A study of psychiatric comorbidity after traumatic limb amputation: A neglected entity

AbSTRACT

Background: Amputation following trauma is emerging as a major health burden on the medical services and on the families and the society as well. Loss of limbs causes inability to support self and the family that further leads to various psychiatric disorders in many patients. Therefore, the present study is planned to explore psychiatric comorbidity in patients with amputation following trauma. Materials and Methods: Fifty-nine amputees were recruited by consecutive sampling within 6-month period from amputation clinic of a tertiary care hospital. All participants were interviewed on a semi-structured pro forma of sociodemographic and amputation-related parameters and assessed on psychiatric comorbidity using Mini-International Neuropsychiatric Interview scale. Results: Majority of the patients were male (88.1%) and belonged to younger age group of 16–30 years (71.2%). Approximately, 97% of patients had single-limb amputation (96.6), predominantly right limb (55.9%). Lower limb amputation was noted in 79.7% of participants. Motor vehicle accident was the most common mode of injury followed by railway track injury and others. The most common psychiatric comorbidities in our sample were major depressive disorder (71.2%), suicidality (30.5%), and posttraumatic stress disorder (PTSD) (20.3%). PTSD was positively correlated with phantom sensation ($r_s = 0.295, P = 0.05$) and phantom pain ($r_s = 0.279, P < 0.05$). Conclusion: A substantial proportion of amputees had alarming sign of depression, suicidal ideation, and PTSD. Thus, there is a need to form liaison between surgical treatment providers and psychiatrists and psychologists to manage psychiatric comorbidity in amputees.

Keywords: Depression, psychiatric comorbidity, posttraumatic stress disorder, traumatic amputation

Trafamic limb amputation is a catastrophic injury and an irreversible act. Limb loss due to a traumatic injury is sudden and emotionally devastating. The loss of the limb may cause distress in amputees not only due to the loss of a body part but also due to the role limitation and the need for adjustment to the changed lifestyle options. Many researchers highlighted that traumatic loss of a limb is typically equated with loss of spouse, loss of one's perception of wholeness, symbolic castration, and even death. This may result in the patient being severely affected emotionally and resulting in a poor quality of life.

The individual undergoing amputation may be at a risk of developing psychiatric disorders due to multiple factors such as feelings of loss, self-stigma, and difficulty in coping up with the impairment. Previous studies have found specific psychiatric morbidity after amputation, for example, major depressive disorder (MDD), posttraumatic stress disorder (PTSD), impulse control disorder, generalized anxiety disorder, and panic disorder. However, most of the researches have largely focused to assess depressive symptoms in amputees that were found to be in the range of 7.4%–28%.

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A study assessed the long-term effects of psychiatric problems that emerged after 6 months to 2 years following amputation which had found depressive disorder not otherwise specified (20.6%) and MDD (10.3%) as the most common diagnoses. Another study has also found MDD (63%) and anxiety disorders (40%) in amputees. A review from India about the psychological effects of amputation also concluded that a substantial proportion of individuals who undergo amputation do suffer from psychological distress and psychiatric disorders (32%–84%) that is generally high as compared to population-based psychiatric prevalence studies conducted in India. However, the existing studies have some methodological issues, for example, small sample size, heterogeneity in the assessment of psychological morbidity, study place, or sample characteristics, and the results cannot be generalized to all parts of India.

Therefore, this study is formulated to bridge the gap in the existing research on psychiatric comorbidity among patients with amputation following trauma. Understanding the experiences of amputees in terms of psychiatric comorbidity is of utmost importance in the present scenario for clinicians to know the problem and to improve service delivery for these patients.

**MATERIALS AND METHODS**

Ethical approval was received from the Institutional Ethics Committee, All India Institute of Medical Sciences (AIIMS), and written informed consent was taken from all patients prior to participation.

**Participants**

It was a cross-sectional study. Fifty-nine amputees attending amputation clinic at Jai Prakash Narayan Apex Trauma Centre, AIIMS, New Delhi, India, were recruited by consecutive sampling for 6 months (November 2014 to April 2015). Patients were in the age range of 16–60 years, of either gender, seeking treatment at the center, with a history of recent traumatic amputation (1–12 months back from the assessment), and willing to provide a written informed consent. Patients with psychiatric illness (as per the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition [DSM-5] criteria) before the traumatic amputation or with neurological disorders, those with current or lifetime diagnosis of substance dependence, and those refused to provide informed consent were excluded from the study.

**Assessments**

Sociodemographic and clinical data sheet: This data sheet was developed for the present study to obtain sociodemographic and amputation-related details of the participants that include age, education, gender, family type, duration of amputation, number of limb amputated, phantom sensation, and pain and causes of amputation.

Mini-International Neuropsychiatric Interview (MINI-7.0.0): This version includes DSM-5 disorders. It is designed as a brief structured interview for the major Axis I psychiatric disorders. It takes 15 min.

**Procedure**

Individuals with amputation fulfilling the selection criteria were approached. After the informed consent, basic demographic information and amputation-related details were obtained. Thereafter, MINI scale was administered to assess psychiatric illness. Interviews were conducted by trained psychologists. Each interview session took approximately 30 min to complete.

**Analysis**

Data were analyzed using the Statistical Package for the Social Sciences, version 20.0 (SPSS, Chicago, IL, USA). Frequencies were estimated for all the categorical data. Correlational analyses were performed using Spearman’s correlation analysis as the data were not following normal distribution.

**RESULTS**

The demographic characteristics of the sample are presented in Table 1. Sample constituted with majority of males (88.1%) and from younger age group, i.e., 16–30 years (71.2%). Most of the participants were educated up to school or college level. Most of them were married (52.5%), unemployed (57.6%), belonged to Hindu religion (81.4%), and belonged to a joint family (55.9%). Majority of them were coming from middle socioeconomic status (69.5%). A large proportion of the participants hailed from an urban locality (61.0%).

Fifty-nine percentage of the participants had undergone amputation surgery 3 months prior to the assessment. Majority of them had single-limb amputation (96.6%), predominantly right side (55.9%). Lower limb amputation was noted in 79.7% of the cases. Phantom limb sensation was experienced by 54.2% of the participants and phantom pain was reported by 47.5% of the participants [Table 2]. Motor vehicle accidents were the main reason for amputation (62.7%) followed by railway track accidents, others (e.g., electric current, sustained injuries in riots, crushed under fallen building, and fall from height), and machinery injury [Table 3].

MDD was found to be the most common associated psychiatric disorder (71.2%). At least 30.5% of participants...
expressed their thoughts about suicide with low, moderate, and severe intensity. PTSD was also noted in 20.3% of the patients [Table 4]. Sociodemographic and clinical parameters did not correlate with any psychiatric illness. Positive correlation was noticed only between phantom sensation and phantom pain ($r = 0.600$, $P < 0.001$), phantom sensation and PTSD ($r = 0.295$, $P = 0.05$), and phantom pain and PTSD ($r = 0.279$, $P < 0.05$).

Table 1: Sociodemographic characteristics of the amputees (n=59)

| Participants’ demographic characteristics | Frequency (n=59), n (%) |
|------------------------------------------|------------------------|
| Age (years)                              |                        |
| 16-30                                    | 42 (71.2)              |
| 31-60                                    | 17 (28.8)              |
| Education                                |                        |
| Illiterate                               | 9 (15.3)               |
| School going                             | 25 (42.4)              |
| College going                            | 25 (42.4)              |
| Gender                                   |                        |
| Male                                     | 52 (88.1)              |
| Female                                   | 7 (11.9)               |
| Marital status                           |                        |
| Single                                   | 27 (45.8)              |
| Married                                  | 31 (52.5)              |
| Widow                                    | 1 (1.7)                |
| Current occupation                       |                        |
| Employed                                 | 9 (15.3)               |
| Unemployed                               | 34 (57.6)              |
| Housewife/students                       | 16 (27.1)              |
| Religion                                 |                        |
| Hindu                                    | 48 (81.4)              |
| Islam                                    | 9 (15.3)               |
| Christian                                | 2 (3.4)                |
| Family type                              |                        |
| Nuclear                                  | 26 (44.1)              |
| Joint                                    | 33 (55.9)              |
| Socioeconomic status                     |                        |
| Low                                      | 17 (28.8)              |
| Middle                                   | 43 (69.5)              |
| Upper                                    | 1 (1.7)                |
| Locality                                 |                        |
| Urban                                    | 36 (61.0)              |
| Rural                                    | 23 (39.0)              |

**DISCUSSION**

Traumatic amputation is both a lifesaving procedure and a life-changing event which limits an individual’s physical activity, social participation, confidence, psychosocial factors, and employment opportunities. Immediate reactions to limb loss vary and are complex. Some individuals experience functional, social, and psychological dysfunction after amputation whereas others adjust and function well after a period of amputation.[20] Understanding the psychiatric comorbidity in amputees might be helpful to know the extent of the problem and the direction of further research or service delivery upgradation. Here, we present psychiatric comorbidity in 59 patients after traumatic limb amputation.

The main finding of the current study revealed that a substantial proportion of individuals who undergo amputation suffered from psychiatric disorders. In other words, the rates of MDD (71.2%), MDD with suicidality (30.5%), and PTSD (20.3%) have been in alarming condition to call for adept management of the psychological distress among the amputees. This finding has been in agreement with the previous studies where researchers reported depression as a highly prevalent psychiatric comorbid condition in amputees, ranging between 13% and 32%. Individuals with amputations might experience significant depressive symptoms at any one time.[10,21-23] The presence of depressive symptomatology could have an association with a wide variety of negative outcomes, for example, increased pain intensity, activity restriction, public self-consciousness, body image anxiety, and reduced quality of life.[24-26] An Indian study used DSM-IV-based version of the MINI questionnaire to analyze the frequency of psychiatric comorbidities in amputees. The authors observed that 63% of cases suffered from depressive disorder.[27] This population sometimes expressed worthlessness and helplessness due to restriction in activity and changed role responsibilities. They might have moderate-to-severe frequency and intensity of suicidal ideation and intention to commit suicide.[14]

In addition, almost 20% of the patients in our study demonstrated symptoms of PTSD. Available estimates of previous studies also suggest that between 15% and 26% of individuals with limb loss might experience PTSD.[22,23,28,29] Muzaffar and Srinagar[22] and Margoob et al.[12] have examined the psychiatric comorbidity in patients with traumatic amputation from Kashmir valley. In their studies, the frequency of PTSD was noticed to be 20% and 80%, respectively. The justification of the higher prevalence of PTSD in their sample could be due to a higher baseline rate of PTSD in Kashmir valley.[18] In another study, authors have found PTSD in two of the three persons with traumatic amputations in their sample and the third patient demonstrated elevated scores on clinician-administered PTSD scale.[19] Recently, a review has been done by Sahu et al.[11] to provide comprehensive information regarding the psychological distress among amputees in Indian setting. They have found that a substantial proportion of those individuals who undergo amputation have developed psychological distress and psychiatric disorders. The prevalence of psychiatric disorders among amputees has

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| Gender                                   |                        |
| Male                                     | 52 (88.1)              |
| Female                                   | 7 (11.9)               |
| Marital status                           |                        |
| Single                                   | 27 (45.8)              |
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| Socioeconomic status                     |                        |
| Low                                      | 17 (28.8)              |
| Middle                                   | 43 (69.5)              |
| Upper                                    | 1 (1.7)                |
| Locality                                 |                        |
| Urban                                    | 36 (61.0)              |
| Rural                                    | 23 (39.0)              |
been found to be in the range of 32%–84%. The rates of depression and PTSD have been in an alarming condition.

Furthermore, no correlation was observed between the demographic parameters such as age and marital status with major depression in our study. We emphasized on the above two variables based on the premise that younger participants might have greater risk of developing depression owing to the greater number of life years ahead of them and also because of the greater perceived loss of social standing.\[33\] Marital status, known as social support, was considered since it was hypothesized that partner support might be protective against major depression.\[34\] In addition, statistically significant correlation was not found between the site of amputation and psychiatric comorbidity. This lack of association could be due to small sample size and short duration of amputation, which might have precluded the development of psychiatric disorders in some of the cases. Moreover, phantom sensation positively correlated with phantom pain and PTSD, while phantom pain had a positive correlation with PTSD. In short, when PTSD symptoms become severe, patients may experience phantom sensation and pain.\[34\]

Findings of the study should be contextualized in terms of the strengths and limitations of the study. The strengths of the study include relatively large number of amputees, and the use of structured interview scale adds to the study strengths. There are few important limitations of the current study that need to be mentioned and addressed in future studies, i.e., poor representation of the female gender, short duration of amputation history, and lack of control group (nontraumatic amputation cases).

**Table 2: Clinical characteristics of the amputees (n=59)**

| Participants' clinical characteristics | Frequency (n=59), n (%) |
|---------------------------------------|------------------------|
| Duration of amputation (months)       |                        |
| <3                                    | 35 (59.3)              |
| >3                                    | 24 (40.7)              |
| Number of limbs amputated             |                        |
| One                                   | 57 (96.6)              |
| Two                                   | 2 (3.4)                |
| Right-left limb                       |                        |
| Right                                 | 33 (55.9)              |
| Left                                  | 22 (37.3)              |
| Both                                  | 4 (6.8)                |
| Upper-lower                           |                        |
| Upper                                 | 12 (20.3)              |
| Lower                                 | 47 (79.7)              |
| Phantom sensation                     |                        |
| Present                               | 32 (54.2)              |
| Absent                                | 27 (45.8)              |
| Phantom pain                          |                        |
| Present                               | 28 (47.5)              |
| Absent                                | 31 (52.5)              |

**Table 3: Level and causes of amputation**

| Level and causes of amputation                | Frequency (n=59), n (%) |
|-----------------------------------------------|------------------------|
| Upper limb amputation                         |                        |
| Digit disarticulation                        | 2 (3.4)                |
| Wrist disarticulation                        | 1 (1.7)                |
| Transradial (below elbow)                    | 2 (3.4)                |
| Elbow disarticulation                        | 1 (1.7)                |
| Transhumeral (above elbow)                   | 6 (10.2)               |
| Total                                         | 12 (20.3)              |
| Lower limb amputation                         |                        |
| Transtibial (below knee)                     | 8 (13.6)               |
| Knee disarticulation                         | 1 (1.7)                |
| Transfemoral (above knee)                    | 28 (47.5)              |
| Foot amputation                              | 1 (1.7)                |
| Hip disarticulation                          | 9 (15.3)               |
| Total                                         | 47 (79.7)              |
| Causes of amputation                          |                        |
| Motor vehicle road accident                  | 37 (62.7)              |
| Railway track accident                       | 9 (15.3)               |
| Machinery injury                             | 4 (6.8)                |
| Electric current                             | 2 (3.4)                |
| Burn                                          | 1 (1.7)                |
| Blast                                         | 1 (1.7)                |
| Others                                       | 5 (8.5)                |

**Table 4: Psychiatric comorbidity in amputees (n=59)**

| Comorbidity                      | Frequency (n=59), n (%) |
|----------------------------------|------------------------|
| Major depressive episode         | 42 (71.2)              |
| Suicidality                      | 18 (30.5)              |
| Low                              | 10 (16.9)              |
| Moderate                         | 3 (5.1)                |
| Severe                           | 5 (8.3)                |
| PTSD – Posttraumatic stress disorder | 12 (20.3)            |

**CONCLUSION**

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In sum, depression, suicidal ideation, and PTSD are the most common psychological reactions in individuals with traumatic amputation. We expected that some of the sociodemographic factors and some amputation related characteristics would have had a relation with psychiatric comorbidity, but the findings of this study did not show any such relationship except relation between PTSD and phantom pain and sensation. Given the high level of depression and PTSD among amputees, the surgical treatment providers need to liaise with psychiatrists and psychologists so that a comprehensive psychological evaluation can be done when required, and treatment of psychiatric disorders if identified can be initiated. Hence, the study opens a new path to continue the steps necessary to identify and manage psychiatric illness in amputees.
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Conflicts of interest
There are no conflicts of interest.

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