Amputation is a major health burden on the families, society, and on medical services as well. Traumatic limb amputation is a catastrophic injury and an irreversible act which is sudden and emotionally devastating for the victims. In addition, it causes inability to support self and the family and driving many patients toward various psychiatric disorders. Extensive information regarding the effects of amputation has not been ascertained and therefore it was decided to do a systematic review. The goal of this review was to provide comprehensive information of peer-reviewed papers examining the psychological distress among amputees in India. A search of the literature resulted in a total of 12 articles with varied sample size from 16 to 190. The sample has been largely comprised males with lower limb amputation caused by primarily traumatic ones, i.e., motor vehicle accident, railway track accidents, machinery injury, blasts, etc., The prevalence of psychiatric disorders among amputees has been found to be in the range of 32% to 84% including depression rates 10.4%–63%, posttraumatic stress disorder 3.3%–56.3%, and phantom limb phenomenon 14%–92%. Although the studies reported that symptoms of anxiety and depression become better over the course of time, however surgical treatment providers need to liaise with psychiatrists and psychologists to support and deal with the psychological disturbances.

**Keywords:** Amputation, depression, phantom limb phenomenon, posttraumatic stress disorder

Amputation of the limbs has been reported to a significantly stressful event for an individual. Amputation as a surgical option is resorted to in circumstances where salvaging a limb is improbable, and the remaining part of the limb tissue needs excision. Surgical amputation of a limb can be an elective procedure or an emergency procedure. The typical indications of amputation include trauma, infections, and neoplasms. Sometimes trauma inflicted during accident or blast may result in partial amputation which needs to be surgically completed to avoid complications. Diabetes represents another condition when diabetic foot may require amputation when putrefaction starts to appear.

Amputation represents an irreversible surgical option which may result in physically challenged and bodily disfigurement. Many researchers in the field of amputation reported 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 result in poor quality of life. The loss of the limb may cause distress 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. The individual undergoing amputation may be at risk of developing depressive disorder due to multiple factors such as feelings of loss, self-stigma, and difficulty in coping up with the impairment.
events leading to the amputation, especially if amputation is induced by accident or blast, may induce symptoms of posttraumatic stress disorder (PTSD). Thus, amputation as an event produces considerable stress and challenges the coping of the individual.

India is a vast country with a large number of individuals in the community with various disabilities. It had been estimated that there are roughly 0.62 amputees in India per thousand population. This translates to close to one million individuals with amputations in the country. The sources of emotional support are probably different from India than the Western world as the familial ties are stronger and provide close supervision and support. Moreover, the health-care service delivery characteristics in India differ considerably than elsewhere, with mental health care access being difficult and fragmentary. Understanding the experiences of amputees in the Indian context might be helpful to know the extent of the problem and the direction of further research or service delivery upgradation. Hence, this review explores the Indian literature on psychological morbidity in patient who has undergone amputations.

### METHODOLOGY

The present study aimed to collate the findings from observational studies reporting psychological distress among amputees in India.

#### Search strategy

The search strategy included electronic search engine databases: PubMed, PsychInfo, and Google Scholar. The keywords for the search were amputation, India, and psychological distress OR depression OR anxiety OR posttraumatic stress disorder. The searches were carried out in August 2015. Searches were independently conducted by authors. In addition, further studies were identified from the cross references. Unpublished material and non-peer-reviewed material were not included as a part of the review, and hand searches of libraries were not conducted as a part of the present review.

#### Study selection

The present review included observational studies published in peer-reviewed English language journals pertaining to psychological distress. Case reports were not included in the present review. Nonlimb amputation was also not included in the present review. Those studies which did not report the prevalence of psychological distress in the study sample were not included.

#### Data extraction

All relevant abstracts were reviewed independently by investigators. After the initial evaluation, 16 abstracts were selected for further evaluation. Full texts of these abstracts were searched. Upon careful reading of the studies, 4 of 16 were not included in the review as they did not report the prevalence of psychological distress in the study sample. They were analysis and discuss the epidemiology, services and rehabilitation of amputees in India, prevalence, etiology, levels of amputation, rehabilitation after amputation, and effect of anxiety, and depression on unilateral transtibial amputees. Thus, rest of 12 studies were included for review.

### RESULTS

The review included 12 published articles based on ten study samples as mentioned in Table 1. The sample sizes of the studies have varied from 16 to 190. The sampling method have varied from being consecutive to nonrandom purposive. The sample has been largely comprised young adult Hindu males. Most of them were married, educated approximately primary grade, and currently employed. The causes of amputation had been primarily traumatic ones (accidents-motor vehicle accident and railway track accidents, machinery injury, blasts, etc.) although other causes were also represented in the sample of amputees. In addition, lower limb amputation was noted in majority of cases than upper limb amputation and among them, most amputation performed with one limb.

Psychological morbidity had been reported in a considerable proportion of cases. There was heterogeneity in the assessment of psychological morbidity in the population of amputees. Assessment methods included clinical impression and diagnosis, as well as used of structured scales such as Beck Depression Inventory, Beck Hopelessness Scale, Carroll Rating Scale for depression, General Health Questionnaire, Hamilton Anxiety Rating Scale, Hamilton Depression Rating Scale, Hospital Anxiety Depression Scale, Mini-International Neuropsychiatric Interview, State-Trait Anxiety Inventory, Structured Clinical Interview for DSM Disorder, and Trauma Symptom Inventory.

The presence of any psychiatric disorder was found in 32%–84% of the sample. The rates of depression reported in the studies varied from 10.4 to 63%. Rates of PTSD have ranged from 3.3% to 56.3%. Generalized anxiety disorder rates ranged from 3.4% to 10%. Follow-up studies show that rates of anxiety and depression decrease over a period of time. Phantom limb phenomenon had been observed in a considerable proportion of patients with amputations (14%–92%) associated with pain, telescope, and movement.
### Table 1: Studies included

| Author, year       | Place of conduct                     | Sample size, selection | Sample characteristics, | Characteristics of amputation | Method of assessment of psychological dysfunction | Results                                                                 |
|--------------------|--------------------------------------|------------------------|-------------------------|-------------------------------|-----------------------------------------------|------------------------------------------------------------------------|
| Bhojak and Nathawat, 1988[^1^] | Jaipur, Rehabilitation Research Centre | 50, consecutive amputees matched with 50 surgical controls (undergone surgery for renal stone, piles, appendicitis, etc.) | Mean age 27.4 years (age range 18-45) 50/50 males 43/50 employed 25/50 educated above middle to higher secondary | Not available | Body Distortion Questionnaire Beck Hopelessness Scale PEN inventory | Body distortion and hopelessness scores higher among amputees than controls (27.9 versus 16.7 and 14.1 versus 8.1, respectively) |
| Karira et al., 2011[^2^] | Mumbai, Tertiary-Care Hospital       | 30, Nonrandom, 2 months follow-up | Age 31.5 years (±12.3, 17-70) Education 5.2 (±4.3, 0-14) 16/30 married 24/30 Hindu 24/30 employed | Causes 26/30 railway accident 2/30 machinery accident 1/30 road accident 1/30 tree fall Limbs amputated One 23/30 (UL - 6, LL - 17), Two 6/30, Three 1/30 | HDRS-17, HAM-A, major depression as per clinical interview | 14/30 patients had postmorbid psychiatric conditions, in which 11 controls had major depression (more common among Hindus, not significant relationship with age, gender, marital status, employment), 1 had acute stress disorder, 1 had PTSD HDRS score 20 (±1.8) at baseline, 13 (±5.2) at 1 month, 8.5 (±3.7) at 2 months HAM-A scores 17.8 (±4.9) at baseline, 14.0 (±4.0) at 1 month and 8.4 (±4.3) at 2 months Depressed patients showed a significant decline (P=0.06) in their HDRS-17 scores with tablet escitalopram (10 mg/day) from baseline to 2 months postamputation evaluation Phantom limb in 22/30 |
| Kashif et al., 2004[^3^] | Pune, Artificial Limb Centre         | 40, soldiers           | 26/40 in the age groups 20-29 37/40 males 36/40 Hindu 29/40 married 33/40 rural 24/40 educated between 6 and 10 34/40 employed | Unclear | GHQ-12 CRSD STAI | 29/40 had pretreatment GHQ-12 score above cutoff and 20/40 after psychiatric treatment (significant) 16/40 probably depressed prior to treatment and 11/40 depressed posttreatment (nonsignificant) State anxiety decreased from 49.7 to 39.6, trait anxiety decreased from 37.6 to 35.2 |

*Contd...*
### Table 1: Contd...

| Author, year | Place of conduct | Sample size, selection | Sample characteristics, | Characteristics of amputation | Method of assessment of psychological dysfunction | Results |
|--------------|------------------|------------------------|-------------------------|-------------------------------|-----------------------------------------------|---------|
| Mall et al., 1997\[26\] | Lucknow, Tertiary-Care Hospital | 25/31 consecutive patients used for analysis (2 excluded due to age criteria, 2 due to early discharge, 1 each due to noncooperative and 1 having schizophrenia) Divided into two groups sick (8) and nonsick group (17) | 25/25 males Age between 16 and 25 years | Duration Limb amputation within last 6 weeks Causes 23/25 emergency surgery 2/25 had elective surgery 12/25 road accidents Limbs amputated One 24/25 (UL - 7, LL - 17), two 1/25 (UL) | SCID-DSM-II-R HDRS HAM-A | 8/25 had PTSD and out of these 8 cases, 5 had both Depression and PTSD Phantom limb in 23/25 (pain 17/23, telescopy 11/23, movement 18/23) |
| Mansoor et al., 2010\[27\] and Muzaffar et al., 2012\[28\] | Srinagar Govt. Medical College | 100, consecutive | 45/100 in 15-0 age 79/100 males 61/100 illiterate 55/100 married 95/100 Muslims 61/100 illiterate 81/100 rural 42/domestic worker | Duration Amputation more than 1 year Causes 53/100 motor vehicle accident 11/100 blast 6/100 land mine 4/100 firearm injury 26/100 others (fall from tree and hillock, electrocution, and machinery mishap) | DSM-IV for diagnosis Semistructured interview MINI | 84/100 had some psychiatric disorder 63/100 major depression 20/100 PTSD 10/100 impulse control disorder 10/100 GAD 6/100 panic disorder 4/100 subsyndromal PTSD Phantom limb phenomenon in 14/100 |
| Marqoob et al., 2008\[29\] | Srinagar, Tertiary-Care Hospital | 16, Nonrandom | 8/16 males | Causes 10/16 trauma (4 road accident, 2 blast trauma, 2 firearm, 2 earthquake) 6/16 therapeutic surgical amputation (3 osteosarcoma, 2 for neglected CTEV 1 gangrene) Type UL 3/16 LL 13/16 | Clinical interview SCID CAPS | 8/16 traumatic amputation had PTSD 1/6 therapeutic surgical amputation had PTSD |
| Mozumdar and Roy, 2010\[30\] | Kolkata, Two Rehabilitation Centres | 85, nonrandom lower extremity traumatic amputation; 105 controls without amputations | Mean age 42.6 (14.1) 85/85 males 56/85 married/cohabiting 64/85 employed 66/85 educated above 5th | Duration Amputated about 2 years prior to the study Cause All were traumatic lower limb amputation Levels of amputation 27/85 above knee, 50/85 below knee, all participants had prosthesis | BDI-II | 42/85 no depression 18/85 mild depression 13/85 moderate depression 12/85 severe depression Mean 15.1 (±12.4) No difference from controls |
### Table 1: Contd...

| Author, year          | Place of conduct                  | Sample size, selection | Sample characteristics, | Characteristics of amputation | Method of assessment of psychological dysfunction | Results                                                                 |
|-----------------------|-----------------------------------|------------------------|-------------------------|-------------------------------|-----------------------------------------------|--------------------------------------------------------------------------|
| Shukla et al., 1982   | Jhansi                            | 72, consecutive        | 26/72 in the age group 10–20 years 68/72 males 32/72 uneducated | Duration After postoperative period Type UL: 38/72 LL: 34/72 Causes 50/72 accidents (43 crush, 7 blast injury) 7/72 osteosarcoma 6/72 chopped off 3/72 Buerger’s disease 3/72 electric burns 1/72 each: Madura foot, osteomyelitis, leprosy | Clinical evaluation (DSM-II)                                           | 29/72 depressive neurosis 16/72 psychotic depressive reaction 2/72 schizophrenia Phantom limb phenomenon in 62/72 cases: Movement in 46, pain in 43, telescopy in 39, and dreams in 27 |
| Srivastava et al.,    | Pune, Artificial Limb Centre      | 50, soldiers, consecutive | Mean age 27.7 years 50/50 males 45/50 rural 36/50 Hindu 37/50 married 38/50 general duty soldiers | Duration 4/50 3 months 26/50 6 months 18/50 12 months 2/50>12 months Causes 28/50 mine blast 18/50 accident 2/50 frost bite 2/50 disease Limbs amputated One limb UL: 9/50 LL: 41/50 | HADS TSI                                                                  | Depression scores baseline 8.9 (±3.2) and after treatment 3.8 (±1.3) Anxiety scores baseline 7.6 (±3.2) and after treatment 4.5 (±1.3) TSI - marginal elevation is noted on subdomain of defensive avoidance (67.1), depression (66.7), dissociation (59.1), and intrusive experiences (55.1) |
| Trivedi et al., 1997  | Lucknow, Tertiary-Care Hospital   | 29, consecutive (subsequently excluded 1 each of alcohol dependence and schizophrenia, 2 two limbs amputation) | 27/29 males 26/29 employed | Duration Amputation had done 6 months to 2 years ago Causes Emergency 25/27, elective 2/27 14/27 road traffic accidents 6/27resher injury 4/27 train accident | SCID HDRS-17 HAM-A                                                      | 11/29 of initial sample had psychiatric disorder 3/29 major depression 6/29 depression NOS 1/29 GAD (in addition to depression) 1/29 schizophrenia 1/29 alcohol dependence Phantom limb in 18/27 Pain 4/25 (associated with psychiatric dx), telescopy 14/25, movement 34/25 |

CRSD – Carroll Rating Scale For Depression; CTEV – Congenital Talipes Equino Varus; CAPS – Clinical Administered PTSD Scale; DSM – Diagnostic and Statistical Manual; GAD – Generalized Anxiety Disorder; GHQ – General Health Questionnaire; HAM-A – Hamilton Anxiety Rating Scale; HDRS – Hamilton Depression Rating Scale; LL – Lower limb; MINI – Mini-International Neuropsychiatric Interview; NOS – Not Otherwise Specified; PTSD – Posttraumatic stress disorder; SCID – Structured Clinical Interview for DSM Disorders; STAI – State-Trait Anxiety Inventory; TSI – Trauma Symptom Inventory; UL – Upper limb; HADS – Hospital Anxiety Depression Scale; BDI – Beck Depression Inventory
DISCUSSION

The present review suggests that Indian literature pertaining to psychological effects of amputation has gradually accrued over time. The studies have been heterogeneous and have attempted to understand the psychological impairment and psychiatric disorders among the amputees from different perspectives. The studies though have been consistent in finding that a substantial proportion of those individuals who undergo amputation do suffer from psychological distress and psychiatric disorders.

The prevalence of psychiatric disorders among amputees has been found to be in the range of 32%–84%. These rates are generally high as compared to population-based psychiatric prevalence studies conducted in India. However, the case–controls studies in the present study provided an inconclusive picture. The study by Bhojak and Nathawat found a lower level of hopelessness among surgical controls, while the study by Mozumdar and Roy found a comparable level of depression among “non-amputated healthy males.” The rates of depression and PTSD also have been alarming in some of the studies.

The findings of this review call for adept management of the psychological distress among the amputees. Depression and anxiety are common problems among patients who have suffered from amputation. Both the antecedent circumstances preceding the amputation and the irreversible procedure of amputation itself may contribute to the occurrence of symptoms of psychological distress. The surgical treatment providers need to liaise with psychiatrists and psychologists so that a comprehensive evaluation occurs when required and treatment of psychiatric disorders if identified can be initiated. The patient may be benefitted by both psychotherapeutic interventions and pharmacological management options. Previous literature suggests that symptoms of anxiety and depression become better over the course of time although patient may need support from various sources while coming to terms with the impairment.

The present corpus of literature from India presents opportunities for further research. The numbers of studies which have followed up patients over a period of time are quite limited. Since Indian social support system and health-care delivery services are quite different from the Western world, the changes with time in the psychological distress and psychiatric morbidity can give a glimpse of remedial and accentuating factors. Moreover, studies need to consistently need to use standardized methods of making psychiatric diagnoses and eliciting symptoms using scales. This would help to compare the studies more accurately. Consistent subgroup analysis of traumatic and nontraumatic amputations can help discern the acuity of the psychological distress in these two groups. Moreover, intervention studies need to be conducted to assess the effectiveness of interventions among the amputees in the local context.

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There are no conflicts of interest.

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