

Factors that contribute to the Development of Psychiatric Symptoms in Physical Trauma Survivors at the University Teaching Hospital in Lusaka, Zambia, 2019

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Abstract

Background: Worldwide 5.8 million people die each year and 45 million are moderately or severely disabled following physical trauma making physical trauma responsible annually for 10% of deaths and 16% of all disabilities. Psychiatric symptoms are common in trauma survivors. It is important to recognize these symptoms early and to identify interventions that will improve treatment outcomes and quality of life of survivors.

Objectives: The aim of this study was to identify the factors that contribute to the development of psychiatric symptoms among physical trauma survivors.

Method: A prospective longitudinal cohort study was conducted in which a total of 162 physical trauma patients were enrolled shortly after admission to the University Teaching Hospital surgical wards and followed up for a period of 12 weeks. Enrolled physical trauma survivors underwent periodic psychiatric evaluation at enrollment, at four weeks post enrollment and at twelve weeks post enrollment. The main outcomes were measured using the Brief Psychiatric Rating Scale, a psychological tool that is used to screen for psychiatric symptoms. Pearson correlations analyses were used to explore factors that contributed to development of psychiatric symptoms.

Results: Overall, 93.7% of the participants had significant mental health symptoms on enrollment. This decreased to 29.4% at 12 weeks post enrollment. The common psychiatric symptoms noted were anxiety, depression, somatization, guilt, and suicidality. The factors affecting the development of psychiatric symptoms identified in this study were the age and sex of participants, the presence of social support, the mechanism of injury and the severity of injury.

Conclusion: Psychiatric symptoms are quite common in physical trauma survivors affecting upto 29.4% of survivors at 12 weeks post trauma. The main factors contributing to the development of psychiatric symptoms include age and gender of individual, the presence of social support, the mechanism of trauma and the severity of trauma.

Keywords: Psychiatric symptoms; Physical trauma; Anxiety; Stress

Introduction

Trauma refers to events or circumstances that are experienced as harmful or life threatening and that have lasting impacts on mental, physical, emotional, and/or social well-being. Trauma can be physical, psychological, emotional, and social or a combination of these types [1-4].

Physical trauma is a serious, life threatening physical injury to the body potentially resulting in life threatening complications such as shock, respiratory failure, and death. Physical trauma can be caused by road traffic accidents, assaults, natural disasters, occupational injury, sporting activities, falls and others [5]. Worldwide 5.8 million people die each year [1] and 45 million are moderately or severely disabled following physical trauma [2]. Survivors of everyday physical trauma resulting from road traffic accidents, assaults, occupational injuries, falls and others, experience a spectrum of emotional reactions [6,7] which can cause distress and dysfunction. For the majority, this response is transient, but it can be followed by a prolonged disorder in the minority, presenting with psychological morbidity such as anxiety, depression, acute stress disorder and post-traumatic stress disorder at 6 months and 12 months [8]. There are many characteristics of physical trauma that contribute to whether an individual experiences being injured as a traumatic event. These may include the perception of fear, helplessness, or horror at the time of the event, the experience of invasive and painful hospital procedures, and dealing with the consequences of the injury such as disability, disfigurement, and pain [9]. Therefore, left untreated, sub-clinically elevated psychological distress is associated with increased risk of psychological disorder requiring lengthy and expensive treatment interventions [10-12].

Materials and Methods

Study design

This was a longitudinal cohort study design, that involved following up of individuals who had experienced physical trauma for a period of 12 weeks. The follow up was done periodically, at

enrolment, which was within 2 weeks of the trauma, at 4 weeks and at 12 weeks post physical trauma. The same psychological tool was used during all the follow up times, this being the brief psychiatric rating scale and the presence or absence of psychiatric symptoms as well as their severity was scored at all follow up times.

Study site

This study was conducted in the Department of Psychiatry and the Surgical wards at the University Teaching Hospital. The recruitment was conducted in the University Teaching Hospital surgical wards and the follow up was conducted from the Department of Psychiatry. The study was conducted from 1st April, 2019 to October, 2019 spanning a period of 6 months.

Target population

This study was targeted at all surgical patients admitted to the University Teaching Hospital casualty and all surgical wards.

Study population

This study was conducted on surgical patients with a diagnosis of physical trauma admitted to the University Teaching Hospital surgical wards who met the inclusion criteria. This included road traffic accidents victims, assault victims, victims of occupational and sporting injuries as well as victims of accidental falls who presented to the University Teaching Hospital and were admitted to the surgical wards.

Selection criteria

Inclusion criteria

- Patients with a diagnosis of physical trauma admitted for at least 24 hours
- Patients with no history of mental illness
- Patients aged 18 and above.

Exclusion criteria

- Patients with severe head injury
- Patients on steroids or Efavirenz based regimens
- Victims of sexual assault.
- Inebriated patients

Sampling procedure

Participants were sampled using systematic sampling procedure. The first thing that was done was determining the population of physical trauma patients that were admitted to the University Teaching Hospital in a month as this was the time period that was used to recruit participants. On average the monthly population of physical trauma patients at UTH is 660. The recruitment was done over a period of 4 weeks. The sample size was estimated at 162, and for this to be possible a sampling interval of 4 was used. This was arrived at using the formula $K(\text{sampling interval}) = N(\text{Population size})/n(\text{sample size})$. $K = 660/162 = 4.04$. The first participant was picked randomly but the subsequent participants were picked following an interval of 4. Therefore, every fourth patient was picked.

Sample size

$$N = Z^2 \times P(1-P) / (E)^2$$

$$N = (1.96)^2 \times 0.1(1-0.9) / (0.05)^2$$

$$N = 138.30$$

$$N = 138.30 / 0.85 \text{ (arbitrary fallout)}$$

$$N = 162.35$$

Above formula was used to calculate the sample size of 138 at 95% confidence interval

$$N = \text{Sample required}$$

$Z = Z$ statistic for a given level of confidence = 1.96 when using a 95% CI

$P =$ The expected prevalence of the condition in the population being studied which is 10%

$E =$ confidence interval, usually 0.05 = this refers to the accuracy range ($\pm 5\%$)

Study procedure

Patients with a diagnosis of physical trauma and meeting the inclusion criteria were recruited into the study using systematic sampling procedure. The enrolment process involved an explanation of the study in details to the physical trauma patients, as well as the follow up procedure. Once the individuals understood the study and its purpose, informed consent was obtained, and the participants consented by signing the consent form. The witness subsequently signed the witness form. Detailed clinical history and demographic information was collected from each patient and a review of the patient file was conducted.

All patients were administered the Brief Psychiatric Rating Scale (BPRS) on recruitment and categorized into low risk and high risk based on the individual scores on the scale. The Brief Psychiatric Rating Scale (BPRS) is a rating scale used to measure psychiatric symptoms such as depression, anxiety, hallucinations, and unusual behaviour. Each symptom has a rating of one to seven and a total of 24 symptoms are scored. Basing on the scale, a mildly ill patient had a score of at least 31, moderately ill patients had a score of 41 and severely ill patients had a score of at least 53. For purposes of this study the scores were grouped into two groups, with one group being a low risk group (scores less than 35) and the other group being a high-risk group (scores of at least 35).

All participants were followed up at four weeks post trauma at which point the BPRS scale were administered to them again. Just as in the initial stage the participants were grouped into low risk and high risk based on how they scored on the scale.

The scores at the various stages were used to analyse the spectrum of mental health symptoms suffered by the physical trauma patients within the 12 weeks of follow up. The follow ups were done at pre-set times which were at 4 weeks after initiation and then at 12 weeks. The follow-ups were done in person and the patient was reminded via phone about the

follow up a few days before the actual date. The follow ups were made more convenient by ensuring that they coincided with the review dates for the department of surgery. The patient symptoms were scored at each follow up using the BPRS.

Nineteen (19) patients were lost to follow up accounting for 11.72% of participants. Efforts were made to contact these patients by phone and through their next of kin, but all efforts proved futile.

Data collection tools

To aid with data collection, a number of tools were used the main ones being the brief psychiatric rating scale, the data collection sheet, and the patient file.

Brief Psychiatric Rating Scale (BPRS): The brief psychiatric rating scale is a rating scale that a clinician and researcher can use to measure psychiatric symptoms such as depression, anxiety, somatic concern, guilt, hostility, and many others.

Data collection sheet: A data collection sheet was used to collect demographic and clinical data for each of the patients

Data analysis: Data was analysed using Statistical Packaging for Social Sciences (SPSS) version 26. Descriptive statistics (Frequencies and descriptives) of various symptoms were analysed in order to determine the prevalence of psychiatric symptoms. Correlations between psychiatric symptoms and demographic as well as clinical characteristics were conducted using Pearson correlations to determine whether there was any association between them and thereby identify the factors that contribute to the development of psychiatric symptoms in physical trauma survivors.

Results

Prevalence of psychiatric symptoms

Overall, 93.7% of the participants had significant psychiatric symptoms on enrolment (**Table 1**). This decreased to 31.7% at four weeks post enrolment and further reduced to 29.4% at 12 weeks post enrolment. The most prevalent psychiatric symptom was anxiety at 37.6% on enrolment, reducing to 18% at 4 weeks post enrolment and 14.1% at 12 weeks post enrolment. This was followed by depressive symptoms accounting for 18.75 on enrolment, reducing to 11.2% at 4 weeks and 11% at 12 weeks follow up. Guilt was common with a prevalence of 15.5%, 2.5%, and 0.6% at enrolment, four weeks, and six weeks, respectively. Somatization had a prevalence of 9.3%, suspiciousness at 8%, suicidality at 3.1%, hallucinations at 2.5% and disorientation and blunted affect both at 1.8%.

Symptom	Prevalence on Enrolment(%)	Prevalence at 4 weeks(%)	Prevalence at 12 weeks(%)
Somatic concern	9.3	0	3.1
Anxiety	37.6	18	14.1
depression	18.7	11.2	11
Suicidality	3.1	0	0

guilt	15.5	2.5	0.6
Suspiciousness	8	0	0.6
Hallucinations	2.5	1.2	0
Disorientation	1.8	1.2	0
Blunted affect	1.8	0	0
Hostility	1.2	0	0
Symptoms were most prevalent at 37.6% on enrolment reducing to 14.1% at 12 weeks post trauma			

Table 1: Prevalence of Psychiatric symptoms from enrolment to follow up Anxiety.

Clinical characteristics of participants

The clinical characteristics of the participants were assessed with regards to the mechanism of physical trauma suffered, the severity of the trauma and the treatment modality employed in managing the patients shown in **Figures 1-3**.

Mechanism of trauma

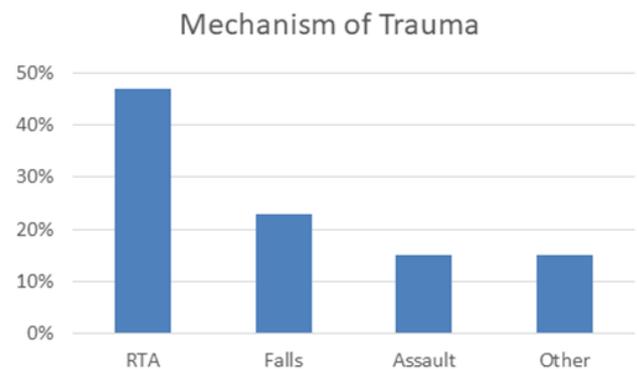


Figure 1: RTA was the most common mechanism of trauma standing at 47%.

Severity of trauma

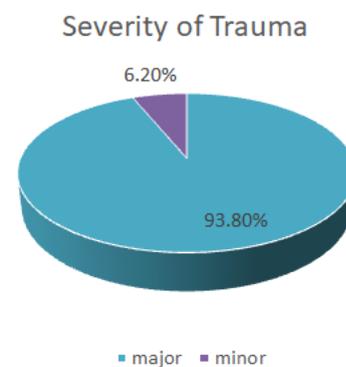


Figure 2: 93.8% of participants suffered major injuries with regards to severity with a score >9 on the ISS.

Treatment modality

Treatment Modality

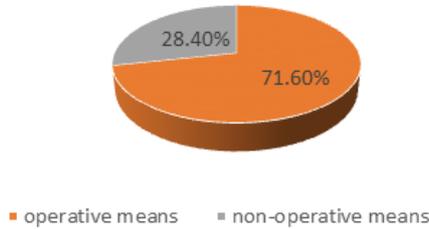


Figure 3: The chart shows that 71.6% of participants were treated using operative means.

Tests of association

The relationship between psychiatric symptoms and demographic and clinical characteristics such as age, sex, education level, social support, marital status, type of trauma, severity of trauma and treatment modality was investigated using Pearson product moment correlation. Preliminary analyses were conducted to ensure no violations of the assumptions of normality, linearity, and homoscedasticity. Results for each analysis are indicated under each respective table. With regards to age, younger patients were more likely to suffer from anxiety compared to the older patients (Table 2). Men were more likely to suffer from anxiety symptoms compared to females as illustrated in Table 3. There was a positive association between disorientation and family/social support compared to other psychiatric symptoms as illustrated in Table 4. The mechanism of trauma correlated positively with the level of suicidality, guilt, hallucinations, and disorientation (Table 5). With respect to severity of symptoms, hostility had a negative correlation with severity of trauma as illustrated in Table 6. There was no statistically significant association between treatment modality and psychiatric symptoms.

Symptom	Age mean	Correlation coefficient	Sig (2 tailed)	Comment
Somatic concern	34	0.148	0.06	Not significant
Anxiety	34	-0.174	0.027	significant
Depression	34	-0.092	0.242	Not significant
Suicidality	34	0.079	0.32	Not significant
Guilt	34	-0.027	0.733	Not significant
Hostility	34	0.005	0.945	Not significant
Hallucinations	34	-0.013	0.87	Not significant
suspiciousness	34	-0.019	0.809	Not significant
disorientation	34	-0.099	0.211	Not significant

Blunted affect	34	-0.03	0.7	Not significant
The correlation between anxiety and age was statistically significant (r=-0.174, p=0.027).				

Table 2: Association between age and psychiatric symptoms.

Symptom	Pearson coefficient	Sig. (2 tailed)	Comment
Somatic concern	0.113	0.151	Not significant
Anxiety	0.154	0.05	significant
Depression	0.146	0.064	Not significant
Suicidality	-0.08	0.311	Not significant
Guilt	0.047	0.555	Not significant
Hostility	-0.075	0.341	Not significant
Suspiciousness	-0.001	0.998	Not significant
Hallucinations	0.002	0.979	Not significant
Disorientation	-0.087	0.269	Not significant
Blunted affect	-0.047	0.556	Not significant

Table shows that the association between sex and anxiety was significant (r=0.154, p=0.050).

Table 3: Association between sex and psychiatric symptoms.

Symptom	Pearson coefficient	Sig. (2 tailed)	Comment
Somatic concern	-0.088	0.267	Not significant
Anxiety	0.053	0.501	Not significant
Depression	0.066	0.404	Not significant
Suicidality	-0.061	0.442	Not significant
Guilt	-0.022	0.78	Not significant
Hostility	0.057	0.47	Not significant
Suspiciousness	-0.076	0.336	Not significant
Hallucinations	-0.008	0.919	Not significant
Disorientation	0.163	0.038	significant
Blunted affect	-0.014	0.244	Not significant

Association between good family support and disorientation (r=0.163, p=0.038).

Table 4: Association between family/social support and psychiatric symptoms

Symptom	Pearson coefficient	Sig. (2 tailed)	Comment
Somatic concern	0.148	0.061	Not significant
Anxiety	0.087	0.272	Not significant
Depression	0.065	0.413	Not significant
Suicidality	0.164	0.038	significant
Guilt	0.174	0.027	significant

Hostility	0.146	0.064	Not significant
Suspiciousness	-0.164	0.037	significant
Hallucinations	0.158	0.044	significant
Disorientation	0.176	0.025	Significant
Blunted affect	0.143	0.07	Not significant
Mechanism of trauma correlated positively with suicidality ($r=0.164$, $p=0.038$), guilt ($r=0.174$, $p=0.027$), hallucinations ($r=0.158$, $p=0.044$), and disorientation ($r=0.176$, $p=0.025$).			

Table 5: Association between mechanism of trauma and psychiatric symptoms.

Symptom	Pearson correlation	Sig. (2 tailed)	Comment
Somatic concern	0.064	0.416	Not significant
Anxiety	0.082	0.402	Not significant
Depression	0.117	0.138	Not significant
Suicidality	0.74	0.351	Not significant
Guilt	0.114	0.148	Not significant
Hostility	-0.212	0.007	Significant
Suspiciousness	0.028	0.72	Not significant
Hallucinations	0.016	0.842	Not significant
Disorientation	0.063	0.426	Not significant
Blunted affect	0.037	0.639	Not significant
Severity of trauma had a negative correlation to hostility ($r=-0.212$, $p=0.007$).			

Table 6: Association between severity of trauma and psychiatric symptoms.

DISCUSSION

The overall prevalence of psychiatric symptoms indicated a percentage of 93.7 on enrolment which was within the first 2 weeks post injury. This reduced markedly to 31.7% at four weeks post enrolment and further reduced to 29.4% at 12 weeks post enrolment. The reactions that physical trauma survivors experience immediately following the trauma can be quite diverse and complicated and may be a result of the traumatic experience, coping and life skills possessed by the survivors as well as the social support from the immediate family and the community at large. The findings in this study are comparable to the findings in a study that was conducted in Sheffield which found that psychiatric disorders had a prevalence of 47.6% at 6 weeks reducing to 43.4% at 6 months post injury [7].

In order to fully address this problem, it was necessary to identify the factors that predisposed an individual to developing psychiatric symptoms following physical trauma. This includes certain demographic and clinical characteristics which when present increased or decreased the risk of developing certain psychiatric symptoms. These factors were identified using tests of associations between the demographic and clinical features and the presence of specific psychiatric symptoms.

Anxiety was the most frequent symptom in this study at all the stages of the study with a prevalence of 37.6% on enrolment dropping to 14.1% at 12 weeks follow up. To determine whether there was an association between the prevalence of anxiety symptoms and other variables, the Pearson correlation was used. The Pearson correlation seems to suggest that there was statistically significant association between the prevalence of anxiety symptoms with age ($r=-0.174$, $p=0.027$) and sex ($r=0.154$, $p=0.050$) of the respondents. This is comparable to the findings in the European study of the epidemiology of mental disorders which was conducted in 6 European countries which found anxiety to be the most frequent psychiatric symptom [13]. With regards to age the younger the participants, the more likely they were to suffer from anxiety disorders because of the impact of the physical trauma on their livelihoods. Firstly, these individuals are in the productive age group which entails that experiencing physical trauma affects their productivity and hence their source of livelihoods. Most participants were between the ages of 20 and 40, they were the main bread winners in their homes and had young families. Being unable to work and provide for their families created a lot of stress for them hence the anxiety.

The study deduced that depressive symptoms were prevalent in 18.7% of the participants on enrolment, 11.2% of participants at 4 weeks post enrolment and 11% of participants at 12 weeks post trauma. This was the second most frequent symptom among the trauma survivors in this study.

In this study, the study indicated that there was no association that was identified to exist between depressive symptoms and other variables. This means that the occurrence of depression was not influenced by the other variables. This is the exact opposite of what was found in the study that was conducted by Leddy et al. [14] who discovered that there was an association between current sports participation with depression and Brewer, [15] who found that situational factors such as athletes recovery/participation status likely impact emotional adjustment to injury. The discrepancy in results could be explained by sensitivity patterns of the psychological tool that was used, as well as the fact that these studies done in other countries focused entirely on athletes, whereas our study included all forms of physical trauma including RTA's, assaults, falls, in addition to sporting injuries. This result was not as anticipated as one would expect depression to be influenced by the severity of the injury suffered which translates into the disability that one gets to live with. However, the levels of social support for the injury survivors in this study which stood at 94.4% could have been protective for the development of some of the symptoms like depression. A study conducted by Gray et al. in Norway [16] found that social support was protective against depression, especially in the elderly population. The study population in this study was mainly young but clearly good social support may have contributed to the low prevalence of depression at 12 weeks post injury.

Somatization (somatic concern) was the 4th most frequent symptom with a prevalence of 3.1% at 12 weeks post injury. Unlike most studies which show a high prevalence of somatic symptom disorder in females compared to males, this study

showed no gender predilection. There was no association between the development of somatic symptoms and other variables such as age, sex, social support, mechanism of trauma, severity of trauma and treatment modality. This means that the development of somatic symptoms was not influenced by any of the other variables. This was different from what was obtained in the study conducted by McCall-Hosenfeld et al. in Boston [17], which found that women reported more somatic symptoms than men following trauma and that the severity of the somatic symptoms was higher in women than men. This was an unexpected finding; however, it can be explained by the fact that in this study 90.7% participants were male and only 9.3% of the participants were female.

There is paucity of information regarding guilt and physical trauma. Guilt was the 3rd most common symptom among the psychiatric symptoms suffered by the trauma survivors with a prevalence of 15.5% on enrolment, 2.5% at 4 weeks and 0.6% at 12 weeks. This guilt results from a belief that the trauma survivor could or should have done something at the time of occurrence of the traumatic event. There was a positive significant correlation between the occurrence of guilt and the mechanism of physical trauma suffered ($p=0.027$). This was the exact opposite of what was found in a study done in the United States of America involving United States Iraq and Afghanistan veterans [18] which found that the emotional and physical distress related to trauma memories mediated posttraumatic guilt and not the mechanism of trauma.

The prevalence of suicidality was 3.1% on enrolment. There was a positive significant correlation between suicidality and mechanism of physical trauma ($p=0.038$). This is comparable to a study that was conducted by O'Connor Stephen et al. [19] at Harborview medical centre which is affiliated to the University of Washington in the United States of America which found that injury mechanism was one of the factors associated with suicidal ideation across one year. This is significant in that some of the injury mechanisms are self-inflicted whereas some are not self-inflicted. This can be linked to the severity of the injury which translates into the nature of disability which raises issues of self-esteem and body image.

Conclusion

The study found that the prevalence of psychiatric symptoms following physical trauma was quite high within the first 12 weeks following the trauma with anxiety symptoms being the most prevalent at 37.6%, followed by depression at 18.7% and guilt at 15.5%. Other symptoms which were common were suicidality and somatic symptom concern. The study went on to find that the factors that contribute to the development of psychiatric symptoms were age, sex, social support, mechanism of trauma and the severity of the injury.

Limitations

The study had its own limitations in that only one psychological tool was used and the follow up period of 12 weeks was short; therefore, a large scale follow up study which

would employ more psychological tools and longer follow up period would be prudent.

Funding

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Informed consent

Informed consent was obtained from all participants who had to sign consent forms.

Study registration

The study was registered under the national health research authority (NHRA) of Zambia.

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