



Original Article

## Psychiatric Morbidity in Patients with Traumatic Brain Injury: A Clinical and Radiological Study

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### ABSTRACT

**Background:** Traumatic brain injury (TBI) is a major public health problem worldwide and is frequently associated with long-term neurological and psychological consequences. Psychiatric morbidity following TBI, including depression, anxiety, and stress-related disorders, can significantly affect functional recovery and quality of life. Early identification of these psychological disturbances is essential for comprehensive patient management. The present study was conducted to assess psychiatric morbidity among patients with traumatic brain injury and to evaluate its association with clinical severity and radiological findings.

**Methods:** This hospital-based cross-sectional observational study included 60 patients diagnosed with traumatic brain injury at a tertiary care medical college hospital. Demographic and clinical data were recorded using a structured proforma. The severity of TBI was assessed using the Glasgow Coma Scale (GCS). Radiological findings were evaluated using CT or MRI of the brain. Psychiatric morbidity was assessed using the Depression Anxiety Stress Scale (DASS-21). Descriptive statistics were used to summarize the data, and associations between variables were analyzed using appropriate statistical tests with significance set at  $p < 0.05$ .

**Results:** Among the 60 patients studied, the majority were males and belonged to younger age groups. Mild traumatic brain injury was the most common clinical presentation. Radiological findings frequently included cerebral contusions and intracranial hemorrhages. Psychiatric morbidity was observed in a considerable proportion of patients. Depression was the most common psychological disturbance, followed by anxiety and stress. Psychiatric symptoms were more frequently observed among patients with moderate and severe traumatic brain injury compared with those with mild injury.

**Conclusion:** Psychiatric morbidity is common among patients with traumatic brain injury and may be associated with injury severity and structural brain abnormalities. Routine psychological assessment using standardized screening tools such as the DASS-21 scale can facilitate early detection of psychiatric symptoms. A multidisciplinary approach integrating neurological and psychiatric care is essential to improve overall outcomes and quality of life in patients with traumatic brain injury.

**Keywords:** Traumatic, Brain, Injury, Psychiatric.

## INTRODUCTION

Psychiatric morbidity in patients with traumatic brain injury represents a major global public health concern and is one of the leading causes of mortality and disability worldwide. It occurs as a result of external mechanical force causing structural damage to the brain, commonly due to road traffic accidents, falls, assaults, or sports-related injuries. Beyond the immediate neurological consequences, TBI is increasingly recognized as an important risk factor for a wide range of long-term neuropsychiatric complications that significantly affect functional recovery and quality of life. <sup>1</sup>Psychiatric morbidity following traumatic brain injury is common and may manifest as mood disorders, anxiety disorders, behavioral disturbances, cognitive impairment, and personality changes. These conditions may develop during the acute phase of injury or emerge months to years after the initial trauma. Studies have demonstrated that emotional and behavioral changes are among the most frequent sequelae after head injury, including depression, anxiety, irritability, emotional instability, and social withdrawal. <sup>2</sup>

Among the various psychiatric disorders observed after TBI, depression is considered the most prevalent. Several studies have reported that approximately one-quarter to one-half of patients develop depressive symptoms within the first year following injury. <sup>3</sup> Major depressive disorder has been documented in a substantial proportion of patients even several years after trauma, suggesting that traumatic brain injury may predispose individuals to persistent psychiatric vulnerability. <sup>4</sup> This increased susceptibility may be attributed to structural damage to brain regions involved in mood regulation, such as the frontal lobes, limbic system, and basal ganglia.

Anxiety disorders are also frequently encountered in patients with traumatic brain injury. These may include generalized anxiety disorder, panic disorder, and post-traumatic stress disorder (PTSD). Research has shown that anxiety and depression frequently coexist following head injury and may significantly impair rehabilitation outcomes. <sup>5</sup> PTSD, in particular, has been reported with widely varying prevalence rates depending on the severity of injury, the mechanism of trauma, and the population studied. <sup>6</sup>

The pathophysiology underlying psychiatric disorders after TBI is complex and multifactorial. Structural brain damage, neurochemical changes, inflammatory responses, and disruption of neural networks are thought to contribute to the development of psychiatric symptoms. In addition, psychosocial factors such as disability, loss of employment, social isolation, and reduced functional independence may further exacerbate emotional distress among affected individuals. <sup>7</sup>

Radiological evaluation plays a crucial role in the assessment of traumatic brain injury and may provide important insights into the relationship between structural brain damage and psychiatric manifestations. Imaging modalities such as computed tomography (CT) and magnetic resonance imaging (MRI) help identify intracranial lesions including contusions, intracranial hemorrhage, diffuse axonal injury, and cerebral edema. These structural abnormalities may correlate with neuropsychiatric outcomes depending on the location and extent of injury. <sup>8</sup> Several studies have suggested that patients with moderate to severe traumatic brain injury are at a higher risk of developing psychiatric disorders compared to those with mild injury. However, even patients with mild TBI may experience persistent psychological symptoms that significantly affect their quality of life. <sup>9</sup> Furthermore, the prevalence of psychiatric illness in individuals with TBI has been reported to be significantly higher than in the general population, highlighting the importance of early identification and management of these conditions. <sup>10</sup>

Despite the growing recognition of psychiatric complications following traumatic brain injury, these conditions often remain underdiagnosed and undertreated in clinical practice. Early screening, multidisciplinary evaluation, and integration of psychiatric care into neurotrauma management are essential for improving long-term outcomes. Therefore, understanding the pattern of psychiatric morbidity and its association with radiological findings in patients with traumatic brain injury is crucial for guiding clinical management and rehabilitation strategies. The present study was undertaken to evaluate psychiatric morbidity in patients with traumatic brain injury and to assess its relationship with clinical severity and radiological findings.

### Objectives:

1. To determine the prevalence and types of psychiatric morbidity among patients with traumatic brain injury.
2. To assess the association between radiological findings of traumatic brain injury (CT/MRI brain) and psychiatric manifestations.
3. To evaluate the relationship between severity of traumatic brain injury and the occurrence of psychiatric disorders.

## METHODOLOGY

This study was designed as a hospital-based cross-sectional observational study conducted in the Departments of Radiology, Psychiatry, and Neurosurgery at a tertiary care medical college hospital. The study was carried out over a period

of 12 months after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants or their legally authorized representatives before enrollment in the study. The study included 60 patients diagnosed with traumatic brain injury (TBI) who presented to the emergency department or were admitted to the neurosurgery ward during the study period. Patients were recruited using consecutive sampling based on predefined inclusion and exclusion criteria.

#### Inclusion Criteria-

- Patients aged 18 years and above diagnosed with traumatic brain injury.
- Patients with radiologically confirmed intracranial injury on CT or MRI of the brain.
- Patients who were clinically stable and able to participate in psychiatric evaluation.
- Patients who provided informed consent for participation.

#### Exclusion Criteria-

- Patients with pre-existing psychiatric disorders diagnosed prior to the traumatic brain injury. Patients with severe cognitive impairment preventing reliable psychiatric assessment.
- Patients with history of neurodegenerative disorders or severe systemic illness affecting mental status.
- Patients unwilling to participate in the study.

After admission and stabilization, eligible patients were evaluated using a structured data collection proforma. Demographic data including age, sex, and mechanism of injury were recorded. Clinical information such as severity of traumatic brain injury, assessed using the Glasgow Coma Scale (GCS) at admission, was documented. Radiological assessment was performed using Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) of the brain. Radiological findings including cerebral contusions, intracranial hemorrhage (epidural, subdural, or intracerebral), diffuse axonal injury, and skull fractures were recorded. Psychological wellbeing and psychiatric morbidity were assessed using the Depression Anxiety Stress Scales (DASS-21). The DASS-21 is a validated self-report instrument designed to measure three related negative emotional states: depression, anxiety, and stress. The scale consists of 21 items, with seven questions for each domain. Each item is rated on a 4-point Likert scale ranging from 0 to 3, based on the severity of symptoms experienced over the past week. Scores for each subscale were calculated and categorized into normal, mild, moderate, severe, and extremely severe levels according to standard scoring guidelines. All collected data were entered into Microsoft Excel and analyzed using statistical software such as SPSS. Descriptive statistics including mean, standard deviation, frequency, and percentage were used to summarize demographic, clinical, and radiological characteristics.

## RESULTS

**Table 1: Age Distribution of Study Participants**

Age Group	Number	Percentage (%)
18–30	18	30.0
31–40	16	26.7
41–50	12	20.0
>50	14	23.3
Total	60	100

**Table 2: Sex Distribution of Patients**

Sex	Number	Percentage (%)
Male	42	70.0
Female	18	30.0
Total	60	100

**Table 3: Severity of Traumatic Brain Injury (GCS)**

Severity	Number	Percentage (%)
Mild TBI (GCS 13–15)	32	53.3
Moderate TBI (GCS 9–12)	18	30.0
Severe TBI (GCS ≤8)	10	16.7
Total	60	100

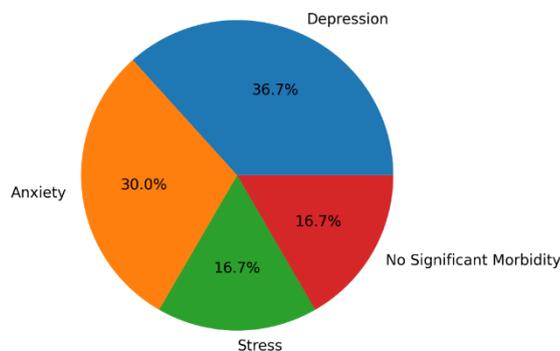
**Table 4: Radiological Findings in TBI Patients**

Radiological Finding	Number	Percentage (%)
Cerebral Contusion	20	33.3

Subdural Hematoma	14	23.3
Epidural Hematoma	10	16.7
Diffuse Axonal Injury	8	13.3
Normal CT/MRI	8	13.3
Total	60	100

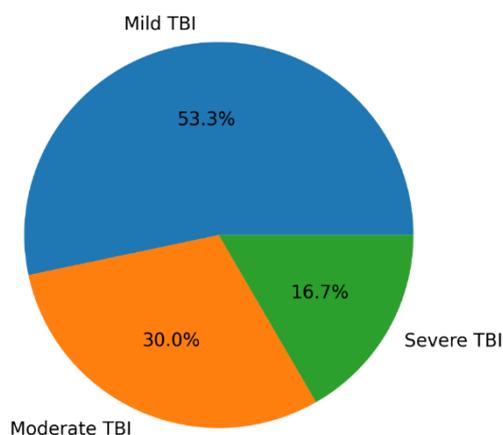
Pie Chart Representation of Study Results

Pie Chart: Psychiatric Morbidity Based on DASS-21 Scale (n=60)



**Figure 1: Psychiatric Morbidity Based on DASS-21 Scale**

Pie Chart: Distribution of TBI Severity (n=60)



**Figure 2: Distribution of TBI Severity**

## DISCUSSION

Traumatic brain injury (TBI) is increasingly recognized not only as a neurological disorder but also as a condition associated with significant psychiatric morbidity. The present study evaluated psychiatric manifestations among patients with traumatic brain injury and explored their relationship with clinical severity and radiological findings. The results of the present study demonstrate a considerable proportion of psychiatric symptoms among patients with TBI, particularly depression, anxiety, and stress, which is consistent with findings reported in previous literature.

In the current study, psychiatric morbidity was observed in a substantial proportion of patients following traumatic brain injury. Depression emerged as the most common psychiatric manifestation, followed by anxiety and stress-related symptoms. Similar findings have been reported in previous studies where depressive disorders were the most frequently observed psychiatric condition after traumatic brain injury. A study reported that major depressive disorder occurred in approximately 33% of patients during the first year following traumatic brain injury, highlighting the significant psychological burden associated with TBI.<sup>11</sup>

The predominance of depressive symptoms observed in the present study is also supported by other research demonstrating that mood disorders represent the most frequent psychiatric outcomes after traumatic brain injury. Systematic reviews have reported that depression may develop in a large proportion of individuals after TBI, often emerging during the first year after injury and significantly affecting long-term recovery and quality of life.<sup>12</sup>

Another important finding of the present study was the presence of anxiety symptoms among a notable proportion of patients with traumatic brain injury. Anxiety disorders, including generalized anxiety disorder and post-traumatic stress disorder, are commonly reported psychiatric sequelae following head injury. Previous research has shown that anxiety and depressive symptoms frequently coexist after traumatic brain injury and contribute to significant functional impairment in affected individuals.<sup>13</sup>

The overall prevalence of psychiatric disorders following traumatic brain injury observed in the present study is consistent with findings reported in other studies. Earlier investigations have demonstrated that psychiatric disorders may occur in nearly half of patients after traumatic brain injury, indicating that neuropsychiatric complications represent a major long-term consequence of head trauma.<sup>14</sup>

Furthermore, studies have suggested that the prevalence of psychiatric disorders following traumatic brain injury may range widely depending on the population studied and the assessment methods used. Research has reported prevalence rates ranging from approximately 18% to more than 80% in different clinical settings.<sup>15</sup> These variations may be attributed to differences in injury severity, follow-up duration, diagnostic criteria, and the tools used for psychiatric evaluation.

The present study also examined the association between severity of traumatic brain injury and psychiatric morbidity. The findings suggest that patients with moderate and severe traumatic brain injury may have a higher likelihood of developing psychiatric symptoms compared to those with mild injury. This observation is supported by previous studies that have reported a higher incidence of psychiatric disorders in patients with more severe brain injury and structural damage.<sup>16</sup>

Radiological findings may also contribute to the development of psychiatric manifestations after traumatic brain injury. Structural brain damage involving the frontal lobes, limbic system, and other regions associated with emotional regulation may predispose individuals to mood and behavioral disturbances. Studies have demonstrated that intracranial lesions such as contusions, hematomas, and diffuse axonal injury may be associated with subsequent neuropsychiatric complications.<sup>17</sup> Overall, the findings of the present study highlight the significant burden of psychiatric morbidity among patients with traumatic brain injury

## CONCLUSION

Traumatic brain injury (TBI) is a significant cause of morbidity and disability and is often associated with psychological and behavioral disturbances. The present study was conducted to assess the prevalence of psychiatric morbidity in patients with traumatic brain injury and to examine its relationship with clinical severity and radiological findings. The results indicate that psychiatric manifestations are common among individuals with TBI and can significantly affect recovery and long-term functional outcomes. A considerable proportion of patients showed symptoms of depression, anxiety, and stress when evaluated using the Depression Anxiety Stress Scale (DASS-21). Among these conditions, depression was the most prevalent psychiatric manifestation, followed by anxiety and stress. These findings highlight that emotional disturbances are frequent consequences of TBI and may adversely impact patients' psychological well-being and quality of life. The study also found that the severity of traumatic brain injury plays an important role in the development of psychiatric symptoms. Patients with moderate and severe TBI demonstrated a higher prevalence of psychiatric morbidity compared to those with mild injuries. Additionally, radiological findings such as cerebral contusions, intracranial hematomas, and diffuse axonal injury suggest structural brain changes affecting emotional regulation. Therefore, early psychological screening and multidisciplinary management are essential to improve rehabilitation outcomes and overall quality of life.

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