



Assessing the Prevalence of Post-Traumatic Stress Disorder and Its Risk Factors among Adult Internally Displaced Persons in Sudan

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Since the middle of April 2023, Sudan has experienced a large armed conflict, which resulted in millions of its people leaving their homes, being internally displaced persons (IDPs) inside the country and externally displaced to neighboring countries. A lot of them were exposed to different kinds of trauma, violence, and injuries, making them more vulnerable to psychological disorders, particularly post-traumatic stress disorder (PTSD). This study aimed to estimate the prevalence of PTSD and determine the associated risk factors among IDPs in Abo Hamad Town, Nahr Neel State, Sudan in December 2023. To our knowledge, few studies explored PTSD among IDPs in Sudan.

Materials and Methods: This is a cross-sectional community-based household study in Abo Hamad Town, Nahr Neel State, Sudan. A total of 118 adult IDPs were interviewed. A pre-tested and structured questionnaire assessed the participants' socio-demographic, clinical, and psychosocial characteristics and substance and displacement-related factors. The Short Post-traumatic Stress Disorder Rating Interview (SPRINT) scale was used to examine PTSD among them. Data were collected during two weeks by a well-trained team supervised by a consultant psychiatrist. Data were analysed using the SPSS version 22. Descriptive results were displayed using frequency tables. Bivariate and multivariate logistic regression was used to identify the association between the outcome and independent variables. A p-value equal or less than 0.05 was considered statistically significant at 95% CI.

Results: The study comprised 118 participants, 72.9% female and 27.1% male. The mean age was 29.94 years (SD±11.84). Most were educated; 57.6% were university graduates, and 22% had secondary education. Married individuals accounted for 46.6% of the sample, while 45.0% were single. More than half (53.4%) of the participants were unemployed. Over two-thirds (67.8%) had been displaced for over four months. A lack of social support was reported by half (50.9%) of the participants. While 16.9% had a chronic medical condition, 5.1% were identified as having a mental illness. The prevalence of PTSD among Internally displaced persons was found to be 70.3%, and a quarter (27.1%) had severe symptoms. The most frequent event was the participant located in an area prone to shooting, which was reported by 90.7% of respondents, followed by property destruction, difficulty lodging, forced detachment from family, and abnormal death of a family member or friend, reported by 53.4%, 50.8%, 37.3%, and 34.7% respectively. Experiencing multiple events was common, and more than half (52.5%) of the participants experienced four or more traumatic events. Related factors with significant association with PTSD were female gender, torture, witnessing the murder of a stranger, and multiple traumatic events experienced by the respondent.

Conclusion: This study showed an alarming high prevalence of PTSD among IDPs in an urban setting. Factors found to be significantly associated with PTSD were being female, experiencing torture, witnessing the murder of a stranger and exposure to multiple traumatic events. Further studies are required to investigate PTSD in IDPs, and psychological support services are of paramount importance to manage PTSD and reduce the suffering of IDPs.

Keywords: Post-traumatic stress disorder; prevalence of PTSD; risk factors; adult internally displaced persons; Abo Hamad; Sudan.

1. INTRODUCTION

Abo Hamad Town: is the capital of Abo Hamad Locality, Nahr Neel State, Sudan. The total population of the locality is about 500,000, with IDPs of about 11,500, 30% of whom are in Abo Hamad town [1]. The study sample was chosen from IDPs hosted inside different districts in Abo Hamad Town, renting houses and living with its inhabitants. There was some humanitarian aid for these IDPs, but it was not enough [2-5]. The Aid was provided by the Ministry of Social

Welfare, Nahr Neel state, Khair Al Majalis Organization, the World Food Program (WFP) and the Turkish Humanitarian Relief Agency [6].

Internally displaced persons (IDPs) are groups who have been forced to leave their homes but remain within the borders of their own country [7,8]. Globally, 30.6 million people were internally displaced due to conflict and disaster [7,9]. Most live in low-income countries, sometimes affected by internal conflicts and violence [7,10]. People experiencing displacement were exposed to

different kinds of trauma, violence and injuries, making them more vulnerable to psychological disorders, particularly post-traumatic stress disorder (PTSD) [7,11].

PTSD: This is a psychological disorder characterized mainly by features of intrusion, avoidance, changes in mood and cognition and hyperarousal following a stressful or traumatic event, all of which can last for a period of more than one month following the traumatic event [7,12-15]. In Ukraine and Europe, the prevalence of PTSD in IDPs was found to be 30.8% [16], while in Africa, in Ethiopia, South Sudan and Mogadishu, Somalia, it was 58.4%, 36% and 32%, respectively [7,17,18]. On the 15th of April 2023, a war conflict started in Sudan. As a result, Sudanese people experienced a high movement internally and externally to the neighboring countries. According to the International Organization for Migration, IDPs in Sudan were estimated to amount to 9 million [19]. PTSD is one of the psychological disorders which occur following an exposure to a traumatic or stressful life event. PTSD can occur due to witnessing and being exposed to terrible events such as murder, threats, kidnap, loss of relatives or friends, loss of house and starvation [7,11]. The objectives of this study were to estimate the prevalence of PTSD and determine the associated risk factors among IDPs in Abo Hamad Town Nahr Neel State, Sudan, in Dec. 2023. To our knowledge, few studies explored PTSD in IDPs in Sudan.

2. MATERIALS AND METHODS

This is a cross-sectional, community-based household (HH) study in IDPs in Abo Hamad town. There were 20 districts in the town, all affected by IDPs. Seven districts were purposely selected for the study because of the ease of accessing them. They included districts 1, 2, 3, 4, 5, 7 and Al Goz. IDPs in Abo Hamad town were 3,502 (= approximately 700 HHs). A total of 118 adult participants (=118 HHs) from the IDPs were interviewed. The households were chosen using the snow-ball method. One member of the adult family members was randomly chosen for assessment. The tool used to collect the data was a structured and pretested questionnaire. It included three parts: Part I included questions about the socio-demographic characteristics of the IDPs (e.g. age, sex, marital status, occupation in original and displaced place), in addition to clinical and other related factors; Part II explored the traumatic events experienced by the participants (e.g. property destruction,

witnessing murder of family member/friend, and torture), and Part III: included the Short Post-traumatic Stress Disorder Rating Interview Scale (SPRINT) [20] to assess the presence of PTSD. Data were collected by a team of medical students and one medical officer who were well-trained in gathering the needed information. Data collection was supervised by a consultant psychiatrist. Data were collected during two weeks from 9/12 – 22/12/2023.

The SPRINT: is a brief global assessment for post-traumatic stress disorder (PTSD) that assesses the core symptoms of PTSD (intrusion, avoidance, numbing and arousal), and related aspects of PTSD (somatic distress, stress vulnerability and role and social functional impairment). It is an eight-item self-report, with one item corresponding to each of the above symptoms, measured on a five-point Likert scale (e.g. 0 = not at all, 4 = very much). Scores from each item are summed to attain a final score. The maximum score is 32 and represents the most severe symptom state. In this study, a cutoff score of 17 has been suggested to determine the presence of PTSD. A score of less than 17 means no PTSD, 17-20 mild, 21-24 moderate and above 24 means severe PTSD.

Data analysis: Data were analyzed using the SPSS software version 22. Descriptive results were displayed using frequency tables. Bivariate and multivariate logistic regression was used to identify the association between the outcome and independent variables. A p-value ≤ 0.05 in multivariate logistic regression was considered statistically significant, and the strength of associations was determined using an adjusted odds ratio (AOR) at 95% CI.

3. RESULTS

The Socio-demographic Characteristics of the participants: The study comprised 118 participants, 72.9% female and 27.1% male. The mean age was 29.94 years ($SD \pm 11.84$), and the age groups are detailed in Table 1. Most were educated; 57.7% were university graduates, and 22% had secondary education. Married individuals accounted for 46.6% of the sample, and 45.0% were single. More than half of the participants (53.4%) were unemployed (Table 1).

The Clinical, Psychosocial, Substance and Displacement-related factors of the participants: In terms of displacement duration, two-thirds (67.8%) of them had been displaced

for over four months. Half (50.9%) of them lacked social support, 16.9% had chronic medical conditions, and 5.1% were identified as having a mental illness. At the same time, 5 (4.2%) reported cigarette smoking. Only one participant (0.8%) admitted to alcohol use (Table 2).

Trauma-related events among the participants: The study included an inquiry about the trauma experienced by internally displaced persons. The most frequent event was the participant being in an area prone to shooting, which was reported by 90.7% of respondents, followed by property destruction, difficulty lodging, forced detachment from family, and abnormal death of a family member or

friend, reported by 53.4%, 50.8%, 37.3%, and 34.7% respectively (Table 3). Other traumatic events are detailed in Table 3, which indicates that only one participant declared being sexually abused. It was noted that experiencing multiple events was common, and more than half (52.5%) of the participants experienced four or more traumatic events.

The Prevalence and level of PTSD: In this study, the prevalence of PTSD among Internally displaced persons in Abo Hamad Town, Nahr Neel State, was found to be 70.3% with 95% CI (67.1 to 73.5). More than a quarter (27.1%) of them had severe symptoms, according to the SPRINT Scale (Table 4).

Table 1. Distribution of Socio-demographic Characteristics among Internally displaced persons in Abo Hamad Town, Nahr Neel State, Sudan, 2023 (n=118)

Variable		Frequency	Percent (%)
Gender	Male	32	27.1
	Female	86	72.9
Age group	15 – 25	39	33.2
	26 – 35	46	38.9
	36 – 45	17	14.4
	46 – 55	7	5.9
	> 55	9	7.6
Education	Illiterate	7	5.9
	Khalwa*	4	3.4
	Elementary	13	11.0
	Secondary	26	22.0
	College/University	68	57.7
Social Status	Married	55	46.6
	Single	53	45.0
	Divorced	3	2.5
	Widow	7	5.9
Working status	Working	56	46.6
	Not Working	62	53.4

* Khalwa: a religious setting for learning Quran, n = sample size.

Table 2. Clinical, Psychosocial, Substance and Displacement-related factors of Participants among IDPs in Abo Hamad Town, Nahr Neel State, Sudan 2023 (n=118)

Variable		Frequency	Percent (%)
Period of Displacement	1 – 4 months	38	32.2
	> 4 months	80	67.8
Social Support	Provided	58	49.1
	Not Provided	60	50.9
Mental Illness	Yes	6	5.1
	No	112	94.9
Medical Illness	Yes	20	16.9
	No	98	83.1
Alcohol Use	Yes	1	0.8
	No	117	99.2
Cigarette Use	Yes	5	4.2
	No	113	95.8

Table 3. Trauma Related events among Internally Displaced Persons in Abo Hamad Town, Nahr Neel State, Sudan, 2023 (n=118)

Traumatic Event Experienced by IDPs	Frequency	Percent (%)
Property Destruction	63	53.4
Difficulty Lodging	60	50.8
Lack of food/water	29	24.6
Witnessing murder of family member/friend	23	19.5
Difficulty access to health care	21	17.8
Forced detachment from family	44	37.3
Being hit/tortured	12	10.2
Severe injury	4	3.4
Witnessing murder of strange person	34	28.8
Abnormal death of a family member/friend	41	34.7
Detained/prison	7	5.9
Located in an area prone to shooting	107	90.7
Harassed/kidnapped	3	2.5
Rape/sexual abuse	1	0.8
Neglect during childhood	10	8.5
Number of events	0 – 3	56
	≥ 4	62
		47.5
		52.5

Table 4. Presence and level of PTSD among Internally Displaced Persons using SPRINT Scale in Abo Hamad Town, Nahr Neel State, Sudan 2023 (n=118)

PTSD	Frequency	Percent (%)
Presence of PTSD	PTSD Mild	25
	Moderate	26
	Severe	32
	No PTSD	35
Total	118	100.0

Associated Factors with the occurrence of PTSD: Different factors were examined using Bivariate and Multi-Binary Logistic Regression for possible association with PTSD. As shown in Table 5, factors that showed significant association with PTSD were: female gender, with the adjusted odds ratio (AOR) = 3.32 (95% CI: 1.29, 8.57), torture, with AOR= 5.90 (95% CI: 0.71, 8.87), witnessing murder of a stranger, with AOR= 1.67 (95% CI: 0.36, 3.18) and multiple traumatic events (≥ 4 or more) experienced with AOR=2.59 (95% CI: 0.98, 6.88). However, some factors which were not significantly associated with PTSD were property destruction and being detached from family (Table 5).

4. DISCUSSION

This study aimed to estimate the prevalence of PTSD and determine the associated risk factors among internally displaced persons in Abo Hamad Town, Nahr Neel State, Sudan in December 2023. The study sample showed a

significant predominance of females. This may be because many fathers and husbands sent their wives and families to safe places after the war and stayed to guard their homes, or went to other places to search for work and earn money themselves. In Sudanese culture, males in the family are generally expected to work and provide for the females. Only one respondent reported sexual abuse, which is far less than expected in such conditions, especially considering the wide range of sexual abuse types and the recent news of many incidents. Sexual abuse might be under-reported due to feelings of shame and the desire to avoid stigma and social and cultural consequences. This notion has also been noted in previous studies [21,12].

This study revealed that the prevalence of PTSD among IDPs in Abo Hamad Town was 70.3%, with a 95% CI (67.1% to 73.5%) among IDPs. This rate is higher than the prevalence reported in two earlier studies in central Sudan (12.3%) [22,23,24], and Darfur (54%) [23,25], in Sudan

and more than that found in Sri Lanka (56%) [23,26], Ethiopia (58.4%) [3], Nigeria (42%) [23,27], Georgia (23.3%) [23,28], and Iraq (20.8%) [7,29]. It was similar to what was seen in North Uganda (74%) [7,30], but less than that found in Medellin, Colombia (88%) [7,31]. A recent review study of PTSD in sub-Saharan Africa showed that the prevalence of PTSD was disproportionately ranging from 12.3% in central Sudan [23, 24] to 85.5% in Nigeria [23,32]. Eight studies out of a total of 11 studies reported more than 50% of the magnitude of PTSD, pointing to a higher magnitude of the prevalence of PTSD in the region [23]. This variation in the prevalence of PTSD within and in different countries might be due to various factors: the accessibility and affordability of mental health care, different socio-cultural differences and the economic situation of the population [23]. However, a more recent review showed that the pooled prevalence of PTSD among IDPs in Africa was 51% (95%CI: 38-64) [33]. Variation in the prevalence of PTSD might also be due to exposure to different trauma types, variation in the study type and sampling technique [7]. The tool used in the assessment of PTSD might be another reason for the variation in PTSD prevalence; PTSD was assessed by using the Post-Traumatic Stress Disorder Checklist for DSM-5 (PCL-5) in South Ethiopia [7], the Harvard Trauma Questionnaire (HTQ)

was used to diagnose symptomatic PTSD in Kaduna, Nigeria [23,27], and the SPRINT scale was used to assess PTSD in the current Study [20].

This study showed that there was an association between the female gender and PTSD. Females were 3.3 times more likely to have PTSD than males. This finding is supported by many previous studies conducted in Ethiopia, Uganda, Iraq, Syria and Yugoslavia [7,23,34-37]. This association was also documented by the recent review study of PTSD among IDPs in Africa [33]. The correlation between female gender and PTSD is plausible as displaced women were more frequently exposed to PTSD antecedents, including gender-based violence, compared to men [23,38-40]. PTSD might be a direct psychological consequence of rape or sexual abuse, the violent loss of a partner, children and becoming a single parent or widow [7,30,41]. When compared with males, exposure to traumatic events had a high impact among females [7,41,42]. Another reason could be that females tend to show a more emotional and ruminative response to illness [7,26,43]. This could increase the risk of developing PTSD. However, a study report in Jos, Nigeria, showed an association between the male gender and PTSD [44].

Table 5. Bivariate and Multi-Binary Logistic Regression of Factors associated with PTSD among IDPs in Abo Hamad Town, Nahr Neel State, Sudan 2023 (n=118)

Explanatory Variable	PTSD		COR (95%CI)	AOR (95%CI)
	Yes	No		
Gender				
Female	65	21	1.792(1.043,3.077)	3.322(1.287,8.574) *
Male	18	14	1	1
Torture				
Yes	11	1	5.194(0.644,7.885)	5.896(0.711,8.874) *
No	72	34	1	1
Witness murder of stranger				
Yes	27	7	1.929(0.748,4.972)	1.672(0.361,3.182) *
No	56	28	1	1
Number of traumatic events experienced				
≥ 4 events	50	12	2.122(1.168,3.856)	2.592(0.976,6.882) *
0 - 3 events	33	23	1	1
Property destruction				
Yes	47	16	1.550 (0.071,3.430)	0.738(0.317,1.718) **
No	36	19	1	1
Detached from family				
Yes	38	6	4.081(1.533,10.8680)	0,252(0.092,0.691) **
No	45	29	1	1

Notes: * p value < 0.05, ** p value > 0.05. Abbreviations: COR=Crude odds ratio, AOR= Adjusted odds ratio, n= sample size.

Regarding traumatic events experienced by the participants, the most frequent events were participants located in areas prone to shooting, property destruction and difficulty lodging. However, events with significant associations with PTSD were torture, witnessing the murder of a stranger and experiencing multiple events. IDPs exposed to torture were 5.9 times more likely to have PTSD than those not exposed. Participants exposed to torture were 10.2%, which was similar to that seen in Nepal (9%) [45]. The rate of PTSD among participants exposed to torture in this study was 91.7%, which is more than what has been documented among torture survivors from the Middle East, Central Africa, South Asia and Southeast Europe, which was 88.3% [45]. Both physical and psychological torture methods were associated with increased symptoms of PTSD, especially when combined [46]. In this study, IDPs witnessing the murder of a stranger were 1.7 times more likely to have PTSD than those not witnessing a stranger's death. In one study conducted in a Danish high school, the prevalence of PTSD was 9.5% seven months after students saw a young man killing his girlfriend in front of a large audience. Additionally, a quarter (25%) of them showed subclinical PTSD [47]. Another study showed that PTSD was associated more with emotional states recalled from the school shooting than with proximity [48]. Three recent psychological theories which explain the production of PTSD following witnessing or experiencing traumatic events were analyzed: the emotional processing theory, the dual representation theory and the cognitive theory [49-52]. Regarding the number of traumatic events experienced by the participants, those who had been exposed to 4 or more of the 16 traumatic events were 2.6 times more likely to have PTSD than participants who had experienced 0-3 traumatic events. Many studies suggest that the experience of multiple traumatic events dramatically increases the risk for the severity and chronicity of PTSD symptoms as compared to a single traumatic event [53-57]. Greater exposure to multiple trauma types of events may predict greater PTSD severity [7,30,58]. However, a recent study showed that the direct effect of the number of traumatic events on PTSD severity was non-significant. It demonstrated that the relationship between the number of traumatic events and PTSD symptom severity is mediated through dysfunctional cognitions and expectations [57].

5. CONCLUSION

This study showed an alarming high prevalence of PTSD among IDPs in an urban setting in Sudan. Factors found to be significantly associated with PTSD were being female, experiencing torture, witnessing the murder of a stranger and exposure to multiple traumatic events. Further studies are required to investigate PTSD in IDPs, the root causes should be addressed, and psychological support services are of paramount importance to manage PTSD and reduce the suffering of IDPs.

6. LIMITATIONS

Because of the difficulties (e.g. transport, the wide spread of the IDPs) faced by the research team, who were themselves internally displaced, the study couldn't cover all IDPs in the selected districts in Abo Hamad Town. These reasons and the lack of randomization limit the generalizability of the study results to all IDPs in the town or other areas.

FUTURE RESEARCH DIRECTIONS

The authors are aware of concurrent research on the same topic undergoing in different cities in Sudan, therefore, we suggest future pooling of data across IDP studies to generate more representative large data to inform policy and comprehensive interventions. Future direction should also aim for systematic randomization of a large sample with prospects of follow up of cases into longitudinal monitoring of progression of PTSD symptoms and, evaluation of efficacy of interventions.

DISCLAIMER (ARTIFICIAL INTELLIGENCE):

Author(s) hereby declare that NO generative AI technologies such as large language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

CONSENT AND ETHICAL APPROVAL

These were obtained from the authorities of Abo Hamad General Hospital and Abo Hamad Locality. The participants were informed about the aims of the study, their right to withdraw and written consent was obtained from them before they filled out the questionnaire.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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