Section: Psychiatry

Original Research Article

PREVALENCE AND RISK FACTORS OF POST-TRAUMATIC STRESS DISORDER IN PATIENTS WITH COMPOUND FRACTURES: RESULTS OF A CROSS-SECTIONAL STUDY

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ABSTRACT

Post-traumatic stress disorder (PTSD) is a frequent psychiatric complication in patients with Compound fractures. The purpose of this study was to determine the prevalence and risk factors of PTSD in patients with Compound fractures. A cross-sectional study was conducted in a Tertiary care hospital in India. Consenting patients with Compound fractures, aged 18 years to 70 years, were administered clinician administered PTSD scale (CAPS-5) pre and post operatively upto 6-month period. 109 patients were recruited for the study over 2 years. The prevalence of PTSD was 16.5% (18 of 109 patients). Factors increasing the risk of PTSD were Motor vehicle collision, Poly trauma, Higher VAS scale for pain.

Keywords: PTSD, Compound fractures, prevalence, risk factors.

INTRODUCTION

Compound fractures resulting from high energy trauma have been on increasing incidence. Many of these patients develop significant post-traumatic psychiatric morbidity. While the physical consequences of such compound fractures are obvious, the psychological consequences are often not apparent.

Post-traumatic stress disorder (PTSD) has been described as the complex somatic, cognitive, affective and behavioural effects of psychological trauma.[1] PTSD is characterized by intrusive thoughts, nightmares and flashbacks of past traumatic events, avoidance of reminders of trauma, hyper vigilance, and sleep disturbance, all of which lead to considerable social, occupational, and interpersonal dysfunction.

PTSD is characterized by four clusters of symptoms:

1. Re-experiencing symptoms (e.g., recurrent intrusive memories, traumatic nightmares, and flashbacks)
2. Avoidance symptoms (e.g., avoiding trauma related thoughts and feelings and/ or objects, people, or places associated with the trauma)
3. Negative changes in cognitions and mood (e.g., distorted beliefs about oneself or the world, persistent shame or guilt, emotional numbing, feelings of alienation, inability to recall key details of the trauma) and
4. Alterations in arousal or reactivity symptoms (e.g., irritability, hyper vigilance, reckless behaviour, sleep disturbance, difficulty concentrating).

In order to qualify for a diagnosis of PTSD, these symptoms must be present for more than one month, lead to significant distress or functional impairment, and must not be due to medications, substance use, or a medical condition. Most individuals who develop PTSD experience its onset within a few months of the traumatic event. However, epidemiologic studies have found that approximately 25 per cent experience a delayed onset after six months or more.[2]

A longitudinal study by Frierson RL, Lippman SR3 on amputees over a 10 years period found that the most common symptoms were anxiety, insomnia, suicidal thoughts, phantom-limb phenomenon and flashbacks after traumatic injury. In another prospective longitudinal study in 1998 by Ehlers A, Mayou RA, Bridget B4, it was observed shortly after a motor vehicle accident, that the prevalence of

PTSD was 23.1%, at 3 months and 16.5%, at one year 13%. Zatzick,[5] and colleagues in 2002 also compared psychological distress and health-related quality of life in 101 hospitalized trauma patients. One year after injury, 30% of the patients (n = 22) met symptomatic criteria for posttraumatic stress disorder (PTSD). Compared with patients without PTSD, patients with PTSD demonstrated significant adverse outcomes. Mohit Bhandari et.al,[6] survey of orthopaedic trauma patients in 2008 found that 1 in 5 patients met the criteria for psychological illness. A study by Warren AM et. al. in 2016 compared the prevalence of PTSD in orthopaedic and non-orthopaedic patients. In orthopaedic patients, 28% had PTSD at 6 months, compared with 34% of non-orthopaedic patients,[7]

MATERIAL AND METHODS

The present study was carried out from September 2015 to September 2017 at a Tertiary Care Hospital in Khammam, India. During this period 109 patients with compound fractures satisfying the following inclusion and exclusion criteria were studied. The type of study carried out was prospective with appropriate statistical analysis.

Inclusion Criteria

1. Patients with compound fractures Gustilo Anderson type II & III[8].
2. Male and female patients belonging to 18 years – 70 years.
3. Patients willing to take part in the study.

Exclusion Criteria

1. Patients having a previous history of any mental illness or currently on medication for any psychiatric illness were excluded.
2. Patients having any debilitating chronic diseases example: liver or kidney failure etc.
3. Patients with soft tissue injury only.
4. Patients who sustained head injury.
5. Patients not willing to take part in the study.

All the patients were assessed clinically. A detailed history was obtained and they were subjected to a thorough clinical examination. Radiological investigations were carried out to confirm the diagnosis. The clinician administered PTSD scale was used to assess the psychological state of the individual pre and post operatively. Peri and post traumatic complications, if any were noted. Significance of changes was assessed by chi-square test.

CAPS PTSD SCALE

The CAPS is the gold standard in PTSD assessment (Appendix-1). The CAPS-5 is a 30-item structured interview that can be used to make current (past month) diagnosis of PTSD, lifetime diagnosis of PTSD and also to assess PTSD symptoms over the past week. In addition to assessing the 20 DSM-5 PTSD symptoms, questions target the onset and duration of symptoms, subjective distress, and impact of symptoms on social and occupational functioning, improvement in symptoms. For each symptom, standardized questions and probes are provided. Administration requires identification of an index traumatic event to serve as the basis for symptom inquiry.

The CAPS-5 is an extensively validated and widely used structured diagnostic interview for posttraumatic stress disorder (PTSD). It was recently revised to correspond with PTSD criteria in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013). CAPS-5 diagnosis demonstrated strong inter-rater reliability (κ = .78 to 1.00), depending on the scoring rule) and test-retest reliability (κ = .83). CAPS-5 total severity score demonstrated high internal consistency (α = .88) and inter-rater reliability (ICC = .91) and good test-retest reliability (ICC = .78), which indicates that the CAPS-5 is a psychometrically sound measure of DSM-5 PTSD diagnosis and symptom severity.

RESULTS

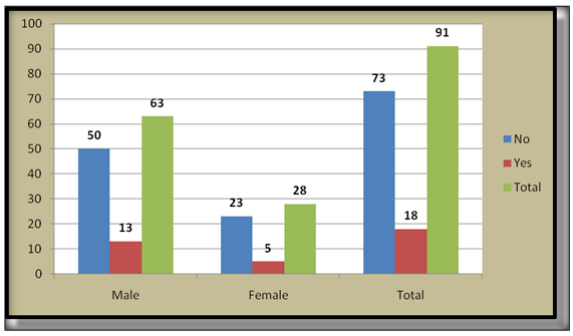

Figure 1: Gender * PTSD Risk

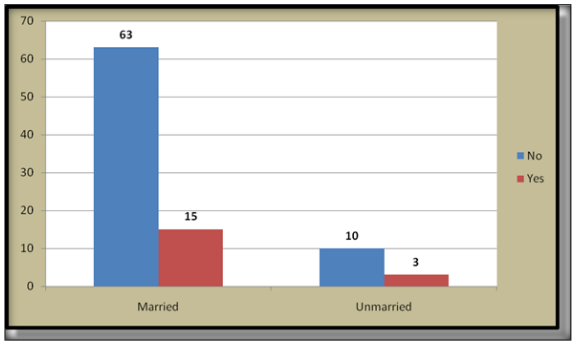

Figure 2: Marital Status * PTSD Risk

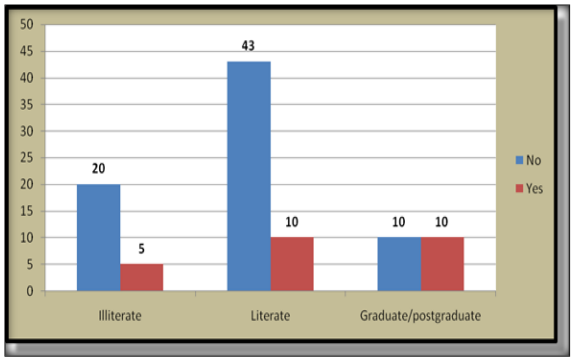

Figure 3: Education * PTSD Risk

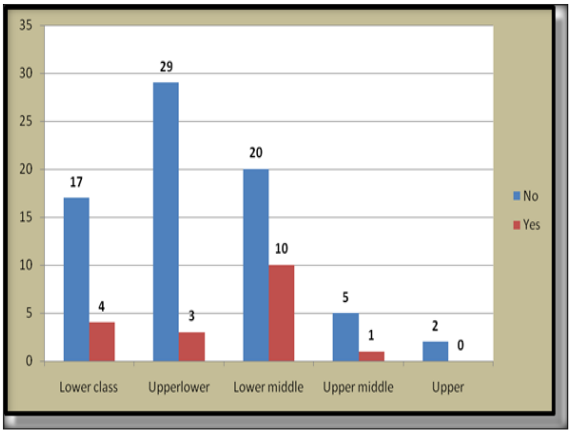

Figure 4: Economic Status Versus PTSD Risk

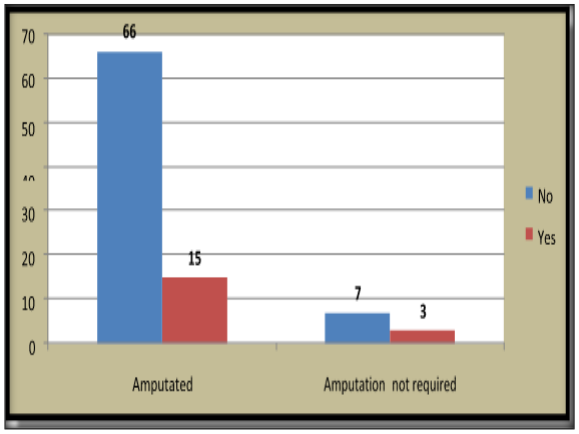

Figure 8: PTSD Prevalence in Amputated Patients

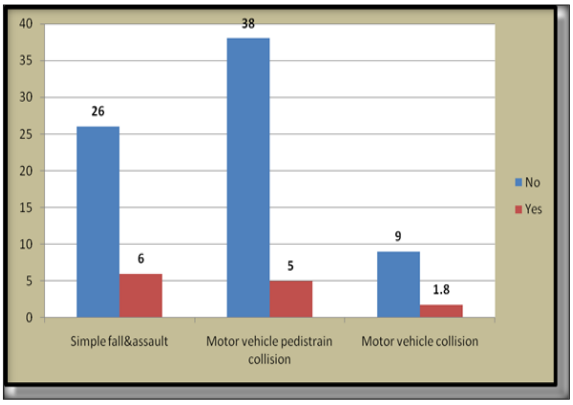

Figure 5: Mode of Trauma and PTSD Risk

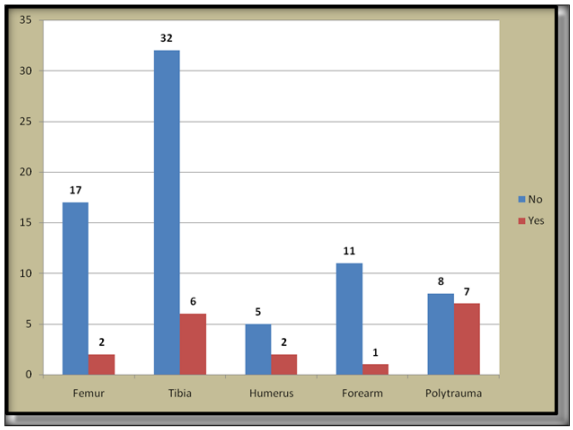

Figure 9: PTSD Prevalence in Various Fractures

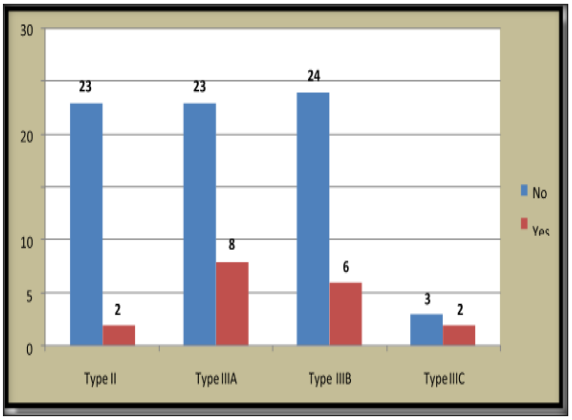

Figure 6: PTSD Prevalence in GA Types

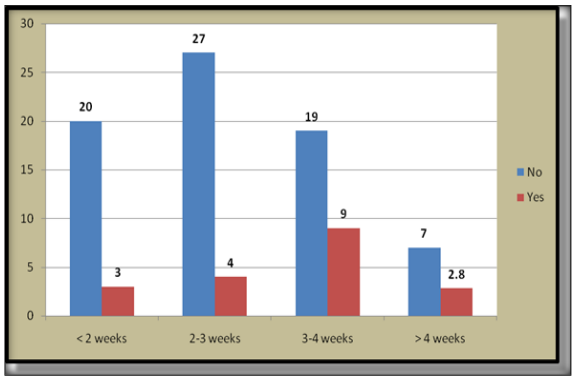

Figure 10: Duration of Hospital Stay * PTSD Risk

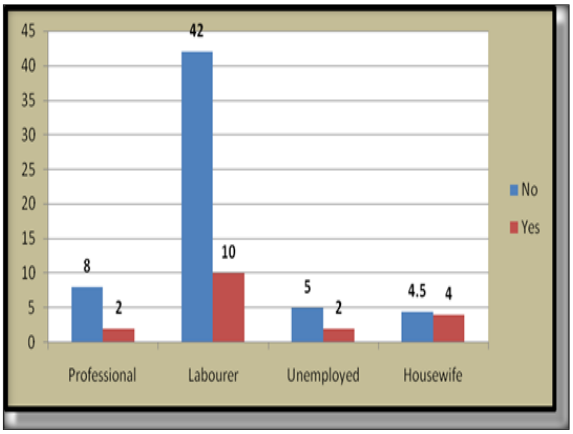

Figure 7: PTSD Prevalence in Various Occupations

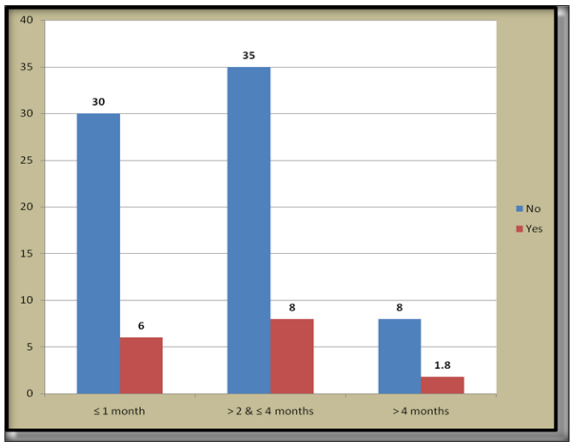

Figure 11: Time Required to Ambulate * PTSD Risk

Table 1: Baseline Characteristics

Characteristic	Frequency (%)
Gender	
Male	13 (72.2%)
Female	5 (27.8%)
Marital status	
Married	15 (83.3%)
Unmarried	3 (16.7%)
Occupation	
Professional	2 (11.1%)
Skilled or unskilled labourer	10 (55.6%)
Unemployed	2 (11.1%)
House wife	4 (22.2%)
Education	
Illiterate	5 (27.8%)
Literate	10 (55.6%)
Graduate or postgraduate	3 (16.7%)
Social status[1]	
Lower class	4 (22.2%)
Upper lower	3 (16.7%)
Lower middle	10 (55.6%)
Upper middle	1 (5.6%)
Upper	0 (0%)
Fracture type[2]	
Type II	2 (11.1%)
Type IIIA	8 (44.4%)
Type IIIB	6 (33.3%)
Type IIIC	2 (11.1%)
Amputation	
Yes	3 (16.7%)
No	15 (83.3%)
Fracture location	
Femur	2 (11.1%)
Tibia	6 (33.3%)
Humerus	2 (11.1%)
Forearm	1 (5.6%)
Multiple	7 (38.9%)
Substance abuse	
Smoking	3 (16.7%)
Alcohol	1 (5.6%)
Other substance	1 (5.6%)
Smoking & alcohol	7 (38.9%)
No	6 (33.3%)
Comorbidities	
Hypertension	4 (22.2%)
Diabetes	2 (11.1%)
Hypertension & Diabetes	1 (5.6%)
No	11 (61.1%)
Mode of injury	
Slip & fall	6 (33.3%)
Motor vehicle pedestrian collision	5 (27.8%)
Motor vehicle collision	7 (38.9%)
Hospital stay	
0-2 weeks	3 (16.7%)
2-3 weeks	4 (22.2%)
3-4 weeks	9 (50%)
>4 weeks	2 (11.1%)
Time required to ambulate	
1 month	6 (33.3%)
2-4 months	8 (44.4%)
>4 months	4 (22.2%)

Note: 1- Based on kuppuswamy modified classification (Appendix-2), 2- Based on Gustilo Anderson classification (Appendix-3).

Table 2: Gender * PTSD Risk

Gender	PTSD Risk		Total	P - Value	Odds ratio	95% Confidence Interval	
	Yes	No				Lower limit	Upper limit
Male	13	50	63	0.759	1.196	0.381	3.753
	72.2%	68.5%	69.2%				
Female	5	23	28				
	27.8%	31.5%	30.8%				
Total	18	73	91				

Note: 18 patients did not complete the follow-up, so considered as missed cases
In current study 13 males have PTSD risk which comprises of 72.2% and 5 (27.8%) females are at risk.

Table 3: Marital Status * PTSD Risk

marital status	PTSD Risk		Total	P - Value	Odds ratio	95% Confidence Interval	
	Yes	No				Lower limit	Upper limit
Married	15	63	78	0.716	0.794	0.194	3.243
	83.3%	86.3%	85.7%				
Unmarried	3	10	13				
	16.7%	13.7%	14.3%				
Total							

In current study 15 married out of 78 are having PTSD risk and 3 out of 13 unmarried people are at risk. And there is no significant association between marital status and PTSD.

Table 4: Education * PTSD Risk

Education	PTSD Risk		Total	P - Value	Odds ratio	95% Confidence Interval	
	Yes	No				Lower limit	Upper limit
Illiterate	5	20	25	0.943	NA	--	--
	27.8%	27.4%	27.5%				
Literate	10	43	53				
	55.6%	58.9%	58.2%				
Graduate or Post graduate	3	10	13				
	16.7%	13.7%	14.3%				
Total	18	73	91				

In present study no significant association was noted between literacy and PTSD risk among compound fractured patients.

Table 5: Economic Social Status * PTSD Risk

Economic Social status	PTSD Risk		Total	P - Value	Odds ratio	95% Confidence Interval	
	Yes	No				Lower limit	Upper limit
Lower class	4	17	21	0.185	NA	--	--
	22.2%	23.3%	23.1%				
Upper lower	3	29	32				
	16.7%	39.7%	35.2%				
Lower middle class	10	20	30				
	55.6%	27.4%	33.0%				
Upper middle class	1	5	6				
	5.6%	6.8%	6.6%				
Upper class	0	2	2				
	0.0%	2.7%	2.2%				
Total	18	73	91				

In present study PTSD is seen in all economical groups and no association noted between economical status and PTSD risk.

Table 6: Mode of Trauma * PTSD Risk

Mode of Trauma	PTSD Risk		Total	P - Value	Odds ratio	95% Confidence Interval	
	Yes	No				Lower limit	Upper limit
Simple fall and assault	6	26	32	0.022	NA	--	--
	33.3%	35.6%	35.2%				
Motor vehicle pedestrian collision	5	38	43				
	27.8%	52.1%	47.3%				
Motor vehicle collision	7	9	16				
	38.9%	12.3%	17.6%				
Total	18	73	91				

Results showing higher prevalence of PTSD risk in severe trauma i.e. motor vehicle collision, and significant association noted between motor vehicle collision and PTSD risk in compound fracture patients.

Table 7: Fracture Type - Gustilo Anderson Types * PTSD Risk

Fracture type – Gustilo Anderson types	PTSD Risk		Total	P - Value	Odds ratio	95% Confidence Interval	
	Yes	No				Lower limit	Upper limit
Type II	2	23	25	0.242	NA	--	--
	11.1%	31.5%	27.5%				
Type IIIA	8	23	31				
	44.4%	31.5%	34.1%				

Type IIIB	6	24	30				
	33.3%	32.9%	33.0%				
Type IIIC	2	3	5				
	11.1%	4.1%	5.5%				
Total	18	73	91				

Results shows PTSD risk is seen in all GA type fractures. And there is no association between GA type and PTSD risk.

Table 8: Occupation of The Patient * PTSD Risk

Occupation of the patient	PTSD Risk		Total	P - Value	Odds ratio	95% Confidence Interval	
	Yes	No				Lower limit	Upper limit
Professional	2	8	10	0.943	NA	--	--
	11.1%	11.0%	11.0%				
Skilled or Unskilled labourer	10	42	52				
	55.6%	57.5%	57.1%				
Unemployed	2	5	7				
	11.1%	6.8%	7.7%				
House wife	4	18	22				
	22.2%	24.7%	24.2%				
Total	18	73	91				

PTSD risk is almost equally seen in all occupations. No significant association noted between PTSD risk and occupation of the patient.

Table 9: Amputation * PTSD Risk

Amputation Yes/ No	PTSD Risk		Total	P - Value	Odds ratio	95% Confidence Interval	
	Yes	No				Lower limit	Upper limit
Yes	3	7	10	0.390	1.886	0.436	8.153
	16.7%	9.6%	11.0%				
No	15	66	81				
	83.3%	90.4%	89.0%				
Total	18	73	91				

Few studies shown there is association between PTSD risk and compound fractures requiring amputation. In present study 3 out of 10 amputated are having PTSD risk and 15 out of 81 non amputated patients had the risk. And no significant association found between PTSD risk and fracture requiring amputation.

Table 10: Fracture Location * PTSD Risk

Fracture location	PTSD Risk		Total	P - Value	Odds ratio	95% Confidence Interval	
	Yes	No				Lower limit	Upper limit
Femur	2	17	19	0.048	NA	--	--
	11.1%	23.3%	20.9%				
Tibia	6	32	38				
	33.3%	43.8%	41.8%				
Humerus	2	5	7				
	11.1%	6.8%	7.7%				
Fore arm	1	11	12				
	5.6%	15.1%	13.2%				
Poly trauma	7	8	15				
	38.9%	11.0%	16.5%				
Total	18	73	91				

Even though PTSD risk is present in compound fractures of all individual bones, it was found that the risk of PTSD was more in poly trauma injury patients. 7 out of 8 poly trauma patients were found to have PTSD risk in present study.

Table 11: Duration of Hospital Stay * PTSD Risk

Duration of hospital stay	PTSD Risk		Total	P - Value	Odds ratio	95% Confidence Interval	
	Yes	No				Lower limit	Upper limit
Up to 2 weeks	3	20	23	0.230	NA	-	--
	16.7%	27.4%	25.3%				
2 to 3 weeks	4	27	31				
	22.2%	37.0%	34.1%				
3 to 4 weeks	9	19	28				
	50.0%	26.0%	30.8%				
Greater than 4 Weeks	2	7	9				
	11.1%	9.6%	9.8%				
Total	18	73	91				

Some studies have shown that longer the hospital stay, more the chances of getting PTSD. But in our study we didn't find any association between duration of hospital stay and PTSD risk in compound fracture patients statistically.

Table 12: Time Required to Ambulate * PTSD Risk

Time required to ambulate	PTSD Risk		Total	P - Value	Odds ratio	95% Confidence Interval	
	Yes	No				Lower limit	Upper limit
Less than or equal to 1 month	6	30	36				
	16.7%	83.3%	100.0%				
	33.3%	41.1%	39.6%				
More than 2 months and less than or equal to 4 Months	8	35	43				
	18.6%	81.4%	100.0%	0.439	NA	--	--
	44.4%	47.9%	47.3%				
More than 4 Months	4	8	12				
	33.3%	66.7%	100.0%				
	22.2%	11.0%	13.2%				
Total	18	73	91				

Table 13: Association of Age and Vas-100 Mm Scale Score with Risk Towards PTSD

Characteristic	PTS D Risk	N	Mean ± SD	Std. Error Mean	P-Valu e	Std. Error Difference	95% Confidence Interval of the Difference	
							Upper limit	Lower limit
Age	Yes	18	46.11 ±	2.9912	0.547	2.94	-7.62	4.06
			12.70					
	No	73	47.89 ±	1.2617				
			10.78					
VAS100	Yes	18	63.39	4.010	0.012	3.35	1.95	15.26
Mm			±17.01					
Scale	No	73	54.78 ±	1.345				
			11.49					

It was found that individuals with higher VAS pain scale readings were at higher risk of developing PTSD when compared to low VAS score individuals. That means individuals who were more sensitive to pain have greater risk of PTSD.

DISCUSSION

It has been observed from the current study and previously conducted studies that, the patients who had experienced orthopaedic trauma can suffer from Post-Traumatic Stress Disorder (PTSD).[9] The physical limitations that happens after serious injury to an extremity has a negative impact on the quality of life in terms of financial and social status of the patient. And also that, poor physical function after an upper and/ or a lower extremity injury is high risk factor and a strong indicator of psychological distress.[10]

Doctors working in orthopaedic department i.e., Orthopaedic surgeons are the primary responsible persons in preventing the psychological stress among these patients by detecting at the earliest and notifying to psychiatrist for further management. There is a need of bringing awareness among the orthopaedic surgeons about the conditions that might lead to psychological distress. But the data with respect to which type of injury and characteristics have more chance to develop into a PTSD was lacking, particularly in India. There is also lack of the data with the associations of different risk factors of PTSD to the different variables of patients with compound fractures.

The current study shows the proportion of PTSD among the patients attending the tertiary care orthopaedic department, with different compound fractures. The current study also has shown the impact of injury-related variables associated with the development of PTSD. In the current study, the post traumatic disorder risk was noticed in 18 patients which comprised to a percentage of 16.5. That is in this study, the prevalence of PTSD was 16.5% (18 of 109 patients).

In the current study, according to multivariate logistic regression analysis the following factors (variables) are significantly related to high risk of getting PTSD.

1) Motor vehicle collision
2) Poly trauma
3) Higher VAS scale for pain

Study conducted by Patil SN,[11] had shown that Among the 282 compound fracture victims interviewed, 37 (13.12%) experienced PTSD, i.e., the prevalence was 13.12%. This study was conducted in the same area of the present study. In this study the association of PTSD and the risk factors was not seen, where as in the current study it has been reported. The lower prevalence of PTSD in the study conducted by Patil SN., compared to the current study could be attributed to the lower sample

size of the present study which is 109 patients whereas in the other study the sample size was 282.
Study conducted by Lee CH et al,[12] had shown that, the lower extremity fracture, multiple fractures, and higher pain VAS scores to be significantly related to PTSD. Multiple extremity fracture may be a predictor for PTSD, although it does not always represent a major trauma. This study done by Lee CH., et al., had shown similar results to the current study.
The results of our study should be considered in light of the following limitations. First, the results of this study cannot be generalized to the general population, because only those patients who came to our institution were enrolled. However, this can also be taken as strength of our study, because it minimized the heterogeneity of the study population. Second, the evaluation of PTSD was performed at a mean of 5.5 (range, 0-6) months from the initial injury. However, because many patients with PTSD undergo chronic progression and remission takes about 3years, we believe it was reasonable to evaluate patients for PTSD at a mean of 12 months. Third, this study does not represent all extremity fractures, because we excluded closed fractures and patients with head injury.

CONCLUSION

In conclusion, the prevalence of PTSD after compound fracture was 16.5% (18 of 109 individuals) and, according to multivariate logistic regression analysis, motor vehicle collision, multiple extremity fractures and higher pain VAS scores were significantly related to the occurrence of PTSD. To achieve an optimal recovery after orthopaedic injury, clinicians must address both the physical and psychological needs of their patients. Early use of psychological intervention such as cognitive behavioural therapy could be beneficial in decreasing the intensity of pain and the prevalence of PTSD.

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