



# Prevalence and Risk Factors of Post-Traumatic Stress Disorder Among Emergency Medicine Trainee Doctors in Sudan Medical Specialization Board

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## Abstract

**Introduction:** Post-traumatic stress disorder (PTSD) is a mental health condition triggered by traumatic events. Emergency medicine (EM) trainees, frequently exposed to severe injuries, death, and high-pressure situations, are highly vulnerable. Research on PTSD prevalence and contributing factors among EM trainees in resource-limited settings like Sudan is scarce. This study aimed to assess the prevalence of PTSD symptoms among EM trainees in the Sudan Medical Specialization Board (SMSB) and identify contributing factors. **Methodology:** A cross-sectional analytic study was conducted from July 24 to September 18, 2020. A total of 171 SMSB EM trainees (response rate: 75%) completed a self-administered PTSD Checklist (PCL-C, civilian version) through an online questionnaire distributed via social media. The PCL-C measured the severity of PTSD symptoms across various clusters. Data were analyzed using SPSS version 26, employing descriptive statistics and chi-square tests to assess associations between PTSD symptoms and sociodemographic or work-related factors. **Results:** The prevalence of severe PTSD symptoms among trainees was 35.1%, with 33.9% experiencing moderate-to-severe symptoms. Numbness was the most common symptom cluster, reported by 47.1% of trainees. Key risk factors included being female, unmarried, under 32 years old, in the first or second year of training, and working in military hospitals. Trainees previously diagnosed with mental illness exhibited higher PTSD symptom severity (2.9%). The most frequently reported traumatic event was witnessing a patient's death after unsuccessful resuscitation (28.2%). High-severity PTSD symptoms were predominantly associated with witnessing medical complications leading to disability (54.3%). **Conclusion:** The study revealed a concerning prevalence of PTSD among EM trainees, emphasizing the need for proactive interventions, including mental health evaluation, counselling, and resilience training. Future research should focus on identifying additional risk factors and evaluating the role of social and occupational support systems in mitigating PTSD in medical trainees.

**Keywords:** PTSD, Trainee Doctors, Emergency Medicine, SMSB, Sudan.

## Introduction

Posttraumatic stress disorder (PTSD) is characterized by heightened stress and anxiety following exposure to a traumatic or stressful event(s). Being a witness to or participating in a violent accident or crime, a military operation or attack; being abducted; being involved in a natural disaster; or enduring systematic physical or sexual abuse are examples of the latter <sup>[1]</sup>. PTSD was initially recognized as a diagnosis in the DSM-III (Diagnostic and Statistical Manual of Mental Disorders, Third Edition) <sup>[2]</sup>. The criteria for it under the fourth edition (DSM-IV-TR) were as follows: (A) The individual has been exposed to a traumatic experience that included both of the following: The individual watched, experienced, or was confronted with an occurrence or events involving real or threatened death, significant harm, or a danger to one's or others' bodily integrity, and the person's response entailed profound dread, helplessness, or terror. (B) The traumatic incident is re-experienced again in one (or

more) of the following ways: Recurrent and bothersome upsetting memories of the incident, including pictures, thoughts, or sensations, Recurrent disturbing nightmares about the traumatic incident, behaving or feeling as if the terrible event were reoccurring (including a sensation of reliving the experience); Illusions, hallucinations, and dissociative flashback episodes (including those that occur upon awakening or when inebriated), acute psychological distress when exposed to internal or external triggers that represent or resemble a feature of The traumatic experience, physiological sensitivity to internal or external signals that represent or resemble a part of the traumatic event. (C) Persistent avoidance of trauma-related stimuli and numbing of general response (not present prior to the trauma), as evidenced by three (or more) of the following: Attempts to avoid thoughts, feelings, or conversations associated with the trauma, attempts to avoid activities, places, or people that arouse recollections of the trauma, an inability to recall an important aspect of the trauma, significantly reduced interest or participation

in significant activities, a sense of detachment or estrangement from others Restricted affective range (e.g., inability to experience love sentiments), A sense of a bleak future (for example, does not expect to have a profession, marriage, children, or live a normal lifespan). (D) Persistent symptoms of enhanced arousal (which were not present prior to the event), as evidenced by two (or more) of the following: Difficulty falling or staying asleep, irritability or outbursts of rage, difficulty focusing, hyper vigilance, and an enhanced startle reaction are all symptoms of a sleep disorder. (E) The disruption has lasted longer than one month (symptoms in Criteria B, C, and D). (F) The disorder results in clinically considerable distress or impairment in social, occupational, or other critical areas of functioning. PTSD was included to the DSM5 under a new chapter called "Trauma and Stress." Disorders that are related. Eliminate criteria A2 and convert the DSM-IV's three symptom clusters (re-experiencing, avoidance/numbing, and arousal) to four: avoidance and persistent negative modifications in cognitions and mood, numbing symptoms, also incorporating new or recurrent symptoms. symptoms that have been conceptualized, such as chronic unpleasant emotional states Arousal and reactivity changes are the last cluster. It can also refer to irritable or violent conduct, as well as irresponsible or self-destructive behaviour. Despite not matching all of the criteria for PTSD, some patients may have a severe disability that need assistance. Those with sub-threshold PTSD may nevertheless have intermediate levels of impairment, according to numerous research. As a result, some argue for a multidimensional rather than a binary approach to psychopathology [5,6]. Trauma is a prevalent occurrence in the population, according to epidemiologic research, and would qualify as a PTSD stressor. These varies across genders. Witnessing another person's death or serious injury, being in a life-threatening accident, and being threatened with a weapon-dominated the most prevalent experiences among women were watching another person being murdered or seriously hurt, as well as being in a life-threatening accident [7-11]. PTSD has a significant impact on individuals and society. It is hypothesized that PTSD, as compared to other anxiety disorders, is strongly related with suicidality [13-15]. Several cross-sectional investigations have confirmed the latter conclusion.

Longitudinal studies have validated this notion [13-15]. PTSD can impair interpersonal skills, parenting, and family economics. According to epidemiological research, 90% of those suffering from PTSD have at least one co morbid mental health problem [6]. Common co morbidities linked with PTSD include severe sadness and anxiety. Dysfunction and alcohol or drug abuse disorders are linked to self-medication of PTSD symptoms [17]. PTSD has been linked to certain personalities more than others, including borderline personalities. disorder [18] and an antisocial personality disorder [19]. It is hypothesized that impulsive personality characteristics increase the chance of being exposed to stressful events. Emergency medication Physicians are at a high risk of developing these psychological symptoms because witnessing a traumatic event in the casualty department, such as a patient brought in severely injured from a catastrophic industrial injury or a gunfight, usually relies on their professional role to help them. They can so briefly divert their attention from the horror of what they are viewing. This may lead to more difficulties [12]. Emergency medical service (EMS) may be a demanding profession. and emergency medicine doctors deal with multiple challenges, such as the potential to witness death and trauma frequently, diagnostic uncertainty, high patient acuity, crowding, medical errors, and bullying from superiors, which puts them at elevated risk for occupational stress and vulnerable to PTSD [20]. PTSD, if not addressed, increases the risk of despair, anxiety,

and suicide. It has a detrimental influence on both the health-care system and human health [21,22].

There are few research on assessing posttraumatic stress disorder among emergency doctors, according to a literature analysis. This study's findings will inform future research on the topic. The ultimate objective is to acquire vital information that could be utilized to improve emergency medical services and to implement preventive efforts against PTSD in these facilities. To our knowledge, no study in Sudan has assessed PTSD among emergency medicine practitioners. The purpose of this study is to determine the prevalence of posttraumatic stress disorder symptoms among emergency medicine trainee doctors enrolled in the Sudan Medical Specialization Board, Sudan. to investigate the incidence of posttraumatic stress disorder symptoms among emergency medicine student doctors. To investigate the relationship between practice-related parameters and the occurrence of posttraumatic stress disorder symptoms. To investigate the relationship between socio demographic characteristics and the prevalence of posttraumatic stress disorder symptoms.

## Methods

### Study design and participants

The study was a prospective analytical cross-sectional study in all hospitals that are considered training canters for emergency medicine residency in Khartoum State, Sudan. Military Hospitals: Medical Services (Sudanese Armed Forces), Rabat Hospital, and Al-Amal National Hospital. Nonmilitary Hospitals: Ibrahim Malik Hospital, Hospital of Altamuz, Omdurman Hospital, Bahri Hospital. A study conducted in July and December 2020 included all doctors under training in emergency medicine on the Sudan Medical Specialization Board.

**Inclusion criteria:** Doctors currently under training in emergency medicine in the Sudan specialization board who accept involvement in this study.

**Exclusion criteria:** Refusal to participate, Trainee doctors who are not active in the training program, Trainees who were diagnosed with PTSD before starting the training program.

### Data collection tools

A self-completed questionnaire was developed to collect data. It was performed on the web during the COVID-19 pandemic, so we tend to take precautions online.

Consent and socio demographic data (age, gender, marital status, workplace) and work-related factors were included in the first portion of the questionnaire.

The PCL-C (civilian version) has been used in the second section to assess symptoms of traumatic situations in any population. The PCL is commonly used in the screening, evaluation, and long-term treatment of people with PTSD. The PCL-C is a checklist that is used to measure various stressful experiences and consists of 17 questions relevant to the development of PTSD. Each question is scored using the Likert scale (1 =not at all to 5 = extremely) based on the severity of each symptom.

The total severity score of symptoms (ranging from 17 to 85) is calculated based on the sum of each individual score. (41\_43)

17-29 =little to no severity

30-44 = moderate to high severity

45-85 = high-severity symptoms

A questionnaire has been distributed to participants directly, giving them sufficient time to fill it alone.

**Sampling Technique**

Regarding EDC full name approval, the SMSB secretary provided a set of residents. After excluding 31 trainees who were not active in the training program, the survey A questionnaire was distributed to 228 emergency medicine trainees. doctors (total coverage sampling), using a web-based questionnaire (directly by WhatsApp application). That response rate was 75% (n = 171).

**Data management and analysis**

The statistical techniques used in this study were answered iteratively. distribution, graphic forms, percentages, cross-tabulation tables, and chi-square tests. Data were analyzed using the computer program IBM statistical package for Social Sciences (SPSS) version 26. A chi-square test was used to compare the differences with a level of significance at a P value less than 0.05 considered significant.

**Ethical consideration**

Data collection started after receiving ethical clearance from the Emergency Department Council of the Sudan Medical Specialization Board.

Provided that participation is voluntary concerning privacy and confidentiality, The participant has the right to withdraw at any time without any deprivation. Informed consent was obtained from participants.

**Results**

Out of 259 emergency medicine trainees eligible for participation, 228 met the inclusion criteria, and 171 provided informed consent, yielding a response rate of 75%. The majority of participants (76.6%) were aged 24-32 years, with 23.4% aged 33-41 years, and none aged 42 or older). Female participants constituted 61.4%, while males accounted for 38.6%. Most trainees were single (71.9%), with married participants making up 25.7% and divorced individuals comprising only 2.3%. Additionally, 74.9% of trainees worked in non-military hospitals, while 25.1% were employed in military hospitals. Only 2.9% of participants reported being previously diagnosed with a mental health disorder (**Table 1**)

**Table 1: Distribution Socio demographical data in EM trainees who working under training program of SMSB**

Demographical Characteristic	Class	Frequency	Percent
Age	24 -32	131	76.6%
	33 -41	40	23.4%
	42 and more	0	0%
	Total	171	100.0%
Gender	Female	105	61.4%
	Male	66	38.6%
	Total	171	100.0%
Marital status	Divorced	4	2.3%
	Married	44	25.7%
	Single	123	71.9%
	Widow	0	0.0%
	Total	171	100.0%
Work place	Military hospitals	43	25.1%
	non-military hospitals	128	74.9%
	Total	171	100.0%
Diagnosed with any mental disorders previously?	Yes	5	2.9%
	No	166	97.1%
	Total	171	100.0%

**PTSD Severity**

The PTSD checklist scores revealed that 35.1% of participants had high-severity PTSD symptoms, 33.9% had moderate-to-high severity, and 31.0% reported little-to-no severity symptoms. Trainees aged 24-32 years showed the highest prevalence of high-severity symptoms (37.4%), followed by those aged 33-41 years

(27.5%), and this difference was statistically significant (p = 0.036). Female participants had a higher prevalence of high-severity symptoms (42.9%) compared to males (22.7%), a statistically significant difference (p = 0.005). Single participants also exhibited higher rates of PTSD (38.2%) compared to married (27.3%) and divorced participants (25.0%) (p = 0.029) (**Table 2**).

**Table 2: Frequency of PTSD symptoms according to the score of severity in EM trainees who working under training program of SMSB (17-29 =little to no severity,30-44 = Moderate to high severity,45-85 = High severity symptoms)**

Score of severity	Frequency	Percent
Little to no severity	53	31.0%
Moderate to high severity	58	33.9%
High severity symptoms	60	35.1%
Total	171	100.0%

**Work-Related Factors**

Participants in their first year of training reported the highest prevalence of high-severity symptoms (46.8%), followed by second-year trainees (31.9%), with the lowest rates among third- and fourth-year trainees (p = 0.031). Trainees working in military hospitals

exhibited significantly higher rates of high-severity symptoms (45.5%) compared to those in non-military hospitals (28.6%) (p = 0.050). No significant association was observed between work hours per week and PTSD severity (p = 0.568) (**Table 3**)

**Table 3: Distribution of work related factors in EM trainees who working under training program of SMSB**

Variables	Class	Frequency	Percent
Work hours per week	24hr-48h	94	55.0%
	48hr-72h	61	35.7%
	72hr-98h	16	9.4%
	Total	171	100.0%

**Traumatic Events**

The most frequently reported traumatic event was witnessing the death of a patient after failed resuscitation (28.2%), followed by witnessing injury and blood (25.1%) and medical errors (18.0%)

(Table 4, Figure 1). Participants who experienced medical complications leading to disability reported the highest prevalence of high-severity symptoms (54.3%) (Table 4)

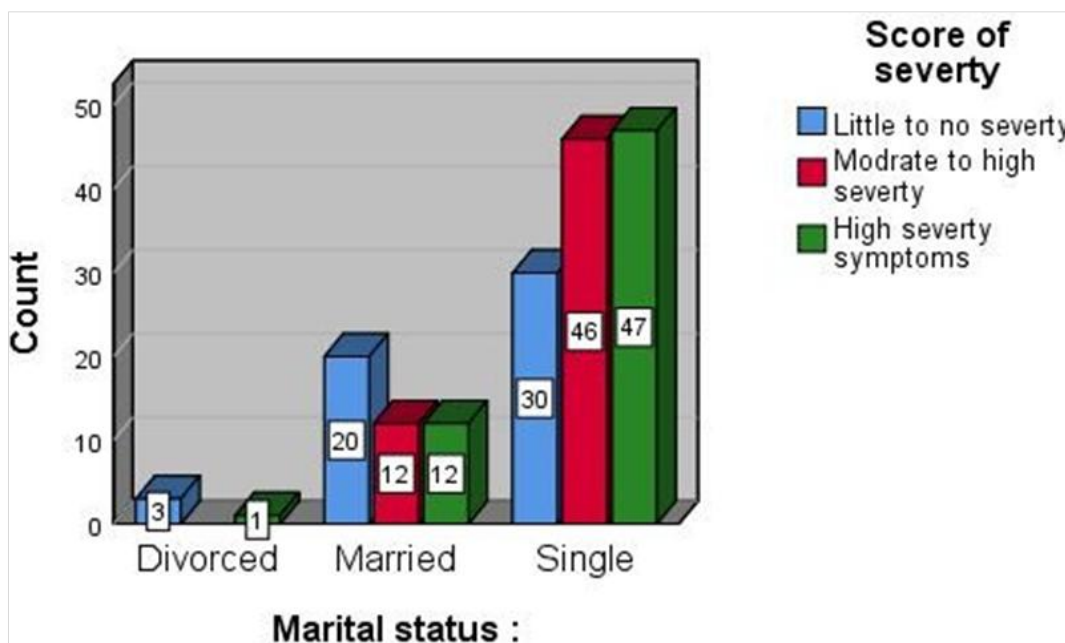
**Table 4: Frequency of traumatic events among EM trainees who working under training program of SMSB**

Events	Frequency	Percent
Witnessed the death after failed in resuscitation of patient	149	28.2%
Witnessed medical error	95	18.0%
Witnessed Injury and blood	133	25.1%
Being threatened or assaulted by a patient or people with him/her	82	15.5%
Witnessed medical complication that lead to disability	70	13.2%
Total	529	100.0%

**Marital Status and PTSD Severity**

The relationship between marital status and PTSD severity among emergency medicine (EM) trainees is presented in. The analysis revealed significant differences across marital status categories in PTSD severity scores (p = 0.029). Among divorced participants, 75.0% reported little-to-no severity symptoms, and 25.0% had high-severity symptoms, with none reporting moderate-to-high severity

symptoms. Married participants exhibited a relatively even distribution, with 45.5% reporting little-to-no severity symptoms, 27.3% reporting moderate-to-high severity symptoms, and 27.3% experiencing high-severity symptoms. Single participants had the highest proportion of moderate-to-high severity symptoms (37.4%) and high-severity symptoms (38.2%), while only 24.4% reported little-to-no severity symptoms (Figure 1).



**Figure 1: Relation between Marital status of EM trainees and Frequency of PTSD severity score**

**PTSD Severity and Previous Diagnosis of Mental Disorders**

The relationship between PTSD severity and a previous diagnosis of mental disorders among emergency medicine (EM) trainees is shown in Table 11. The results indicate a statistically significant association (p = 0.007). Trainees without a prior diagnosis of mental disorders showed a distribution of 31.9% with little-to-no severity

symptoms, 31.9% with moderate-to-high severity symptoms, and 36.1% with high-severity symptoms. In contrast, all trainees with a previous mental health diagnosis (5 participants) reported moderate-to-high severity symptoms (100.0%), with none reporting either little-to-no severity or high-severity symptoms.

**Table 5: Relation between frequency of PTSD symptoms and EM trainees who diagnosed with any mental disorders previously**

			Score of severity			Total
			Little to no severity	Moderate to high severity	High severity symptoms	
Have you been diagnosed with any mental disorders previously?	No	Count	53	53	60	166
		%	31.9%	31.9%	36.1%	100.0%
	Yes	Count	0	5	0	5
		%	0.0%	100.0%	0.0%	100.0%
Total	Count	53	58	60	171	
	%	31.0%	33.9%	35.1%	100.0%	

**Distribution of Traumatic Events and PTSD Severity**

The distribution of traumatic events contributing to moderate-to-high PTSD severity among emergency medicine (EM) trainees revealed that witnessing the death of a patient after failed resuscitation was the most common event (36.2%), followed by

witnessing injury and blood (33.1%), medical errors (32.6%), and being threatened or assaulted by patients or relatives (30.5%). Witnessing medical complications leading to disability accounted for 24.3% of cases (Table 5).

**Table 6: Distribution of Traumatic events according PTSD score of Moderate to high severity**

Score of severity	Traumatic events	Frequency	Percent
	Witnessed the death after failed in resuscitation of patient	54	36.2%
	Witnessed a medical error	31	32.6%
Moderate to High Severity	Witnessed Injury and blood	44	33.1%
	Being threatened or assaulted by a patient or people with him/her	25	30.5%
	Witnessed medical complication that lead to disability	17	24.3%

The distribution of traumatic events contributing to high-severity PTSD symptoms among emergency medicine (EM) trainees highlights the significant impact of these experiences. Witnessing medical complications leading to disability was the most impactful event (54.3%), followed by witnessing medical errors (45.3%), and

being threatened or assaulted by patients or relatives (43.9%). Witnessing the death of a patient after failed resuscitation and injury or blood were both associated with 38.3% of high-severity PTSD cases (Table 6)

**Table 7: Distribution of Traumatic events according to PTSD score of High severity symptoms**

Score of severity	Traumatic events	Frequency	Percent
	Witnessed the death after failed in resuscitation of patient	57	38.3%
	Witnessed a medical error	43	45.3%
High severity symptom	Witnessed Injury and blood	51	38.3%
	Being threatened or assaulted by a patient or people with him/her	36	43.9%
	Witnessed medical complication that lead to disability	38	54.3%

**Discussion**

This study aimed to assess the prevalence of PTSD symptoms among emergency medicine (EM) trainees in Sudan and examine the factors influencing their severity. The findings revealed a high prevalence of PTSD symptoms, with 69% of participants experiencing moderate-to-high or high-severity symptoms (33.9% and 35.1%, respectively). This supports the hypothesis that EM trainees are at heightened risk of PTSD due to the inherently stressful nature of their work environment.

Several key findings emerged. A majority of participants exhibited PTSD symptoms of moderate-to-high severity (33.9%) or high severity (35.1%). Witnessing the death of a patient after failed resuscitation was the most frequently reported traumatic event, followed by exposure to injury and blood, medical errors, and complications leading to disability. These findings are consistent with previous research by Klamen [23], Mills [24], and Thompson [25], which identified similar workplace stressors as significant contributors to PTSD symptoms. Younger age, female gender, and being single were significantly associated with higher PTSD severity. These results align with prior studies demonstrating that younger adults and females are more vulnerable to PTSD [26,27]. Additionally, marital status appeared to provide a protective effect,

with single participants exhibiting higher PTSD rates compared to married or divorced individuals, a finding supported by previous studies [23].

Workplace factors also played a significant role. First- and second-year trainees showed higher PTSD severity than those in later years, likely due to a lack of coping strategies and experience in managing workplace stressors. Trainees working in military hospitals reported higher PTSD symptoms than those in non-military settings, likely due to increased exposure to trauma in these environments. These findings are consistent with studies on military personnel (28,29,30). Notably, trainees with a history of mental disorders were significantly more likely to experience severe PTSD symptoms, emphasizing the role of pre-existing mental health conditions as risk factors for PTSD [31].

The high prevalence of PTSD symptoms may be explained by the unique challenges faced by EM trainees, including repeated exposure to death, injury, and medical errors. Younger trainees may lack the coping mechanisms needed to navigate these stressors effectively. Females might report symptoms more frequently due to higher emotional expressiveness and willingness to seek help. Marital status may serve as a buffer, with married individuals benefiting from emotional and social support, as noted in previous research [23]. The elevated PTSD rates in military hospitals are likely

related to the intensity and frequency of trauma encountered in these settings.

This study has several limitations. The use of a self-reported questionnaire may have introduced reporting bias, potentially inflating PTSD prevalence. Participant fatigue due to the length of the questionnaire may also have influenced response accuracy. Furthermore, the reliance on DSM-IV criteria excluded newer features introduced in DSM-5, such as alterations in cognition and mood, which might have provided a more comprehensive understanding of PTSD. Additionally, the study was conducted in Sudan, and the findings may not be generalizable to other settings due to cultural and healthcare system differences.

The findings highlight the urgent need for mental health support in EM training programs. Interventions such as resilience training, trauma-informed care education, and access to counselling services should be prioritized to address the psychological needs of trainees. Specific strategies targeting younger and early-year trainees, as well as those working in military hospital settings, could be particularly beneficial.

Future research should adopt longitudinal designs to explore the long-term impact of workplace trauma on EM trainees and evaluate the effectiveness of mental health interventions. Expanding the assessment to include DSM-5 criteria could provide more nuanced insights into PTSD. Cross-cultural studies could help identify universal and context-specific risk factors for PTSD among medical trainees. Additionally, intervention studies focusing on the impact of structured mental health programs, such as resilience training and counselling, would be invaluable in reducing PTSD prevalence and supporting the well-being of EM trainees.

## Conclusion

This study revealed a high prevalence of PTSD symptoms among emergency medicine (EM) trainees in Sudan, with 69% experiencing moderate-to-high or high-severity symptoms. The findings highlight significant associations between PTSD severity and factors such as younger age, female gender, single marital status, early training years, and military hospital settings. Traumatic events, including patient deaths, medical errors, and complications leading to disability, were major contributors to PTSD, underscoring the psychological toll of emergency medicine training.

To address these challenges, institutions should implement structured mental health programs, including counselling, resilience training, and stress management workshops. Support systems, such as mentorship and peer networks, are crucial for younger trainees and those in high-risk settings. Policy-level interventions, including regular psychological assessments and national guidelines tailored to healthcare professionals, can help identify and mitigate PTSD symptoms early. Future research should focus on longitudinal studies, cross-cultural comparisons, and the integration of DSM-5 criteria to better understand and address PTSD in medical trainees. These measures will foster a supportive training environment, improving the well-being and performance of EM trainees.

## List of Abbreviations

EM: Emergency Medicine  
PTSD: Post-Traumatic Stress Disorder  
SMSB: Sudan Medical Specialization Board  
PCL-C: PTSD Checklist (Civilian Version)  
SPSS: Statistical Package for the Social Sciences  
DSM: Diagnostic and Statistical Manual of Mental Disorders

## Declarations

[www.ijirms.in](http://www.ijirms.in)

## Ethics Approval and Consent to Participate

The study was conducted in accordance with ethical standards outlined by the Emergency Department Council of the Sudan Medical Specialization Board. Ethical approval was obtained prior to data collection. Participants were informed about the study's purpose and assured of their confidentiality and voluntary participation. Written informed consent was obtained from all participants.

## Consent for Publication

Not applicable.

## Conflicts of Interest

The author declares no conflicts of interest related to this study.

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## Author's Contributions

Dr. Ahmed Mohamed: He played a central role in conceptualized and designed the study, supervised data collection, conducted statistical analysis, prepared the manuscript, and drafted all sections of the article, including interpretation of findings.

Dr. Abla Mohamed Elmahdi Elshafei: Supervised the findings of the study and contributed to the discussion of results.

Dr. Mogahid Alteib Yousif Alteib: Assisted in the discussion of results and contributed to the final manuscript preparation.

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