nurses in Sri Lanka,

particularly during the COVID-19 pandemic. Most prior research focused on general psychological well-being, anxiety, and depression, but no studies have specifically estimated PTSD among nurses caring for COVID-19 patients, especially at the end of the third wave (Alles et al., 2021). A few studies were undertaken to assess the nurses' psychological well-being during and after the COVID-19 pandemic in Sri Lanka (Pathiraja et al., 2022; Wijesinghe et al., 2023). However, to the best of our knowledge, no reported studies have specifically assessed the manifestation of PTSD among nurses during or after the COVID-19 pandemic in Sri Lanka. Hence, this study was conducted to assess the prevalence of PTSD and factors associated with PTSD, including socio-demographic characteristics, work-related variables, Depression, Anxiety, and Stress Scale-21 (DASS-21) subscale scores (depression, anxiety, stress), among nurses who cared for COVID-19 patients during the third wave in Sri Lanka.

Methods

Study design and setting

A descriptive cross-sectional study was conducted in state sector hospitals in Sri Lanka from 18th August 2021 to 17th October 2021, at the end of the third wave of the COVID-19 pandemic. This time was characterized by a high case load driven by the Delta variant. There was a nationwide lockdown and strict global travel restrictions.

Study population

Nurses who worked in state sector hospitals in Sri Lanka were eligible to participate. This

helped ensure consistency in the study by maintaining the same workplace conditions, resource availability, and protocols, which could vary significantly from those in the private sector. Nurses who had at least one week of working experience with patients with COVID-19 were included. A minimum of one week was set to ensure participants had sufficient exposure to the clinical and emotional demands of caring for COVID-19 patients, enabling them to provide meaningful insights. Those who were on maternity leave and/or quarantined due to COVID-19 exposure during the data collection period were excluded, as they were not actively engaged in patient care at the time.

Sample size and sampling technique

Based on Cochran's sampling equation (Robb, 1963), the required sample size was determined to be 384 nurses, assuming a 95% confidence level, a 5% margin of error, and a proportion of 0.5 (Sullivan & Feinn, 2012). Participants were recruited through convenience sampling using social media platforms such as Facebook and WhatsApp, targeting professional nursing groups and hospital-based nursing forums. These groups primarily consisted of registered nurses working in state-sector hospitals across Sri Lanka. To ensure that only eligible participants were included, the survey incorporated an initial screening question asking respondents to confirm their professional status as registered nurses. Participants who did not meet this criterion were automatically excluded from completing the questionnaire.

Data collection tool

A self-administered questionnaire developed in Google Forms was utilized. It consisted of four sections. Section 1 included the socio-demographic data of the participants, such as age, gender, marital status, highest education level, living status, duration of work, and workplaces. Section 2 consisted of COVID-19-related characteristics of the participants, including self-reported perceived mental and physical well-being, working days and hours per week, receiving appropriate information regarding COVID-19, and the COVID-19-infected status of family members of nurses.

Section 3 assessed the prevalence of PTSD through using the Sinhala version of the Impact of Event Scale (IES-R-SL) (Dawson et al., 2007; Perera-Diltz et al., 2009). IES is comprised of three sub-scales: the “intrusive”, “avoidance”, and “hyperarousal”. Each subscale includes eight, eight, and six items, respectively. Respondents rated each item using a five-point Likert scale (0 = not at all, 1 = a little bit, 2 = moderately, 3 = quite a bit, 4 = extremely), with higher scores indicating more severe symptoms. A total score of 24 or higher was considered indicative of clinical concern (Weiss, 2007).

The original IES demonstrated accepted psychometric properties, with an internal consistency of 0.78. The internal consistency for the sub-scales was reported as moderate to high, with an α of 0.43 for the intrusion sub-scale and 0.82 for the avoidance sub-scale (Horowitz et al., 1979). The IES-R-SL showed satisfactory internal consistency for both sub-scales: Cronbach’s alpha levels were 0.83, 0.75, and 0.68 for the intrusive

avoidance and hyperarousal sub-scales, respectively (Dawson et al., 2007; Perera-Diltz et al., 2009).

Section 4 assessed depression, anxiety, and stress among nurses using the Depression, Anxiety, and Stress Scale-21 (DASS-21) (Lovibond & Lovibond, 2011). The DASS-21 consists of three self-report scales to measure depression, anxiety, and stress. The items are scored on a 4-point Likert-type scale ranging from 0 to 3 (0 = Did not apply to me at all, 1 = Applied to me to some degree, or some of the time, 2 = Applied to me to a considerable degree, or a good part of time, 3 = Applied to me very much, or most of the time). The Sinhala Version of DASS-21 (Si-DASS-21) was used (Rekha, 2012). The internal consistency of the sub-scales of depression, anxiety, and stress in the Si-DASS-21 was 0.83, 0.76, and 0.80, respectively.

A pre-test was conducted among a convenience sample of 10 nurses selected from Sri Jayewardenepura General Hospital, Sri Lanka, to check the readability and understandability of the questionnaire. Minor revisions were incorporated, and the completion time for the online survey was identified as approximately 20 minutes.

Data collection

Participants were invited through social media platforms related to nurses in Sri Lanka, such as WhatsApp and Facebook groups. An advertisement for the survey, accompanied by a written information sheet and a link to the questionnaire, was distributed. The survey was accessible to users of social media groups during the data

collection period. In this study, a forced-response option was applied to prevent missing data; however, to respect participants' autonomy, each question also included a "Prefer not to say" option, allowing participants the choice to withhold responses if they wished.

Data analysis

Descriptive statistics, including frequencies and percentages, were used to describe socio-demographic, COVID-19-related characteristics, and the prevalence of PTSD, anxiety, depression, and stress levels. Given the small sample size, the Shapiro-Wilk test was computed to examine the normal distribution of the data. It revealed a significant deviation from normality ($W = 0.91$, $p < 0.01$). Therefore, the Mann-Whitney U-test was used to examine the associations between PTSD and depression, anxiety, and stress. Before analysis, a post-hoc power assessment was run through G*Power v3.1.9.7, and statistical power ($1-\beta$) was calculated as 99%, confirming that the final sample of 257 participants was sufficient to achieve a statistical power detecting the medium-sized effect (Serdar et al., 2021). The Chi-square analysis and Fisher's exact test were performed to examine the association between PTSD levels and socio-demographic factors and COVID-19-related characteristics. The significance level was set at $p < 0.05$. The data were analysed using the Statistical Package for Social Sciences (SPSS) 24.0. In the data analysis, the variables workplace/unit and years of experience as a nurse were excluded from the analysis of associations due to highly heterogeneous

distributions and small subgroup sizes, which could compromise the reliability of statistical results.

In IES, the participants who scored ≥ 24 were classified as demonstrating PTSD, while those who scored < 24 were categorised as not demonstrating PTSD (Weiss, 2007).

In Si-DASS-21, the total scores for each scale were multiplied by 2 (Rekha, 2012), thus, the possible range for each scale is from 0 to 42 (Rekha, 2012). The scoring system classifies levels of depression, anxiety, and stress into five categories; normal, mild, moderate, severe, and extremely severe based on specific score ranges. For depression, scores of 0–9 indicate normal levels, 10–13 mild, 14–20 moderate, 21–27 severe, and 28 or above extremely severe. For anxiety, scores of 0–7 are considered normal, 8–9 mild, 10–14 moderate, 15–19 severe, and 20 or above extremely severe. For stress, scores of 0–14 indicate normal levels, 15–18 mild, 19–25 moderate, 26–33 severe, and 34 or above extremely severe. Overall, higher scores reflect increasing severity of symptoms across all three dimensions.

Ethical considerations

This study was approved by the Ethics Review Committee of the Faculty of Medicine, University of Colombo, Sri Lanka (No: EC/22/002). As a part of the online survey, informed consent was recorded. To ensure the participants' privacy and confidentiality, they were instructed not to share any personal information or comments on the survey advertisement post. They were further asked to contact the principal investigator (PI) for any queries. The PI

monitored the social media posts and removed any comments. No personal identifiers, including names, contact numbers, or addresses, were collected during data collection. The electronic data were password-protected, and only the investigators had access.

Results

In the current study, 257 (66.90% of 384 recruited nurses) nurses responded to the online survey. There was no missing data, as a forced-response option was applied in the Google Form

Socio-demographic characteristics

The socio-demographic characteristics of the participants are presented in Table 1. Most respondents were female (89.50%), married (84%), had a Diploma in Nursing (67.30%), and lived with their spouse and/or children (80.90%). Of the sample, 44% were aged between 36 and 45 years, and 42.8% had 11-20 years of nursing experience.

COVID-19-related characteristics

Table 2 presents the COVID-19-related characteristics among nurses. From the sample, the majority of participants rated their perceived physical well-being (88.30%) and psychological well-being (81.30%) as good.

Most nurses (98.10%) worked more than 3 days per week, with 6-12 hours per day (62.60%). Notably, 37.40% of participants worked 13-24 hours per day. From the participants, 91.40% stated that they received adequate information on the prevention and control of COVID-19. The majority

(83.30%) of participants reported that there was enough PPE available. From the sample, 89.50% reported having a family member who had been infected with COVID-19, and 18.30% reported a death of a family member due to COVID-19.

Distribution of PTSD, depression, anxiety, and stress among the participants

Table 3 presents the distribution of the manifestations of PTSD, depression, anxiety, and stress among the participants. From the sample, 40.10% of participants presented with PTSD manifestations. The median depression score was 06 (IQR 7.21 – 9.52), with 65% experiencing normal levels, while 6.20% experienced extremely severe depression. Median anxiety score was 06 (IQR 7.38 – 9.54), with 58.8% falling within the normal range, whereas 12.10% reported extremely severe anxiety. The median stress score was 08 (IQR 10.04 – 12.48), with 72.80% of participants having a normal stress level, while 5.10% experienced an extreme stress level.

Association between PTSD and depression, anxiety, and stress

The associations between PTSD and depression, anxiety, and stress among nurses are presented in Table 4. Depression, anxiety, and stress were significantly associated with the PTSD status of the participants ($p < 0.001$) and had large effect sizes with rank-biserial correlations of 0.52, 0.49, and 0.55, respectively. Participants with PTSD had a higher median score for depression, anxiety, and stress when compared to the non-PTSD

Table 1: Socio-demographic characteristics of participants (n=257)

Characteristics	Frequency (n)	Percentage (%)
Age (Years)		
25-35	90	35.00
36-45	113	44.00
46-55	49	19.10
>55	05	1.90
Gender		
Male	27	10.50
Female	230	89.50
Marital status		
Single	40	15.60
Married	216	84.0
Widowed	01	0.40
Highest education level		
General Diploma	173	67.30
BSc in Nursing	80	31.10
Postgraduate	04	1.60
Living status		
With spouse and/or children	208	80.90
With parents	28	10.90
Alone	07	2.70
Others	14	5.40
Years of experience as a nurse (years)		
1-10	96	37.40
11-20	110	42.80
>20	51	19.80
Workplaces (unit/ward)		
Medical	31	12.10
Surgical	25	9.70
Intensive Care Unit	36	14.00
Operating Theatre	25	9.70
Accident and Emergency unit	16	6.20
Gynaecology and Obstetrics	28	10.90
Out-Patient department	05	1.90
Paediatric	12	4.70
Special units	15	5.80
Clinics	14	5.40
Other	50	19.50

Table 2: COVID-19-related characteristics of the participant (n=257)

Characteristics	Frequency (n)	Percentage (%)
Perceived physical well-being		
Poor	07	2.70
Fair	23	8.90
Good	227	88.40
Perceived psychological well-being		
Poor	08	3.10
Fair	40	15.60
Good	209	81.30
Care provision for patients positive with COVID-19 is currently		
Yes	249	96.88
No	08	3.11
Duration of caring for patients with COVID-19		
≤ 3 months	152	59.10
>3 months	105	40.90
Average working day per week		
≤ 3 days	05	1.90
>3 days	252	98.10
Average working hours per day		
6-12 hours	161	62.60
13-24 hours	96	37.40
Receiving sufficient information on COVID-19		
Yes	235	91.40
No	22	8.60
Availability of sufficient PPE		
Yes	214	83.30
No	43	16.70
Presence of family members positive with COVID-19		
Yes	230	89.50
No	27	10.50
Death of a family member positive with COVID-19		
Yes	47	18.30
No	210	81.70

Table 3: PTSD, depression, anxiety, and stress among nurses (n=257)

Variable	Category	Severity score rating	Frequency (n)	Percentage (%)	Median (IQR)	95% CI	
						Lower	Upper
PTSD					15 (15.08 – 16.75)		
	Yes	≥24	103	40.10		53.70	65.80
	No	< 24	154	59.90		34.20	46.30
Depression					06 (7.21 – 9.52)		
	Normal	0 - 9	167	65.00		58.80	70.80
	Mild	10 - 13	29	11.30		7.40	15.20
	Moderate	14 - 20	31	12.10		7.80	16.30
	Severe	21 - 27	14	5.40		2.70	8.60
	Extremely severe	28+	16	6.20		3.50	9.30
Anxiety					06 (7.38 – 9.54)		
	Normal	0 - 7	151	58.80		52.50	64.60
	Mild	8 - 9	15	5.80		3.50	8.90
	Moderate	10 - 14	37	14.40		10.10	18.30
	Severe	15 - 19	23	8.90		5.40	12.80
	Extremely Severe	20+	31	12.10		8.20	16.30
Stress					08 (10.04 – 12.48)		
	Normal	0 - 14	187	72.80		67.30	78.20
	Mild	15 - 18	23	8.90		5.40	12.50
	Moderate	19 - 25	17	6.60		3.90	10.10
	Severe	26 - 33	17	6.60		3.90	9.70
	Extremely severe	34+	13	5.10		2.70	8.20

PTSD = Post-Traumatic Stress Disorder; IQR = Interquartile Range

Table 4: Association between PTSD and depression, anxiety, and stress (n =257)

Variable	PTSD		No		U	<i>r_{rb}</i>	<i>P</i> value
	Yes	IQR (95%CI)	Median	IQR (95%CI)			
Depression	10.00	11.23 – 15.41	2.00	3.98 – 6.12	3839.5	0.52	<0.001
Anxiety	12.00	10.89 – 14.66	4.00	4.48 – 6.66	4081	0.49	<0.001
Stress	16.00	14.75 – 18.88	6.00	6.35 – 8.74	3605	0.55	<0.001

PTSD = Post-Traumatic Stress Disorder; IQR = Interquartile Range; U = Mann-Whitney U statistic; *r_{rb}* = rank-biserial correlation.

Participants with PTSD had a higher median score for depression, anxiety, and stress when compared to the non-PTSD participants.

Associations between PTSD and socio-demographic and COVID-19-related factors

Table 5 presents the associated socio-demographic and COVID-19-related factors of PTSD among the participants. Marital status was significantly associated with PTSD, with single participants (57.50%) showing a higher prevalence compared to married participants (37%) ($p=0.038$). Self-reported psychological well-being was also significantly associated with PTSD, with participants with good psychological well-being (64.60%) showing a lower prevalence of PTSD.

Additionally, sufficient information on COVID-19 prevention (information preparedness) was significantly linked to PTSD prevalence, as participants who reported insufficient information had higher PTSD rates (63.60%) compared to those who received sufficient information (37.90%) ($p=0.023$). Experiencing the recent loss of a family member or relative due to COVID-19 was associated with higher PTSD rates, with 53.20% of those who experienced such losses affected, compared to 37.10% of those who did not ($p=0.042$).

Discussion

This study examined the prevalence of PTSD and its associated factors among nurses during the COVID-19 pandemic in Sri Lanka. A significant number of nurses present with characteristics of PTSD, highlighting the need for improving

psychological health among nurses during and following public health crises, such as COVID-19. In the present study, 40.1% of the nurses reported manifestations of PTSD, which is higher than the global pooled estimate of 17.5% (Yunitri et al., 2022). When comparing to the global rates, A higher rate of PTSD among nurses during the COVID-19 pandemic was reported in China (Jiang et al., 2022; Xiao et al., 2020), where the onset of the pandemic and facing an overwhelming patient load occurred simultaneously. Additionally, a higher rate of PTSD was reported in Korea (Moon et al., 2021) and Spain (Blanco-Daza et al., 2022), while comparatively lower rates were reported among nurses in the UK (Brook et al., 2023), USA (Rice et al., 2023), Bangladesh (Chowdhury et al., 2021), Italy (Marcomini et al., 2021), and Colombia (Guillen-Burgos et al., 2022) compared to the global data (Yunitri et al., 2022). These differences may be attributed to the complex and multifaceted nature of nurses' mental health responses during a crisis (Rathnayake et al., 2021) as well as the availability of infrastructure, access to resources, organizational support, and access to mental health services (Rathnayake et al., 2021; Abukar et al., 2025; Tinsae et al., 2024). Differences in prevalence across countries may also be influenced by varying instruments, cutoff scores, timing of data collection, and healthcare system contexts. Hence, caution is needed when comparing across studies as differences in measurement tools and cutoffs may affect comparability. Literature supports that the COVID-19 pandemic has increased the risk of PTSD among healthcare workers, particularly

Table 5: Associations between PTSD and Socio-demographic and COVID-19-related characteristics of the participants (n=257)

Characteristics	PTSD <i>n</i> (%)		<i>x</i> ² <i>value</i>	<i>Cramer's V</i>	<i>P value</i>
	No	Yes			
Age (Years)					
25-35	48 (53.30)	42 (46.70)	5.28	0.14	0.15*
36-45	69 (61.10)	44 (38.90)			
46-55	35 (71.40)	14 (28.60)			
>55	02 (40)	03 (60)			
Gender					
Male	14 (51.90)	13 (48.10)	0.81	0.05	0.40
Female	140 (60.90)	90 (39.10)			
Marital status					
Single	17 (42.50)	23 (57.50)	6.55	0.16	0.03
Married	136 (630)	80 (37)			
Highest education level					
General Diploma in Nursing	109 (63)	64 (37)	2.89	0.10	0.23*
BSc in Nursing	42 (52.50)	38 (47.50)			
Postgraduate	03 (75)	01 (25)			
Year of experience (years)					
1-10	55 (57.30)	41(42.70)	5.71	0.14	0.05
11-20	61 (55.45)	49 (44.55)			
>20	38 (74.50)	13 (25.50)			
Living status					
With spouse and/or children	129 (62)	79 (38)	4.80	0.13	0.17*
With parents	17 (60.70)	11 (39.30)			
Alone	02 (28.60)	05 (71.40)			
Others	06 (42.90)	08 (57.10)			
Perceived physical well-being					
Poor	02 (28.60)	05 (71.40)	3.13	0.11	0.20*
Fair	13 (56.50)	10 (43.50)			
Good	139 (61.20)	88 (38.80)			
Perceived psychological well-being					
Poor	04 (50)	04 (50)	10.60	0.20	0.005*
Fair	15 (37.50.)	25 (62.50)			
Good	135 (64.60)	74 (35.40)			
Care provision for patients positive with COVID-19 is currently					
Yes	150 (60.20)	99 (39.80)	0.33	0.03	0.71*
No	04 (50)	04 (50)			

Table 5: Associations between PTSD and Socio-demographic and COVID-19-related characteristics of the participants (n=257) (Cont.)

Duration of caring for patients with COVID-19					
≤ 3 months	89 (58.60)	63 (41.40)	0.59	0.03	0.34
>3 months	65 (42.20)	40 (38.80)			
Average working day per week					
≤ 3 days	02 (1.30)	03 (2.90)	0.35	0.057	0.31*
>3 days	152 (98.70)	100 (98.10)			
Average working hours per day					
6-12 hours	98 (60.90)	63 (39.10)	0.68	0.02	0.39
13-24 hours	56 (58.30)	40 (41.70)			
Receiving sufficient information on COVID-19					
Yes	146 (62.10)	89 (37.90)	5.56	0.14	0.02
No	08 (36.40)	14 (63.60)			
Availability of sufficient PPE					
Yes	132 (61.70)	82 (38.30)	1.65	0.08	0.19
No	22 (51.20)	21 (48.80)			
Presence of family members positive with COVID-19					
Yes	137 (59.60)	93 (40.40)	0.11	0.02	0.83
No	17 (63)	10 (37)			
Death of a family member positive with COVID-19					
Yes	22 (46.80)	25 (53.20)	4.11	0.12	0.04
No	132 (62.90)	78 (37.10)			

*Fisher's exact test

among nurses (Jiang et al., 2022), compared to those who work in critical care (Yu-Chin et al., 2023), those who experienced workplace violence (Zhong et al., 2022), and those who experienced physical violence (Shi et al., 2017).

This study also reports a considerable prevalence of depressive symptoms, anxiety, and stress, and these psychological problems are associated with the development of PTSD manifestations among nurses who have

experience in providing care for patients with COVID-19. The findings are supported by several studies conducted internationally (Marvaldi et al., 2021; Morgado-Toscano et al., 2023; Ślusarska et al., 2022). A recent systematic review also reports higher rates of depressive symptoms, anxiety, and stress among nurses during the COVID-19 pandemic (Al Maqbali et al., 2021). Similar to the current study's findings, several global studies cited that the majority of nurses reported depressive symptoms, anxiety, and

depression (Pathiraja et al., 2022; Perera et al., 2021; Yu-Chin et al., 2023) during the COVID-19 pandemic in Sri Lanka. The development of these psychological problems has been influenced by various factors, such as exposure to the virus, fear of infection, concerns about personal and family health, increased workload, and emotional strain from the crisis (An et al., 2020; Chew et al., 2020; Moreira et al., 2023). Poor psychological status is highly related to the development of PTSD manifestations. For example, recent studies support that depressive symptoms make a person more prone to PTSD, possibly due to the shared emotional distress and difficulties in cognitive processing caused by both conditions (Yu-Chin et al., 2023). Moreover, the continuous feeling of distress, lack of emotional resilience, and the burden of psychological trauma from caring for COVID-19 patients might contribute to the exacerbation of PTSD manifestations in previously depressed subjects (Manchia et al., 2022). In the present study, the PTSD is associated with stress, indicating that nurses experiencing higher levels of stress have a greater likelihood of developing PTSD (Mann et al., 2025). These results emphasise that PTSD often co-occurs with and is linked to other psychological health problems, including anxiety, depression, and stress, which lead to elevated general psychological distress among nurses (Post et al., 2011). Therefore, it is essential to implement continuous supportive programs focused on building emotional resilience and promoting psychological relaxation and well-being among nurses during public health crises like the COVID-19 pandemic.

The present study highlights significant associations between PTSD with socio-demographic characteristics, self-rated psychological well-being, information acquisition, and loss of a family member or relative due to COVID-19. Interestingly, unmarried participants show a higher rate of PTSD manifestations compared to married participants. Although there are no studies that examined the influence of marital status on the development of PTSD manifestations among nurses during the COVID-19 pandemic, it may be attributed to the fact that single individuals often lack the emotional support and social stability provided by a partner, potentially making them more vulnerable to PTSD manifestations following a traumatic incident (Johansen et al., 2022). Social support provided by a spouse is believed to play a crucial role in mitigating the effects of traumatic experiences and helps individuals cope more effectively (Liu et al., 2020).

Self-reported psychological well-being is associated with the PTSD manifestation among nurses, and those who reported good psychological well-being experienced lower rates of PTSD. Psychological well-being represents an individual's optimal functioning, and it encompasses self-acceptance, personal growth, a sense of purpose, positive relationships, autonomy, and mastery over one's environment (Radstaak et al., 2022). Therefore, nurses, especially those who face traumatic experiences, such as the COVID-19 pandemic, need a supportive environment, particularly in the workplace (Georgousopoulou et al., 2024). Psychological support interventions,

including routine psychological screening, counselling services, stress management training, and the establishment of strong peer support systems, are essential (Kunzler et al., 2020).

Receiving sufficient information regarding COVID-19 is also significantly associated with PTSD manifestation, suggesting that the adequacy of information during a public health crisis like COVID-19 plays a crucial role in mental health outcomes among frontline healthcare workers (Gupta & Sahoo, 2020). The current research finding is consistent with a study conducted in China, which reported that those who received inadequate information or unclear communication from hospital management experienced significantly higher levels of psychological distress, including symptoms of PTSD (Lai et al., 2020). This finding was also confirmed by a German study that reported nurses and physicians who reported being well-informed by their institutions about COVID-19 safety protocols and evolving guidelines demonstrated lower levels of emotional exhaustion and PTSD manifestations (Zerbini et al., 2020). A lack of proper communication is a risk factor for poor mental health (Zerbini et al., 2020), while transparent communication and adequate training were associated with lower stress and better psychological outcomes among nurses during the COVID-19 pandemic (Post et al., 2011). Therefore, it is essential to develop awareness programs and an information delivery framework as part of pandemic preparedness strategies in future crises (Akbari et al., 2024; Morganstein, 2022).

The current findings highlight that participants who have experienced the loss of a family member or relative due to COVID-19 are more likely to develop PTSD manifestations. This finding is consistent with a study conducted in the Netherlands, which reported that individuals who lost family members during the pandemic experienced significantly higher levels of prolonged grief and PTSD manifestations compared to those who did not suffer such losses (Reitsma et al., 2025). Literature supports that personal bereavement, especially sudden and traumatic loss, is a significant risk factor for the development of PTSD (Kolk, 2000). The COVID-19 pandemic led to grief experiences that are often more complex due to restrictions on mourning rituals, limited access to support systems, and the uncertainty surrounding the circumstances of the death (Kolk, 2000). Healthcare workers, particularly nurses, may experience compounded stress due to loss, as they are exposed to it in their personal and professional lives (Breen, 2020). This dual burden can exacerbate trauma responses, leading to a higher prevalence of PTSD (Breen, 2020). Therefore, additional strategies are needed to support nurses who have experienced losses due to a pandemic like COVID-19. The strong association between bereavement and PTSD underscores the need for targeted bereavement support and trauma-informed care for nurses. Structured interventions, such as grief counselling, peer debriefing sessions, and supportive follow-up, may help mitigate the psychological impact of personal loss while caring for patients during a public health crisis.

Based on the identified determinants, several context-specific interventions are recommended to support nurses' mental health during and after public health crises. Regular brief PTSD screening should be implemented to enable early identification of at-risk nurses. Structured peer support and debriefing sessions can help address stress, anxiety, and grief, while managerial communication protocols and improved information pipelines should ensure that nurses receive timely and adequate information, addressing the PTSD risk associated with insufficient COVID-19 information. Access to counselling services, including cognitive-behavioral therapy and stress management training, is important for nurses experiencing higher levels of stress, anxiety, or depression, which are strongly associated with PTSD. Providing protected rest time can help prevent chronic stress and burnout, and structured bereavement services should be available for nurses who have experienced the loss of a family member or patient, targeting the PTSD risk related to bereavement. Collectively, these findings aim to mitigate psychological distress and promote resilience among frontline healthcare workers to respond to future public health problems like COVID-19 outbreaks.

Limitations

This study has several limitations. The cross-sectional design restricts the ability to draw causal inferences between PTSD and its associations and introduces temporal ambiguity. The use of a convenience sampling method, combined with recruitment via social media and inclusion limited to

state-sector hospital nurses, may have introduced coverage and selection bias, and limits the generalizability of the findings to all nurses in Sri Lanka. Geographic stratification was not applied, and private-sector nurses were not included, further constraining representativeness. The reliance on self-reported data collected through an online questionnaire may have resulted in response bias, including underreporting or overreporting of psychological symptoms, and raises the possibility of common method bias. Diagnostic interviews were not conducted to confirm PTSD, which may have affected outcome accuracy. Residual confounding due to unmeasured factors such as organizational support, staffing ratios, and prior mental health conditions cannot be ruled out. Although the study did not reach the initially estimated minimum sample size of 384, post-hoc power analysis indicated that the sample was adequate to provide reliable and valid results. Finally, the lack of longitudinal follow-up limits understanding of changes in PTSD manifestations over time and across different healthcare settings.

Conclusions

The prevalence of PTSD among Sri Lankan nurses at the end of the third wave of COVID-19 is comparatively high. There is a positive association between depression, anxiety, and stress with PTSD status. Marital status, self-reported psychological well-being, information preparedness, and loss of a family member due to COVID-19 infection are also associated with PTSD manifestation. The impact of both occupational and personal stressors on the mental health of frontline health workers eventually contributes to the

development of PTSD among nurses during the COVID-19 period. The current findings underscore the need for planned interventions, including monitoring psychological well-being and improved psycho-social support mechanisms for nurses. Designing and implementing interventions aimed at improving psychological well-being, strengthening social support networks, and enhancing institutional communication in future crises is essential. It is essential to integrate mental health services into routine occupational health programs to build a more resilient healthcare workforce in preparation for future public health crises.

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Conflict of interest

The authors declared that they have no conflicts of interest.

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