Research Square

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Prevalence and Associated Factors of Posttraumatic Stress Disorder in Victims of the Eseka Train Disaster in Cameroon: A Cross-sectional Study

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Abstract

Background

Railway disasters, such as the one that occurred in Eseka on October 21st, 2016, can result in severe physical trauma and may predispose victims to mental disorders such as posttraumatic stress disorder (PTSD).

Objectives

This study aimed to assess the prevalence of PTSD among survivors and identify associated risk factors.

Methods

We conducted a cross-sectional analytical study involving victims of the Eseka train disaster who received care at the Yaounde Emergency Center and Yaounde Central Hospital. Data were collected using a structured questionnaire that included sociodemographic information, personal and family history of psychiatric disorders, details of physical injuries, and the PTSD Checklist for DSM-5 (PCL-5).

Results

A total of 71 participants were enrolled, with a slight predominance of females (sex ratio 1.03). Statistically significant associations were found between PTSD and female gender ($p = 0.004$, OR = 4.32), student status ($p = 0.02$, OR = 4.48), and pelvic injury ($p = 0.03$, OR = 6.4). Nevertheless, multivariate analysis showed that only female gender had statistically significant association with PTSD ($p = 0.03$, adjusted OR = 3.87).

Conclusion

Approximately one-third of the Eseka train disaster survivors developed PTSD, underscoring the need for integrating long-term mental healthcare in disaster management systems in Cameroon. Further research is warranted on a larger and more inclusive cohort of the train disaster victims in order to consolidate our findings.

Introduction

The Eseka train disaster, which occurred on the 21st October 2016 led to mass casualties in which 550 victims were injured while 79 people died according to official reports(1). In addition to physical injuries,

it was assumed that the survivors may have sustained psychotrauma which further led to the development of posttraumatic stress disorder which is the interest of our study.

Posttraumatic stress disorder (PTSD) is a common psychiatric disorder that can result after an individual experiences a traumatic event. PTSD has a broad clinical presentation but is characterized by symptoms impairing cognition, mood, somatic experience, and behavior. PTSD can cause chronic impairments, lead to comorbid psychiatric illness, and lead to an increased risk of suicide(2).

To this date, few studies exist concerning PTSD in survivors of railway disasters. For the railway accident that occurred in Clapham, Selley et al found that thirty percent of survivors had avoidance and intrusion symptoms of PTSD(3). Concerning the railway crash of Viarregio in Italy, prevalences of 50.4% and 59.5% were respectively found by Mauri et al and Miniati et al(4, 5). Meanwhile the PTSD rate in passengers victim of the Odisha train accident was 20.7%(6).

There is no data available concerning prevalence of PTSD in survivors of train disasters in Cameroon. Thus, a study was conducted in order to determine the prevalence of PTSD and associated factors in survivors of the Eseka railway disaster who were attended and admitted in Yaounde Central Hospital and Yaoundé Emergency Center.

Materials and methods

Study design: This was a cross-sectional study conducted at Yaounde Central Hospital and Yaounde Emergency Centre from February 2nd 2017 to July 31st 2017. These facilities were selected because they received and managed the majority of casualties from the Eseka railway disaster.

Study population: It focused victims of the Eseka railway disaster who were managed in the aforementioned hospitals.

Inclusion criteria: Were included in the study, victims who were 18 years and above and who consented to participate in the study.

Exclusion criteria: Those who declined to participate or whose contact information was unavailable were excluded from the study.

Sampling method: It was a non-probabilistic sampling with consecutive and exhaustive recruitment of eligible participants during the study period.

Study materials: A questionnaire consisting mainly of sociodemographic data, family psychiatric history, past history of physical trauma and types of injuries sustained due to the accident was used for the interview. This **questionnaire was developed for this study (see supplementary file)**.

The PTSD screening tool was the PCL-5. PCL-5 is a scale for assessment and diagnosis using the DSM 5 criteria which was developed in 2013 for the National Centre of PTSD in USA(7). It consists of 20

questions which assess the presence and degree of symptoms of the PTSD in DSM 5 in the past one month. For each of the 20 questions corresponds 5 response options to which a notation ranging from 0 (absent) to 4 (extremely) is attributed for a total score ranging from 0 to 80. Screening test is positive for a score ≥ 30(7).

Bias: In order to mitigate bias, the following measures were implemented. The use of standardized questionnaire and the validated tool PCL-5 was to ensure consistency across participants. In order to minimize recall bias, the medical records were used to corroborate the data on injury. Clear inclusion and exclusion criteria were applied to maximize internal validity. Finally, in order to adjust for potential confounders, a multivariate logistic regression was performed.

Procedures: Ethical approval and research authorization were obtained from the participating hospitals. Patient medical records were reviewed to retrieve contact information and details of sustained injuries. Participants were contacted individually by telephone, informed about the study, and invited to participate. Upon consent, they were interviewed using the structured questionnaire and the PCL-5 screening tool. Medical records were also used to corroborate injury data.

Ethical Considerations: Informed and voluntary consent was obtained from all participants prior to data collection. Confidentiality and anonymity were maintained throughout the study.

Data collection: The participants were individually interviewed with a questionnaire consisting of sociodemographic data, past history of personal or family history of psychiatric disorder, mental healthcare follow-up after the incident and the PCL-5 screening tool for PTSD. The medical files were used to obtain data concerning injuries.

Statistical methods: Data collected was processed and analyzed using Excel 2013, Epi INFO 7.0 and SPSS 23. Frequencies, means, Odds ratios and Chi-square methods were used in the analysis of variables. The degree of association between variables were considered significant when the p value was less than 0.05. Multivariate logistic regression was done to adjust for confounders.

Results

One hundred and forty-one victims of the Eseka railway disaster were managed at Yaounde central Hospital and Yaounde Emergency Centre. Out of these, 5 were excluded because they were younger than 18 years. Among the remaining 136 eligible survivors, 65 were not enrolled (35 could not be contacted, 20 declined participation and 10 had incomplete or unavailable records). Thus, the final analytic sample comprised 71 participants. It consisted of 36 females (50.7%) and 35 males (49.3%). The mean age was 39.36 ± 12 years with ages ranging from 18 to 72 years. Socio-demographic characteristics of the study sample are presented in Table 1.

Table 1
Socio-demographic characteristics

Age (years)	**Mean/SD**
	39.36 ± 12 (Range 18–72)
Gender	N (%)
Male	35 (49.3)
Female	36 (50.7)
Marital status	N (%)
Single	25(35.2)
Married	41(57.8)
Divorced	2(2.8)
Widowed	3(4.2)
Employment status	N (%)
Student	13 (18.3)
Employed	28 (39.5)
Self-employed	17 (23.9)
Unemployed	13 (18.30)
Educational level	N (%)
Primary	8 (11.3)
Secondary	28 (39.4)
University	35 (49.3)

In our series, 17 (23.9%) participants had a personal or family history of psychiatric disorders; while only 23 (32.4%) participants received mental healthcare follow-up after the accident.

Concerning injury profile, majority of participants sustained spinal injuries 36.6% followed by head/face injuries (31%) as shown in Fig. 1. There were no thoracic nor abdominal injuries documented nor reported.

Of the seventy-one participants, 23 had a score ≥ 30 on the PCL-5 tool. Thus, the prevalence of PTSD in this study was 32.4% as illustrated in the Fig. 2 below.

The association of PTSD with the demographic factors is shown in the Table 2 below

Table 2

Bivariate Analysis of demographic factors and PTSD. Sociodemographic factors associated with post-traumatic stress disorder (PTSD) among victims of the Eseka train disaster. Odds ratios (OR) with 95% confidence intervals (CI) and p-values are presented for age, gender, marital status, education, and occupation. Significant associations were observed for gender, marital status, and occupation (significant if < 0.05).

Variable	PTSD (+) N (%)	PTSD (–) N (%)	Total	OR (95% CI)	p-value
Age (years)					
18–30	7 (36.8)	12 (63.2)	19	1.31 (0.52–5.01)	0.20
30–40	5 (23.8)	16 (76.2)	21	0.55 (0.22–2.36)	0.31
40–50	7 (41.2)	10 (58.8)	17	1.66 (0.47–4.37)	0.27
50–60	3 (42.9)	4 (57.1)	7	1.65 (0.41–11.87)	0.20
60–70	1 (16.7)	5 (83.3)	6	0.39 (0.04–3.47)	0.35
≥ 70	0 (0.0)	1 (100.0)	1	–	0.67
Gender					
Male	6 (17.1)	29 (82.9)	35	0.24 (0.08–0.70)	0.004
Female	17 (47.2)	19 (52.8)	36	4.32 (1.44–13.2)	0.004
Marital status					
Single	11 (44.0)	14 (56.0)	25	2.40 (0.80–6.70)	0.05
Married	9 (22.0)	32 (78.0)	41	0.30 (0.10–0.85)	0.01
Divorced	1 (50.0)	1 (50.0)	2	2.13 (0.12–35.0)	0.55
Widow	2 (66.7)	1 (33.3)	3	4.40 (0.30–51.0)	0.24
Education level					
Primary	3 (37.5)	5 (62.5)	8	1.26 (0.23–5.99)	0.53
Secondary	8 (28.6)	20 (71.4)	28	0.72 (0.25–2.04)	0.36
University	12 (34.3)	23 (65.7)	35	1.24 (0.45–3.43)	0.43
Occupation					
Student	8 (61.5)	5 (38.5)	13	4.48 (1.22–16.84)	0.02
Employed	5 (17.9)	23 (82.1)	28	0.32 (0.09–0.98)	0.04
Self-employed	8 (47.1)	9 (52.9)	17	2.25 (0.70–7.05)	0.13
Unemployed	2 (15.4)	11 (84.6)	13	0.31 (0.04–1.43)	0.12

The PTSD rate among participants with a personal or family history of psychiatric disorders was 41.2% but no significant association was found. The frequency of PTSD was also higher among those who did not receive mental healthcare follow-up after the accident (31.4% compared to 26.1%). However, no significant difference or association was observed (p = 0.22, OR = 0.66).

There was significant association between pelvic injuries and PTSD (p = 0.03, OR = 6.4) as shown in Table 3 below.

Table 3. Bivariate Analysis of Injuries and PTSD among participants. Distribution of PTSD by injury type among victims of the Eseka train disaster. Odds ratios (OR) with 95% confidence intervals (CI) and p-values are shown (significant if <0.05). Pelvic injury was significantly associated with increased odds of PTSD.

Injury	PTSD (+) N (%)	PTSD (-) N (%)	Total	OR (CI 95%)	P –value
Head/face injury	7 (31.8)	15 (68.2)	22	0.96 (0.33 –2.82)	0.47
Spinal Injury	9 (34.6)	17 (65.4)	26	1.17 (0.42 –3.27)	0.31
Chest Injury	5 (26.3)	14 (73.7)	19	0.65 (0.20 –2.11)	0.34
Upper Limb Injury	7 (33.3)	14 (66.7)	21	1.06 (0.35 – 3.14)	0.45
Lower Limb Injury	4 (33.3)	8 (66.7)	12	1.05 (0.28 - 3.9)	0.59
Pelvic Injury	**5(71.4)**	**2(28.6)**	**7**	**6.4 (1.13- 35.96)**	**0.03**

The multivariate analysis of significant factors is shown in Table 4 below.
Table 4: Multivariate Analysis of Factors Associated with PTSD: Female gender was the only factor significantly associated with PTSD **(adjusted OR = 3.87, 95% CI: 1.14–13.16, p = 0.030)**, while pelvic trauma showed a borderline association **(adjusted OR = 6.56, 95% CI: 0.78–55.38, p = 0.084).**

Term	Adjusted Odds Ratio	95% C.I. (Lower–Upper)	P-Value
Employed	0.5321	0.1361 – 2.0804	0.3644
Student	1.7701	0.3184 – 9.8422	0.5141
Female	3.8705	1.1383 – 13.1608	0.0302
Married	0.5142	0.1444 – 1.8312	0.3047
Pelvic injury	6.5604	0.7771 – 55.3836	0.0839

Discussion

In our study, twenty-three participants tested positive for PTSD, resulting in a prevalence of 32.4%. This rate is lower than those reported by Mauri et al. and Miniati et al., who found prevalences of 50.4% and 59.5%, respectively, among survivors of the Viareggio railway accident in Italy(4, 5). The discrepancy may stem from methodological differences. For example, Mauri and Miniati recruited participants from psychiatric services, whereas our study invited individuals to participate directly. Another possible factor is the smaller sample size in our study. It is noteworthy that 27.1% of participants in Mauri et al.'s study reported losing someone in the accident(4); while only one participant in our study reported such a loss. However, our findings exceed those of Kar et al., who reported a PTSD prevalence of 20.7% among victims of the Odisha train accident in India(6). PTSD prevalence was highest in subjects with age range 50 to 59 years (42.8%). This gets close the findings of Miniati et al who had a mean age of 51.5 years for subjects with PTSD(4).

Prevalence of PTSD was significantly higher in female subjects (47.2% $p = 0.004$). Qualitatively, this is closer to the results of Miniati et al who had a prevalence of 57.6% in female victims(4). this supports the notion that female population is more vulnerable to trauma and have more risks of developing PTSD compared to male population(8). Psychosocial and biological factors relying on the interactions of oxytocin on the amygdala could also account for this vulnerability(9).

The frequency of PTSD was significantly reduced in married subjects (OR 0.3 $p = 0.01$). This contrasts to the results of Miniati et al who found a higher prevalence of PTSD in married subjects (4). This could be explained by the fact that married subjects benefitted from moral and social support from their partners and families; the latter may have also encouraged them to seek for mental health services.

In our study, the prevalence of PTSD among university students was notably high, with 61.5% affected ($p = 0.02$). This elevated rate may be partly explained by the presence of underlying depression and anxiety symptoms, which are common in this population. Supporting this, Cusack et al. demonstrated a strong association between baseline symptoms of depression and anxiety and the development of PTSD in college students, highlighting the interplay between these mental health conditions(10). Another explanation could be to the fear of the consequences of physical injuries which could lead to loss of academic year and reduced quality of social life

Subjects who were employed had significantly low frequency of PTSD ($p = 0.04$). This could due to the social security and insurance they may have benefited from their employers.

The frequency of PTSD was higher among subjects with a past history of psychiatric illness (41.2%), but no significant association was found. Nevertheless, this finding is similar to that of Miniati et al., who reported a higher frequency of PTSD in victims with a past psychiatric history(4). This further confirms that psychiatric comorbidities increase the risk of developing PTSD (11). Jack et al stipulated that mental health interventions for post disaster trauma helped to foster resilience and recovery(12). This is

shown in our study whereby victims who had mental healthcare follow up after the Eseka train disaster had lower rates of PTSD than those who did not benefit from any mental healthcare.

The frequency of PTSD was highest in victims with pelvic injury (71.4% p = 0.03). This could due to the severe pain and functional impairment generated by the injury. It should also be noted that peritraumatic pain could be predisposing factor for the development of post-traumatic stress disorder(13). Our findings corroborates those of McMinn et al who found that sustaining a traumatic pelvic injury is associated with increased risk of diminished quality of life, both mentally and physically, with patients having higher levels of PTSD even one-year post-injury(14).

Despite the associated factors discussed above, multivariate analysis showed that only the female gender had a significant association to PTSD while pelvic injury had a strong but non-significant association to PTSD **(**Table 4**)**. This could be explained by the effect of confounders and the bias from our small sample size.

Limitations of this study include a small sample size, primarily due to the limited availability of contact information of victims. The study focusing only on hospital-managed survivors in the city of Yaounde may also account for the small sample size. Additionally, the study design did not allow for long-term follow-up, which may have hindered the identification of individuals who developed post-traumatic stress disorder (PTSD) after the initial interview period.

Generalizability

Since our cohort focused on victims who were managed at the aforementioned hospitals, our results may not be generalized to a broader population including those who did not sustain any physical injury or family members of victims. However, these results could portray the prevalence of PTSD in all the hospital-managed victims of the Eseka train disaster who were managed in other hospitals in Cameroon.

Conclusion

Despite the limitations mentioned above, the study provides information on the prevalence and associated factors of PTSD in survivors of the Eseka train disaster. Hence, 32.4% of participants developed PTSD with female gender, pelvic injury and university students being significantly associated. Subjects who were employed and married had significantly lower frequencies of PTSD implying a relative protective factor. This work highlights the presence of PTSD in survivors of disasters such as the Eseka train disaster and the importance of integrating mental healthcare as part of the management response for survivors of disasters in Cameroon. Although this is the first study assessing prevalence in train disasters in Cameroon, further studies on larger and more inclusive cohort of victims of the Eseka train disaster should be conducted in order to consolidate our findings.

Declarations

1. Funding: The work did not benefit from any funding from any organization nor is there any financial activity associated to this work.

2. Conflicts of interest: The authors declare no conflict of interest

3. Ethics approval: Approval for the research was given by the Ethical Committee of Université des Montagnes (**Authorization N° 2017/034/PR/UdM/CIE**).

4. Consent to participate: All the participants gave voluntary consent for the publication of the information in this work on the condition that his identity remains hidden.

5. Written Consent for publication: All the participants provided written informed consent while their identities were hidden. The study adhered to the principles in the Declaration of Helsinki.

6. Clinical Trial Number: Non-applicable

7. Availability of data and material: All data generated during this study are included in this manuscript and are available upon request to the corresponding author.

8. Code availability: Non-Applicable

9. Large Language Model (LLM): No Large Language Model was used.

10. Authors' contributions

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Supervision: Vincent de Paul Djientcheu, Jean-Pierre Kamga Olen, Gilbert F.O Ngongang

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Figures

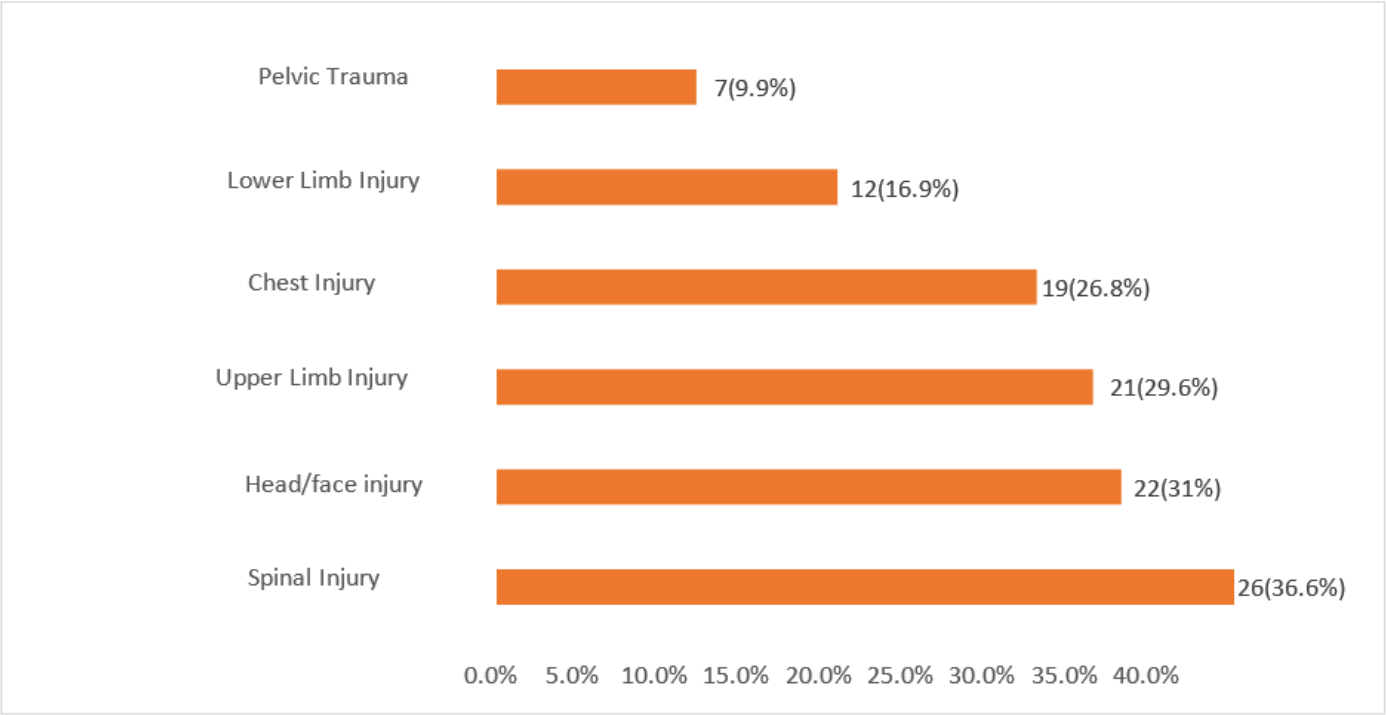


Figure 1

Distribution of injuries

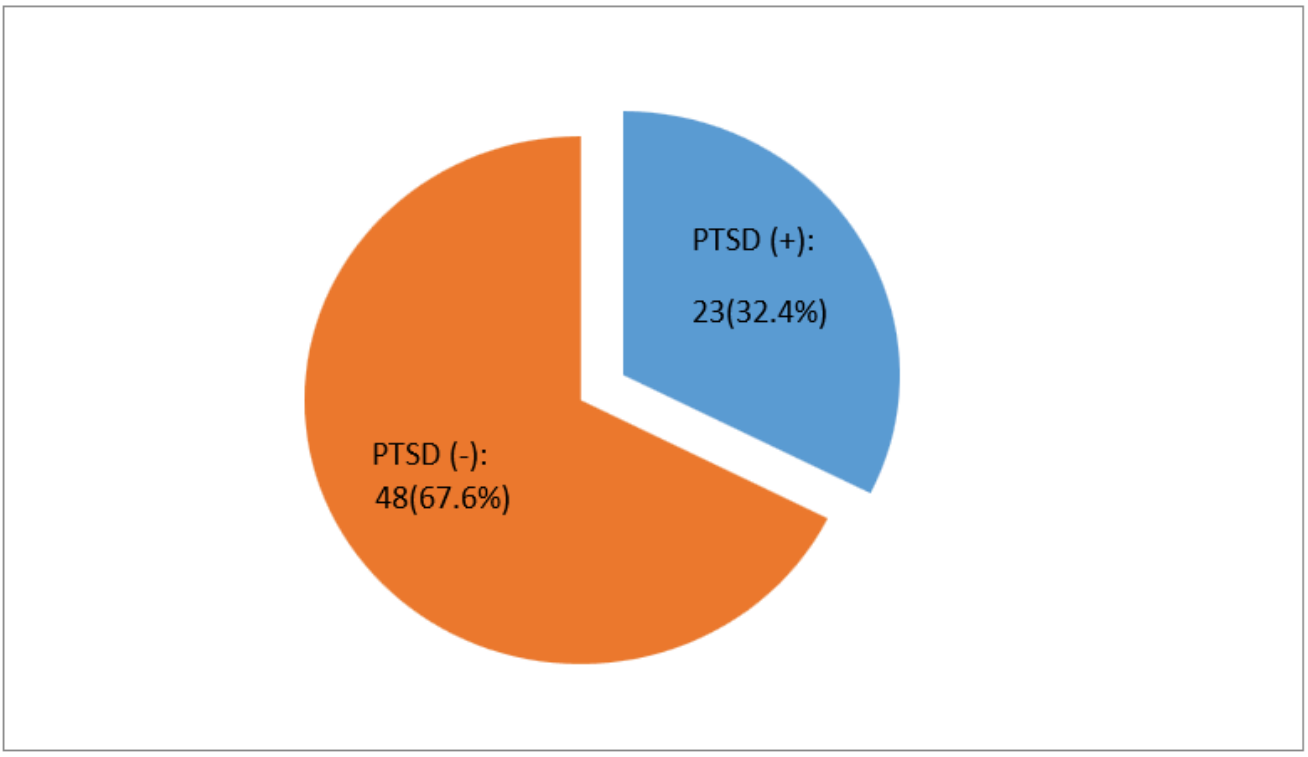


Figure 2

Prevalence of PTSD in the participants