

# Posttraumatic stress disorder correlates among Iraqi internally displaced persons in Duhok, Iraqi Kurdistan

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## Research article

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# Abstract

## Background

In 2014, the terrorist militant group the Islamic State of Iraq and Syria (ISIS) took over one-third of Iraq. This study measured the rate of posttraumatic stress disorder (PTSD) among Iraqi internally displaced persons (IDPs) and examined associated demographic and traumatic risk factors and comorbid psychiatric symptoms.

## Methods

A cross-sectional survey was carried out in April-June 2015 at the Khanke camp, northern Iraq. Trauma exposure and PTSD were measured by the Harvard Trauma Questionnaire (Iraqi version), and psychiatric comorbidity was measured by the General Health Questionnaire (GHQ-28).

## Results

Of 822 adult IDPs, 33.8% screened positive for PTSD. Associated factors included exposure to a high number of traumatic events, unmet basic needs and having witnessed the destruction of residential or religious areas. Being a widow was the only linked demographic factor (OR = 14.56, 95% CI: 2.93–72.27). The mean scores of anxiety/insomnia and somatic symptoms were above the average cutoff means (M = 3.74, SD = 1.98, R = 0–7 and M = 3.69, SD = 2.14, R = 0–7, respectively) among the IDPs with PTSD.

## Conclusions

High traumatic exposure, specifically unmet basic needs and having witnessed destruction, was an important predictor of PTSD among IDPs. Psychiatric comorbidity was high among those with PTSD. Anxiety, insomnia and somatic symptoms were strongly associated with PTSD. These findings are important for mental health planning for IDPs in camps.

## Clinical trial registration

Not applicable.

# Background

At the beginning of 2014, the terrorist militant group the Islamic State of Iraq and Syria (ISIS) took over large areas of northern and central Iraq, and they controlled one-third of the territory of Iraq by the end of 2014 [1]. The continuous armed conflict in the country led to the displacement of thousands of Iraqi people. The United Nations (UN) estimated that 3.2 million Iraqis were internally displaced persons (IDPs) by the end of 2015 [2]. On August 3, 2014, ISIS launched a very large attack against Yezidi and gained control of the city of Sinjar and the surrounding villages in northwestern Iraq [3]. Almost 6,800 people were abducted by ISIS, and approximately half of them were later rescued. Approximately 200,000 people were displaced within a few days, and the majority of them were Yezidis. Yezidis are a religious minority who speak Kurdish and inhabit northern Iraq, Iran and Syria and southeastern Turkey [3]. They refuse religious conversion, which is why they have faced many genocides in their history. The bulk of the displaced people resettled in refugee camps around the city of Duhok in northern Iraq [4].

Refugees and IDPs are a population that is highly vulnerable to mental disorders compared to native and other migrant populations [5]. Exposure to traumatic events in the homeland, such as persecution; torture; combat; imprisonment; threats because of ethnicity, race, or religion; lack of food, water and shelter; separation; and violence to or death of family members, is a common reason for displacement [6]. Posttraumatic stress disorder (PTSD) and depression are the most commonly reported mental disorders with a wide range of occurrence rates [7].

PTSD can be defined as a mental disorder that can occur if an individual experiences, witnesses, or confronts a traumatic event. Patients with PTSD may suffer from intrusive thoughts about the traumatic experience and flashbacks as well as avoidance behavior and hyperarousal symptoms such as irritability and disruptions in sleep and concentration [8]. PTSD is highly prevalent among refugees, immigrants and asylum seekers at a rate of 9–36% compared with the rate of 1–2% in the general population [9]. In addition to severe traumatic events and lack of social support during such situations, the common predictors of PTSD among traumatized individuals are being young, female, having lower socioeconomic status, a family history of psychiatric disorders, and being of a minority race [10, 11]. The number and types of experienced traumatic events are associated with different rates of PTSD [12].

Although many studies have investigated the psychosocial consequences of mass traumas and displacement in different population samples, we aimed to investigate the mental health impact of mass displacement in a population with a long history of multiple genocides added to decades of exposure to internal and external conflicts and political instability. Our study highlights the necessity of mental health assessment, care, and follow-up among this specific population group because although refugee camps provide safe accommodations, displaced people need physical and mental health care. We examined the prevalence of PTSD and investigated the possible correlated factors of PTSD among IDPs resettled in refugee camps in Duhok, Iraqi Kurdistan. Furthermore, we investigated the association between PTSD and symptoms such as depression, anxiety, somatic symptoms and social dysfunction.

## Methods

### Study design and participants

This is a cross-sectional study performed in April-June 2015 as part of a larger community cross-sectional survey among Iraqi IDPs and Syrian refugees resettled in refugee camps in Duhok Province. This research was supported by the Directorate of Health and the Italian nongovernmental organization Association for Solidarity among People (AISPO).

The participants were adults of both genders living in the Khanke camp, which is located 20 km west of the city of Duhok, northern Iraq. In 2015, the number of IDPs in Duhok Province was 483,068, constituting 92,024 families [13]. They were living in the camps and in unfinished structures and school buildings. At the time of the study, the camp population comprised 16,460 individuals living in 3,120 tents, most of whom were Yezidi IDPs from Sinjar [14].

The inclusion criterion was that the individual should have a history of displacement following the 2014 ISIS attacks in Iraq. Individuals suffering from mental disorders that affect insight, disturb normal communication or deteriorate cognitive abilities, such as intellectual disabilities, dementia or psychotic disorders, were excluded.

The tent numbers were entered into an Excel sheet, and 822 tents were randomly selected. From each selected tent, one eligible adult fitting the sample inclusion criterion was asked to participate voluntarily. The participant was randomly selected by putting eligible family members' names on small pieces of paper in a bag and choosing one blindly.

The scientific committee of the College of Medicine/University of Duhok and the Research Ethics Committee of the Duhok Directorate of Health approved the study. The participants provided written informed consents before we conducted the interviews. The interviewer assured the participants of the confidentiality of the gathered data. Of the 822 IDPs selected to participate in the current study, only 8 did not consent to participate in the study; in those cases, other family members were randomly selected and asked to participate in the study. A psychiatrist familiar with training in such instruments trained six counselors in the use of the study tools full time for 5 days. The project supervisor, his assistant, and the 6 interviewers were hired locally. The face-to-face interviews lasted for two months, beginning on April 15, 2015.

### Measures

The demographic questionnaire requested the age, gender, religion, marital status, education level, work status, number of siblings, past psychiatric history, and past family history of psychiatric disorders.

The Harvard Trauma Questionnaire (HTQ) is a widely used simple and reliable checklist that measures traumatic experiences, torture exposure, and symptoms [15]. It is beneficial in the assessment of the severity and types of premigration or displacement traumas suffered by survivors of mass violence and common trauma-related psychiatric disorders, such as depression, PTSD and anxiety [16]. Parts I and IV of the Iraqi version of the HTQ were used [17]. Part I comprises 43 items assessing the traumatic events experienced and witnessed [18]. The first 16 items of part IV assess PTSD symptoms [19]. For each item, the individual selects from a 4-point severity scale: "not at all", "a little", "quite a bit", and "extremely". In the present study, the HTQ symptom scale received a Cronbach's alpha of 0.799, which indicates good internal consistency. If the individual's HTQ symptom score is  $\geq 2.5$ , it indicates a likelihood of clinical PTSD.

The General Health Questionnaire (GHQ-28) was developed by Goldberg in 1978 as a screening instrument for those at risk of developing psychiatric disorders, especially emotional distress, in medical settings [20]. Although it is designed to screen but not to diagnose psychological well-being, it can detect possible cases of psychiatric morbidity, and the total score can be used as an index of severity [21]. It comprises four factor subscales: somatic symptoms (items 1–7); anxiety/insomnia (items 8–14); social dysfunction (items 15–21), and severe depression (items 22–28) [22]. The respondent is asked to report alterations in his/her mood, feelings and behaviors in the previous 4-week period. The individual responds on a 4-point scale: "less than usual", "no more than usual", "rather more than usual", and "much

more than usual" [23]. A binary method of scoring was used in which the first 2 response selections were scored as 0 and the last 2 as 1 [21]. A score above 4 indicates the presence of distress [21].

### Statistical Analysis

The gathered data were analyzed using SPSS (software statistical computer package version 22). The preliminary descriptive analysis used frequency tables, including means (M) and standard deviations (SDs), for quantitative data, and percentages were used for qualitative data. The categorical data were tested by chi square. Principal component analysis (PCA) with oblique rotation ( $\delta = 0$ ) was applied to variables of the HTQ part I to designate component groups of traumatic events. The oblique rotation was carried out because we anticipated that the events were correlated with one another. The items with a primary loading greater than 0.30 on the same component were combined. Multiple linear regression analysis was adopted for the types of experienced traumatic event components as predictors of PTSD. Logistic regression analysis was used to probe the contribution of demographic factors to participants' PTSD symptom levels. Significance was assumed at P values <0.05, and high significance at P <0.001. The independent sample t test was applied for differences in means.

## Results

Table 1 demonstrates the sociodemographic characteristics and mental disturbances of the participants at the time of the study. The mean age was 33.79 (SD = 12.74) years, and the range was 77 (18–95) years, but most of the participants were young (18–40 years). There were slightly more males than females (56.4% vs 43.6%). The largest group was from the Yezidi religion (n = 812, 98.8%), and most of them were married (77.6%). A total of 364 (44.3%) of the participants were illiterate, 33.1% had completed primary school, and a few had completed high school or held a higher academic degree. The majority were unemployed (n = 694, 86.2%). Most of the participants were from large families, and the mean number of siblings was 7.22 (SD = 3.26).

Table 1 Sociodemographic characteristics of participants and their PTSD prevalence rates. (N=822)

<b>Sociodemographic characteristics</b>		<b>N</b>	<b>% of total</b>
Ages	18-40 years old	618	75.2
	41-64 years old	166	20.2
	65 years old or more	38	4.6
Gender	Female	358	43.6
	Male	464	56.4
Religion	Yezidi	812	98.8
	Muslim	5	0.6
	Christian	3	0.4
Marital status	Single	161	20.1
	Married	622	77.6
	Separated	3	0.4
	Widow	16	2
Education level	Illiterate	364	44.3
	Primary	272	33.1
	Secondary	162	19.7
	Academic	24	2.9
Work status	Employed	111	13.8
	Not employed	694	86.2
Past psychiatric history	Positive	32	3.9
Past family psychiatric history	Positive	53	6.5
Number of siblings	Range, M (SD)	21, 7.22 (3.26)	
<b>PTSD symptoms</b>			
PTSD 16 items (Range = 1-4)	M (SD)	2.26 (0.510)	
Intrusion (Range = 1-4)	M (SD)	2.63 (0.597)	
Avoidance (Range = 1-4)	M (SD)	2.5 (0.639)	
Numbing (Range = 1-4)	M (SD)	1.77 (0.650)	
Hyperarousal (Range = 1-4)	M (SD)	2.11 (0.699)	

#### PTSD, PTSD- first 16 questions of HTQ part IV

Only 3.9% had a positive past psychiatric history, and 6.5% had a family history of psychiatric disorders. The PTSD scores measured on the HTQ are also shown in Table 1. PTSD had a mean score of 2.26 (SD = 0.51, R = 1-4). Intrusion and avoidance symptoms had the highest means (M = 2.63, SD = 0.59, R = 1-4 and M = 2.5, SD = 0.63, R = 1-4, respectively) compared to numbing and hyperarousal symptoms.

Table 2 displays typing and subtyping of common traumatic events, item loading, and frequencies and percentages of experiencing or witnessing among the participants. Prior to the PCA step, the frequencies and percentages of exposure to traumatic events were studied. Traumatic events that were extremely rare (experienced by less than 5%) were deleted because they did not provide enough information to maintain a meaningful grouping of items. From a total of 48 items, 25 were deleted. Examples of uncommon traumatic events were sexual violence; brainwashing; forced labor; witnessing the torture, murder, arrest or execution of others; witnessing chemical attacks; being confined to home; being forced to pay for bullets used to kill family members; receiving the body of a family member and being prohibited from mourning and burial rites; and having someone inform against a participant. Another item (suffering ill health without access to

medical care) was also canceled because its primary loading was less than 0.30 on the same factor. As a result, 22 variables remained that were suitable for PCA.

PCA yielded 6 trauma components, which altogether produced a cumulative variance of 50.1%. Every traumatic event subtype had a loading greater than 0.30 on one component and did not have a loading greater than 0.30 on the next component. The traumatic events were sorted as follows: 1. Trauma to or persecution of self, 2. Trauma to or abduction of family member or friend, 3. Forced immigration, 4. Lack of basic necessities, 5. Witnessed destruction, and 6. Coercion.

Table 2 Typing and Subtypes of traumatic events, item loading, and frequencies and percentages of occurring among IDPs. (N = 822)

Traumatic event	1	2	3	4	5	6	N (%)
Tortured (physical or mental suffering)	0.78						91(11.1)
Searched	0.71						152(18.6)
Oppressed because of ethnicity, religion, or sect	0.67						519(63.3)
Exposed to combat situation	0.48						391(47.7)
Forced to change religion	0.45						338(41.4)
Disappearance, hostage or kidnapping of family member		0.68					110(13.4)
Murder or violent death of friend		0.65					219(26.8)
Murder or violent death of family member		0.59					114(13.9)
Disappearance, hostage, or kidnapping of friend		0.54					318(38.9)
Serious physical injury of family member or friend		0.43					64(7.8)
Witnessed video film on a known person or places, content is violence		0.32					50(6.1)
Forced to leave hometown			0.91				782(95.4)
Expelled from city based on ancestral origin, religion, or sect			0.89				771(94)
Lack of food or clean water				0.82			640(78)
Lacked shelter				0.81			747(91.1)
Witnessed desecration or destruction of religious shrines					0.76		124(15.3)
Witnessed shelling, burning, or razing of residential areas					0.76		103(12.7)
Witnessed rotting corpses					0.57		128(15.7)
Forced evacuation under dangerous conditions						0.71	771(93.8)
Forced to hide						0.61	700(85.4)
Confiscation, looting, or destruction of personal property						0.55	793(96.5)

Types of traumatic events: 1. Trauma or persecution to self, 2. Trauma or abduction of others, 3. Forced immigration, 4. Lack of basic necessities, 5. Witnessed destruction, and 6. Coercion.

Table 3 shows the cumulative trauma events and rates of PTSD among the participants. The prevalence of PTSD among them according to the cutoff scores was 33.8%. Among those who were mildly traumatized (1-10 traumatic events), only 163 (30.9%) screened positive for PTSD compared to 69.1% who screened negative. Only 109 (38.1%) of the IDPs who experienced 11-20 traumatic events screened positive for PTSD. Of those who were severely traumatized (>20 traumatic events), 6 (66.7%) had a diagnosis of PTSD compared to only 3 (33.3%) who did not. All these differences were statistically significant ( $\chi^2 = 8.66, P < 0.05$ ).

Table 3 Cumulative trauma events and rates of PTSD among IDPs. (N=822)

Traumas experienced by each IDP	PTSD diagnosis		Total
	Positive	Negative	
N	N (%)	N (%)	N (%)
1-10 traumas	163 (30.9)	364 (69.1)	527 (100)
11-20 traumas	109 (38.1)	177 (61.9)	286 (100)
>20 traumas	6 (66.7)	3 (33.3)	9 (100)
Total	278 (33.8)	544 (66.2)	822 (100)

PTSD, PTSD- first 16 questions of HTQ part IV > 2.5,  $\chi^2 = 8.659$ ,  $df = 2$ ,  $P = 0.013$

Multiple linear regression analysis of subtypes of experienced traumatic event components as predictors of PTSD is demonstrated in Table 4. The overall regression model was significant  $F(6,811) = 4.618$ ,  $P < 0.001$ . Among the 6 types of traumatic components yielded by the PCA method, the types of individual trauma exposure that were significant predictors of the development of PTSD were unmet basic needs and having witnessed destruction ( $\beta = 0.096$ ,  $P < 0.05$  and  $\beta = 0.115$ ,  $P = 0.001$ , respectively). Lower PTSD scores were associated with forced migration ( $\beta = -0.103$ ,  $P < 0.05$ ).

Table 4 Types of the experienced traumatic events (by HTQ) as predictors of PTSD among Iraqi IDPs. (N=822)

Variables	Untenderized B	Standardized $\beta$	T	P	R <sup>2</sup>	F	P
					0.033	4.618	<0.001
Trauma or persecution to self	-0.159	-0.055	-1.438	0.151			
Trauma or abduction to others	0.014	0.006	0.155	0.877			
Forced immigration	-0.258	-0.103	-2.923	0.004			
Lack of basic needs	0.161	0.096	2.721	0.007			
Witnessed destruction	0.227	0.115	3.194	0.001			
Coercion	-0.056	-0.02	-0.548	0.584			

HTQ, Harvard trauma questionnaire, PTSD, PTSD- first 16 questions of HTQ part IV

To study the sociodemographic correlates (age, gender, marital status, religion, education level, occupation, and number of siblings) for PTSD, a binary logistic regression model was used (Table 5). Religion was not entered into logistic regression because the majority were Yezidis, and the number of individuals belonging to other religions, such as Muslims or Christians, was  $\leq 5$ . The table shows that sociodemographic variables were not risk factors for developing PTSD among the Iraqi IDPs except that being a widow was a strongly significant predictor (OR = 14.559,  $P = 0.001$ , 95% CI for OR = 2.933-72.274).

Table 5 Sociodemographic variables as predictors of PTSD among Iraqi IDPs. (N=822)

Demographic variables (reference)		P-value	OR	95%CI for OR
Age		0.357	1.007	0.993-1.021
Gender	Male (ref)		1.00	
	Female	0.089	0.738	0.52-1.047
Marital status	Single (ref)		1.00	
	Married	0.542	1.167	0.71-1.921
	Separated	0.195	5.11	0.433-60.369
	Widow	0.001*	14.559	2.933-72.274
Education	Illiterate (ref)		1.00	
	Primary	0.08	0.72	0.498-1.04
	Secondary	0.354	0.794	0.488-1.293
	Academic	0.494	0.715	0.273-1.871
Work status	Employed (ref)		1.00	
	Unemployed	0.996	1.001	0.629-1.594
Number of siblings		0.058	1.047	0.998-1.099
Psychiatric history	Negative (ref)		1.00	
	Positive	0.815	0.905	0.393-2.084
Family history	Negative (ref)		1.00	
	Positive	0.309	0.711	0.368-1.371

OR, Odd ratio, CI, Confidence interval, \*P-value <0.05

Table 6 demonstrates the comparison of the means and SDs of the GHQ-28 and its components among Iraqi IDPs with or without the diagnosis of PTSD. The scores of the total GHQ-28 and all its components were significantly higher in those diagnosed with PTSD than in those without the diagnosis ( $P < 0.001$  in all domains). The total GHQ-28 score was near the average cutoff mean ( $M = 13.32$ ,  $SD = 4.71$ ,  $R = 0-28$ ) among the IDPs with a diagnosis of PTSD. The mean scores of anxiety/insomnia and somatic symptoms were above the average cutoff means ( $M = 3.74$ ,  $SD = 1.98$ ,  $R = 0-7$  and  $M = 3.69$ ,  $SD = 2.14$ ,  $R = 0-7$ , respectively) among the IDPs with PTSD.

Table 6 Psychiatric symptoms by general health questionnaire (GHQ-28) among Iraqi IDPs with or without the diagnoses of PTSD.

	Range	PTSD <i>M (SD)</i>	No PTSD <i>M (SD)</i>	<i>t</i>	<i>df</i>	<i>P</i>
Total GHQ-28	0-28	13.32 (4.709)	8.75 (4.706)	13.171	820	< 0.001
Somatic symptoms	0-7	3.69 (2.140)	2.37 (2.172)	8.326	820	< 0.001
Anxiety/ insomnia	0-7	3.74 (1.978)	2.63 (1.887)	7.866	820	< 0.001
Social dysfunction	0-7	2.73 (1.831)	1.49 (1.714)	9.652	820	< 0.001
Severe depression	0-7	3.15 (1.338)	2.27 (1.349)	8.899	820	< 0.001

IDPs, internally displaced persons, PTSD, post-traumatic stress disorder mean score  $\geq 2.5$ , *t*, independent sample t test, *df*, degree of freedom, *P*, P value.

## Discussion

Our study provides evidence of mental distress after exposure to traumatic events endured by Iraqi IDPs resettled in IDP camps following the violent attacks by ISIS in 2014. It showed a 33.8% prevalence rate of PTSD and a high rate of psychiatric symptoms, especially anxiety, insomnia, and somatic symptoms. A higher number of traumatic events was associated with a higher rate of PTSD. Predictive traumatic events for PTSD were unmet basic needs and having witnessed destruction. Demographic factors did not predict PTSD except that being widowed increased the rate of PTSD by 14 times.

The high prevalence rate of PTSD (33.8%) found in our study is consistent with the rates of PTSD revealed in other studies performed on Iraqi refugees and displaced people after the events of 2014. A systematic review of the literature describing the prevalence rates of PTSD among resettled Iraqi refugees in Western countries finds a range from 8 to 37.2% [24]. Asylum seekers, refugees, and IDPs displaced to Iraqi Kurdistan showed a PTSD prevalence rate of 48.7% [25]. Tekin et al. [26] showed a rate of 42.9% among displaced Iraqi Yazidis. The rate was 36.4% among Yazidi children and adolescents who had immigrated to Turkey from Iraq [27]. Among other refugees inhabiting Iraqi Kurdistan camps, such as Kurdish Syrian refugees, the estimated levels of PTSD symptoms ranged between 35 and 38% [28]. This finding indicates the impact of mass conflict and displacement and the severity of the traumatic events that these respondents had experienced, including a combination of war and political, religious and ethnic violence. Several factors, such as different methodological approaches and demographic characteristics, may contribute to the differences in PTSD rates reported in other studies.

Among the 4 categories of specific PTSD symptoms, the intrusion symptoms suffered by the Iraqi IDPs participating in our study showed the highest means. Symptoms of avoidance were also relevant, with high means compared to numbing and hyperarousal symptoms. Iraqi refugees in Germany presented similarly, with nightmares as the most prominent symptom of PTSD [29].

Traumatic events among refugees and IDPs are not presented individually, but they are usually accumulated and interconnected [27]. There is a positive correlation between the number of experienced traumatic events and vulnerability to developing mental disorders [6]. Our study presented the effect of the number of traumatic events on the rate of PTSD. Approximately 66.7% of those who had experienced more than 20 traumatic events developed symptoms of PTSD. This indicates the cumulative effect of exposure to multiple traumatic events before and during the displacement time. The cumulative trauma index accounts for the increased prevalence rate of PTSD among Iraqi refugees [19]. This finding supports the dose-response relationship between traumatic exposure and PTSD among refugees in postconflict periods [30]. Among Syrian refugees in Turkey, experiencing 2 or more traumatic events was a significant predictor of PTSD [31].

Different subtypes of experienced traumatic events had different effects as predictors of PTSD. There were significant positive correlations between traumatic events and PTSD symptoms among Kurdish Syrian refugees in Iraqi Kurdistan camps [28]. In our study, the most significant predictors for the development of PTSD were unmet basic needs and having witnessed destruction. Unmet basic needs included becoming homeless with no access to health care and lack of food and water. This finding indicates that being deprived of basic elements of survival can have a predictive value in the development of PTSD among IDPs because of its direct impact on individuals. Having witnessed destruction included witnessing the destruction of religious shrines; the shelling, burning, or razing of residential areas; and rotting corpses. Witnessing these violent events, which are associated with losing the homeland and religious persecution, exacerbates war impacts. The most painful or terrifying traumatic event recounted by the survivors of "Anfal", a military operation against the Kurds of northern Iraq, was witnessing murder [32]. Additionally, trauma subtypes provided even more entropy than the cumulative trauma effect in the prediction of PTSD [19]. The study showed that unmet basic needs was a stronger risk factor for depression than for PTSD.

When we searched for sociodemographic predictors of PTSD among Iraqi IDPs, marital status was the only component that acted as a predictive factor. The severity of experienced traumatic events and the short period between traumatic exposures and the assessment (less than 1 year) made the IDPs perceive the traumas more collectively and more similarly than respondents in other studies. A study conducted on Yazidis found that no sociodemographic predictors for PTSD among the surviving Yazidi women and girls except the number of family members directly affected by ISIS [4]. Being a widow increased the risk of developing PTSD by 14 times. Not having a partner is associated with poor mental health owing to the lack of the social support provided by a partner and the sense of increased responsibility for raising the children and increased worry about the future. Additionally, widows may have witnessed the killing of their husbands by ISIS soldiers. This finding indicates that poor social support is a strong predictor of PTSD among Iraqi IDPs. Those who were widowed prior to the 2014 events may have been affected by prior loneliness and its mental consequences, aggravating their vulnerability to PTSD [33]. Following traumatic events, the incidence of PTSD is significantly higher in widows than in married women with living spouses. Among the Rwandan population, 87% of widows suffered from panic disorders and had a higher incidence of psychopathology, including PTSD [34].

Our study clarified the occurrence of mental health disturbances in addition to PTSD among Iraqi IDPs. The comorbid psychiatric problems detected among those suffering from PTSD in comparison to the non-PTSD-affected group were somatic symptoms, anxiety/insomnia, social dysfunction and severe depression. The most frequently observed psychological problem with higher means was anxiety/insomnia. The reason could be the severe stress experienced during the attacks and during displacement, or it could be PTSD and depression. Anxiety

and insomnia can be part of or can aggravate the hyperarousal component of PTSD psychopathology [35]. Although the relationship between sleep and PTSD appears to be more complex than can be explained by the current PTSD paradigm [36], the research suggests that experiencing traumatic events can lead to sleep problems, and posttraumatic stress can interfere with sleep. Another explanation is that hypervigilance, an important symptom of PTSD, can lead to regional arousal states and in turn produce insomnia [37].

In addition to anxiety insomnia, somatic symptoms were more prominent among IDPs. The relationship between traumatic experiences, PTSD, and somatic symptoms has been well reported [38]. Biologically, PTSD is associated with instability in the limbic system and interferes with the hypothalamic-pituitary-adrenal and sympatho-adrenal medullary axes, which interfere with neuroendocrine functions, resulting in pseudoneurological somatic symptoms [37]. Psychologically, there are two somatic complaint factors related to PTSD psychopathology: the first is related to the physical perceptions of bodily dysfunctions and is called “weakness,” and the second is related to sympathetic hyperactivation and is called “arousal [38].” A high correlation between the somatic and syndrome scales and the PTSD checklist was found among Cambodian refugees [39].

Our study showed that the IDPs with HTQ scores above the PTSD cutoff score have higher depression means than those without PTSD. This high rate of depression accompanying PTSD may be due to the effect of loss, which is usually accompanied by trauma, especially in conflict-affected populations, and often involves the deaths of family members, relatives, or friends [40]. On the other hand, exposure to traumatic events and PTSD can be a risk factor for depression. Furthermore, the poor financial situation of the IDPs can explain the high rates of depression. Among IDPs in Kaduna, northwestern Nigeria, comorbid PTSD was a predictive factor of depression [41].

This study is not devoid of limitations. Because the sample was taken from only one IDP camp, omitting IDPs inhabiting informal settlements and within cities, it is difficult to determine whether it is representative. Those with a history of psychiatric disorders prior to displacement were excluded from participating in the study. The strength of this study is the careful assessment of PTSD and other mental problems by six well-trained Kurdish psychological counselors who did not need the help of interpreters and did not use self-reported questionnaires. Additionally, they were able to select probable cases and refer them to suitable mental health services. Furthermore, this is a rare study that highlights the cumulative and qualitative effects of trauma exposure in IDPs who have recently escaped from severe terroristic attacks to displacement camps.

## Conclusions

The results of this study provide evidence of the high prevalence rate of PTSD among Iraqi IDPs living in displacement camps in northern Iraq. The number of experienced traumas was positively correlated with the symptom severity of PTSD. Unmet basic needs and having witnessed destruction were the most impactful traumatic events. Anxiety, insomnia, and somatic symptoms had high levels of comorbidity with PTSD. The results of our study provide a better understanding of the mental health of Iraqi IDPs and a cross-cultural understanding of the effects of mass conflicts and displacement. Furthermore, the results of this study have possible applications for governmental and nongovernmental organizations and those who supply psychosocial support for Iraqi IDPs.

## Abbreviations

ISIS: Islamic State of Iraq and Syria; PTSD: posttraumatic stress disorder; IDPs: Iraqi internally displaced persons; HTQ: Harvard Trauma Questionnaire; GHQ: General Health Questionnaire; UN: The United Nations; AISPO: Association for Solidarity among People (Italian nongovernmental organization); SPSS: Statistical Package for the Social Sciences; PCA: Principal component analysis.

## Declarations

### Ethics approval and consent to participate

The scientific committee of the College of Medicine/University of Duhok and the Research Ethics Committee of the Duhok Directorate of Health approved the study (Reference number: 08042015-09-02). The participants provided with written informed consents before conducting interviews.

### Consent for publication

Not applicable

### Availability of data and materials

All data generated or analysed during this study are included in this published article and its supplementary information files.

### Competing interests

No conflict of interest is declared by the authors and the funders.

### Funding

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### Authors' contributions

PHT, NIT, and HMS were all contributors to the design, planning and implementation of the current study. PHT conceptualized and designed the study, review, revised the manuscript, carried out the statistical analyses and preparation of submission files. NIT participated in the design of the study, coordinated and supervised data collection, interpreted the data. HMS coordinated data collection, reviewed statistical analysis, and edited the draft manuscript. All authors contribute to the writing of the manuscript and all read and approved the final manuscript.

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