Evaluation of treatment of psychiatric morbidity among limb amputees

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Background: The sudden jolt of becoming an amputee brings with it the realization of loss of independence and self-built psychological and physical security. Advances in the field of prosthesis give the individual hope for better future, but the presence of psychological morbidity is a hurdle to be crossed in the road to satisfactory rehabilitation.

Aim: This study aimed to assess the psychiatric morbidity in amputees and the response to treatment. Materials and Methods: One hundred newly amputated soldiers were assessed by means of clinical interview, General Health Questionnaire, Impact of Event Scale, Hospital Anxiety Depression Scale, McGill Pain Questionnaire, and Dallas Pain Questionnaire. Individuals were treated with appropriate medications and psychotherapy, and response to treatment was assessed. Results: Psychiatric disorders were diagnosed in 66% including adjustment disorders (40%), depressive episode (20%), and posttraumatic stress disorder (6%). Phantom sensation and phantom pain were noted in 72% and 64% of participants, respectively. More psychiatric disorders and phantom sensation were found in the early months after amputation. Psychiatric morbidity was associated with negative body image, distressing pain, and restriction of activities of daily life. Treatment produced complete remission of symptoms in 65.15% of individuals suffering from psychiatric disorders and statistically significant reduction in the scores of psychiatric rating scales. Conclusions: There is a high prevalence of psychiatric morbidity among amputees. Psychiatric treatment produces significant improvement in the psychological well-being of amputees and underlines the need to focus on the psychological rehabilitations of the amputee apart from physical rehabilitation.

Keywords: Amputation, management, phantom pain, phantom sensation, psychiatric disorders

The words “amputation” and “amputee” send shivers up the spine of most people because they bring out the inherent fear in all of us of becoming handicapped and dependent for the whole life. Amputation of limb involves losing a leg or arm or part of those limbs due to a traumatic accident or due to a surgery for any reasons. Throughout history, amputation has routinely been performed for a variety of reasons. Skeletons with amputated limbs dating back to 36,000 years have been found. In some cultures, amputation was a form of religious rehabilitation in those attempting to appease the gods. Amputation administered as a punishment can be found in Arabic and Peruvian cultures. The modern therapeutic concept of amputation started with Ambrose pare who is considered as the father of modern-day amputation.

Loss of an anatomical part of the body such as limb is devastating to most people. The patient does not feel that he/she has lost a limb, but feels that he/she has lost a slice of his/her world and a large part of his/her future. Despite advancements made in the field of prosthesis manufacturing, an artificial limb does not completely reinstate the functioning of intact limb. Immense psychological challenges are faced to an amputee while
adapting to the pre-/post-amputation phase. It brings out the castration anxiety, infantile fear of punishment, and all other cathexes attached with organ loss. Amputation causes a threefold loss in terms of function, sensation, and body image. The grief for loss of body image and functions increases self-consciousness, gives rise to anxiety, depression, sexual problems, job dissatisfaction, social stigmatization, and results in psychosocial dysfunction and psychiatric disorders. This leads to dissatisfaction with future life and suicidal ideas among the amputees.

The new amputee often grieves for the lost limb and the old body image, and goes through five stages as a part of his/her grieving process, i.e., denial, anger, bargaining, depression, and acceptance.[8] This resembles the way in which people respond to the death of a loved one or when being diagnosed with a life-threatening illness.[9]

Most amputees, following amputation, have a negative attitude toward their current body schema, which has been found significantly related with the presence of psychiatric disorders. Successful adjustment for the amputees appears to be in the incorporation of the prosthesis into their body image and focus on the future and not on the part which has been lost.[7] Apart from the magnitude and type of loss, whether the amputation was elective or sudden and the personality structure of the patient are important factors determining the outcome and well-being of the amputee. Those amputees who had long-standing tendency to anxiety or depression coped less well after amputation and suffered more than others. Paradoxically, another group who were rigid and compulsively self-reliant people were also suffering from various psychiatric disorders significantly more than the other amputees.[8]

Amputees face difficulty in believing the fact of loss of limb and tend to avoid reminders. This results in clear visual memories of the lost part and experience of a strong sense of their persisting presence. This form of persisting feeling of amputated limb is known as “phantom limb” phenomenon. It is reported to move in space and time in much the same way as the preamputation limb did. The length of phantom gets changed, over time. Many amputees suffer from a strange form of pain in the form of burning, cramping, numbing, smarting, stinging, throbbing, piercing, or tearing sensation located in an appendage that no longer existed. This is “phantom pain.” Studies have attributed the phantom pain to cortical reorganization, psychosocial factors, and stress.[9]

Decreased job-finding ability, dissatisfaction with the new job, decreased social interaction, interpersonal conflicts with the family members, decreased self-esteem, distorted body image, and increased dependency are the few of many reasons for the development of psychological maladaptation. Younger amputees have been reported to have increased depression and anxiety symptoms along with the features of posttraumatic stress disorder (PTSD).[10] Thus, amputation of a limb affects almost all aspects of an individual’s life and to fully recover from the limb loss, all of these need to be addressed. However, in practice, little attention is paid to the psychological state of the individual unless he or she presents with overt behavioral abnormalities. There is a paucity of Indian work in this field, especially among service personnel.[11-15] In view of the above, this study was planned to evaluate the extent and nature of psychological problems in amputees and find the various variables involved in the precipitation and perpetuation of the problems and the effects of treatment.

MATERIALS AND METHODS

This hospital-based, prospective, pre- and post-treatment study was undertaken at Artificial Limb Centre (ALC), Pune, a large tertiary care center for amputees. The study was approved by the ethics committee of the institute. All the individuals gave written informed consent.

Study group

One hundred consecutive adult male amputees who underwent amputation in the past 1 year were selected after applying the following exclusion criteria:

a. Patients who were unwilling to participate in the study (none of the patients, who were eligible for the study, refused to participate)

b. Past history of psychiatric disorders (none of the amputees were excluded for this reason)

c. Associated physical disabilities other than amputation (two amputees who had suffered multiple injuries including head injury and blindness due to the trauma were excluded).

Tools

- Sociodemographic and clinical pro forma
- General Health Questionnaire 12 (GHQ 12)[16]
- Hospital Anxiety and Depression Scale (HADS)[17]
- Impact of Event Scale-Revised (IES-R)[18]
- Amputee Body Image Scale[7]
- McGill Pain Questionnaire[19]
- Dallas Pain Questionnaire.[20]

Methods

After explaining the nature and scope of the study, informed consent was obtained from every patient. All patients were interviewed within 1 week of their admission and weekly intervals thereafter. Whenever possible, a reliable relative was interviewed.
Sociodemographic data along with the findings of physical examination and mental status evaluation were recorded in a special pro forma made for the study. Psychiatric diagnosis was made clinically as per the International Classification of Diseases (ICD-10) Diagnostic Criteria for Research (DCR).[13] Amputees diagnosed to have psychiatric disorders were treated with appropriate medications (selective serotonin reuptake inhibitors or tricyclic antidepressants either alone or in combination), apart from supportive psychotherapy and other measures. Antipsychotics and electroconvulsive therapy (ECT) were used if indicated. Standardization of treatment procedure was not attempted during the current study. All patients were followed up regularly. Necessary dose adjustments were made as per individual cases. Response to treatment was assessed after 6 weeks of initial evaluation. All the patients who were treated were reassessed using all the rating scales used initially.

### Statistical analysis

Frequency data were compared using the Chi-square test. For comparing the scores of psychological tests pre- and post-treatment, Wilcoxon test was used. The differences were considered statistically significant if $P < 0.05$. Statistical analysis was done using software package SPSS version 17 (IBM, USA).

### RESULTS

The mean (± standard deviation) age of the 100 amputees included in the study was 34.34 (±12.65) years. Age of the amputees ranged from 19 to 67 years. All the amputees were male. Sociodemographic characteristics and the causes of amputation are summarized in Table 1. Relation of age to cause of amputation is summarized in Table 2.

#### Type of amputation

Amputations performed at the time of occurrence of accident were taken as “urgent,” and those performed after preplanning were taken as “elective.” Out of all cases, 72% of amputations were urgent, which was due to blast/firearm injuries during counter-insurgency operations. The remaining 28% were elective type due to causes such as peripheral vascular diseases (PVD) and diabetes [Table 1].

#### Duration after amputation

Among all the amputees, 11% were amputated in <3 months, 34% in 3–6 months, 28% in 6–9 months, and 27% in 9–12 months prior to the study.

#### Site of amputation

Bilateral amputations were 8%, while 92% were unilateral comprising 78 unilateral lower-limb amputations (49 below knee, 22 above knee, 2 through knee, and 5 foot and below) and 14 unilateral upper-limb amputations (5 above elbow, 4 below elbow, and 5 wrist and below).

#### Phantom phenomenon

Type of phantom limb sensation felt by the amputees included phantom pain (64%), movement (38%), telescopy (21%), and dreams (16%). The type of phantom pain complained of by the 64 patients included: current ($n = 18; 28.13%$), burning ($n = 15; 23.44%$), stabbing ($n = 10; 15.63%$), cutting ($n = 10; 15.63%$), itching ($n = 7; 10.94%$), tearing ($n = 2; 3.13%$), and throbbing ($n = 2; 3.13%$). The relation of phantom sensation to the site of amputation is summarized in Table 3.

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**Table 1: Demographic characteristics and causes of amputation**

| Characteristics | $n$ (%) |
|-----------------|--------|
| Age group (years) |        |
| ≤20             | 5 (5)  |
| 21-30           | 46 (46)|
| 31-40           | 20 (20)|
| 41-50           | 19 (19)|
| 51-60           | 3 (3)  |
| 61-70           | 7 (7)  |
| Education status |        |
| <10th           | 20 (20)|
| 10th standard   | 47 (47)|
| >10th standard  | 33 (33)|
| Income (rupees/month) |     |
| <3000           | 17 (17)|
| 3000-5000       | 35 (35)|
| 5000-10,000     | 39 (39)|
| >10,000         | 9 (9)  |
| Religion        |        |
| Hindu           | 79 (79)|
| Sikh            | 17 (17)|
| Christianity    | 03 (03)|
| Islam           | 1 (1)  |
| Marital status  |        |
| Married         | 68 (68)|
| Unmarried       | 32 (32)|
| Causes of amputation |     |
| Service-related injuries ($n=61$) |          |
| Mine blast      | 39 (39)|
| Gunshot, splinter injuries | 15 (15)|
| Crush injury, frost bite, etc. | 7 (7)  |
| Traffic accidents ($n=24$) |     |
| Train           | 14 (14)|
| Road            | 10 (10)|
| PVD ($n=15$)    |        |
| Diabetes        | 10 (10)|
| Thromboangiitis obliterans | 2 (2) |
| Other PVD       | 3 (3)  |

PVD - Peripheral vascular disease
Table 2: Relation of age and psychiatric disorders to the cause of amputation

| Variables                        | War-related psychiatric disorders (n=54), n (%) | Traffic injuries (n=24), n (%) | PVD (n=15), n (%) | Other injuries (n=7), n (%) |
|----------------------------------|-----------------------------------------------|--------------------------------|--------------------|---------------------------|
| Age group                        |                                               |                                |                    |                           |
| <30 (n=51)                       | 10 (19.61)                                     | 0 (0)                          | 4 (7.8)            |
| 31-50 (n=39)                     | 17 (33.33)                                     | 13 (65.71)                     | 7 (46.67)          |
| >50 (n=10)                       | 0 (0)                                         | 1 (20)                         | 8 (80)*            |
| Psychiatric disorders            |                                               |                                |                    |                           |
| Adjustment disorder, anxiety and depression (n=30) | 20 (66.67) | 8 (33.33) | 1 (6.67) | 1 (16.67) |
| Adjustment disorder, prolonged depressive reaction (n=10) | 4 (40) | 5 (50) | 1 (10) | 0 |
| Major depressive disorder (n=20) | 7 (35) | 7 (35) | 6 (30) | 0 |
| Posttraumatic stress disorder (n=6) | 2 (33.33) | 4 (66.67) | 0 | 0 |
| Total psychiatric disorders (n=66) | 33 (50) | 24 (36.36) | 8 (12.12) | 1 (1.52) |

*χ²=42.44, df=2, P<0.05 (S), χ²=26, df=2, P<0.05 (S). PVD - Peripheral vascular disease; S - Significant

Table 3: Phantom sensation and sites of amputation

| Variables                        | Phantom limb phenomenon present, n (%) | Significance |
|----------------------------------|---------------------------------------|--------------|
| Site of amputation               |                                       |              |
| Lower limb (left) (n=35)         | 23 (65.71)                            | χ²=0.35; df=1; P>0.05 (NS)       |
| Lower limb (right) (n=43)        | 31 (72.09)                            |               |
| Lower limb unilateral (n=8)      | 54 (69.23)                            | χ²=0.03; df=1; P>0.05 (NS)       |
| Upper limb unilateral (n=14)     | 10 (71.43)                            |               |
| Total unilateral amputations (n=92) | 64 (69.57)                         | Fishers exact test=0.1015 (NS)                                         |
| Total bilateral amputations (n=8) | 8 (100)                              |               |
| Time since amputation (months)   |                                       |              |
| <3 (n=11)                        | 9 (81.82)                             | χ²=5.96; df=3; P<0.05 (NS)      |
| 4-6 (n=34)                       | 28 (82.35)                            |               |
| 7-9 (n=28)                       | 20 (71.43)                            |               |
| >10 (n=27)                       | 15 (55.55)                            |               |

NS - Not significant

Psychiatric diagnosis

Comorbid psychiatric disorders were present in 66 amputees including adjustment disorder, mixed anxiety and depressive reaction (30%), adjustment disorder, prolonged depressive reaction (10%), mild depressive episode (5%), moderate depressive episode (7%), severe depressive episodes without psychotic symptoms (4%), severe depressive episodes with psychotic symptoms (4%), and PTSD (6%). Relation of psychiatric disorder to the cause of amputation is summarized in Table 2.

Psychiatric Rating Scale results

The scores of the amputees diagnosed with psychiatric disorders and others on the HADS, GHQ, IES, and Body Image Scale (BIS) are summarized in Table 4. IES score below “5” was found in 84 amputees and 16 amputees had score more than “5.” Out of these 16 amputees, 6 were diagnosed to suffer from PTSD, 8 had major depressive disorder, and 2 had adjustment disorders.

Relation of pain assessed by the McGill Pain Questionnaire and psychiatric disorder

According to McGill Pain Questionnaire, 35 patients had distressing pain, 45.7% of whom had a psychiatric disorder, while 65 had distressing pain, 76.92% of whom had a psychiatric disorder. The difference was statistically significant (χ² = 6.58, df = 1, P < 0.05) [Table 5].

Restriction of activities of daily life (as assessed by the Dallas Pain Questionnaire) and psychiatric disorders

Sixty patients reported restriction of activities of daily life of 50% or above, and 83.3% of them had a psychiatric disorder. The difference was statistically significant (χ² = 20.08, df = 1, P < 0.05, Table 5).

Effects of treatment

Two cases of severe depressive episode with psychosis were treated with ECTs apart from psychotherapy. All the four cases of severe depressive episode with psychosis were treated with antipsychotics apart from antidepressants. All the four cases of psychosis completely recovered with treatment. Among amputees with depressive episode, 13 (65%) showed complete remission and 7 (35%) had residual symptoms. Out of adjustment disorders, 19 cases (63.33%) of adjustment disorder with anxiety and depression showed complete remission and 11 cases (36.67%) had residual symptoms. Five cases (50%) of adjustment disorders with depressive reaction showed complete remission, whereas five cases (50%) had residual symptoms. All patients with PTSD showed complete remission. In total, out of 66 patients having psychiatric disorders, 43 (65.15%) had complete remission and 23 (34.85%) had residual symptoms. No statistically significant difference could be found between recoveries of various disorders.
DISCUSSION

Since long, amputation has been known to be associated with vast psychological disturbances for an amputee. Though recent advances have been made in the development of prosthesis, providing many functional aspects of an amputated limb, the psychiatric disturbances are largely uncared for, more so in the early stages. Many studies in the past have reported high incidence of psychiatric disorders associated with amputation. Severity and type of amputation, personality traits, and social and cultural factors may be the underlying causes of mental illness in amputees. For effective rehabilitation of an amputee, it is imperative to have the knowledge of psychological morbidity and response to psychiatric treatment in these patients.

Table 4: Psychological test values of all amputees before treatment and amputees with psychiatric disorders (before and after treatment)

| Test             | All amputees before treatment | Amputees with psychiatric disorders | Wilcoxon signed-rank test (before and after treatment), P |
|------------------|-------------------------------|-------------------------------------|----------------------------------------------------------|
|                  | Mean (median; SD)             | Before treatment                    | After treatment                                           |
| GHQ score        | 2.46 (2; 1.99)                | 3.38 (2; 2.20)                      | 1.206 (1; 0.57)                                          | −6.27, <0.05 |
| IES score        | 3.17 (2.54; 2.08)             | 3.72 (3.15; 2.22)                   | 2.17 (2.15; 0.82)                                        | 6.624, <0.05 |
| Anxiety score    | 6.05 (5; 2.63)                | 6.86 (7; 2.8)                       | 4.60 (5; 1.48)                                          | −5.98, <0.05 |
| Depression score | 8.11 (8; 3.23)                | 9.92 (9; 2.67)                      | 6.06 (6; 1.64)                                          | −6.75, <0.05 |
| BIS score        | 43.81 (42.5; 12.27)           | 46.25 (45; 11.95)                   | 28.38 (29; 6.92)                                        | −6.85, <0.05 |

BIS - Body Image Scale; SD - Standard deviation; GHQ - General Health Questionnaire; IES - Impact of Event Scale

Table 5: Distribution of amputees (n=100) as per scores on Hospital Anxiety and Depression Scale, General Health Questionnaire, Impact of Event Scale, McGill Pain Questionnaire, and Dallas Pain Questionnaire before and after treatment

| Range                  | Number of amputees at baseline | Number of amputees after treatment | χ²/Fisher’s test | P          |
|------------------------|--------------------------------|-----------------------------------|----------------|------------|
| Anxiety score          |                                |                                   |                |            |
| 0–7                    | 71                             | 100                               | Fisher’s exact test | <0.0001    |
| >7                     | 29                             | 0                                 |                |            |
| Depression score       |                                |                                   |                |            |
| 0–7                    | 42                             | 86                                | χ²=22.67 (df1) | <0.0001    |
| 8–11                   | 38                             | 14                                |                |            |
| GHQ                    |                                |                                   |                |            |
| 0–1                    | 37                             | 84                                | χ²=44.27 (df1) | <0.0001    |
| 2 and above            | 63                             | 16                                |                |            |
| IES score              |                                |                                   |                |            |
| <5                     | 84                             | 100                               | Fisher’s exact test | <0.0001    |
| 5 and above            | 16                             | 0                                 |                |            |
| McGill Pain Questionnaire |                           |                                   |                |            |
| Distressing pain present | 65                         | 30                                | χ²=23.17 (df1) | <0.0001    |
| Distressing pain absent | 35                          | 70                                |                |            |
| Dallas Pain Questionnaire |                         |                                   |                |            |
| Restriction in activities of daily life 50% or more | 62 | 19 | χ²=36.60 (df1) | <0.0001 |
| Restriction in activities of daily life <50% | 38 | 81 | | |

IES - Impact of Event Scale; GHQ - General Health Questionnaire

Sociodemographic variables

Age distribution [Table 1] shows that the maximum representation of cases were in 21–30 years of age. This was due to the fact that ALC, Pune, caters to service personnel, and the young soldiers are prone to have amputation more than the elderly due to the nature of duties. All the amputees were male in this group. This selection bias was due to the fact that the hospital catered only to male patients. Education distribution [Table 1] shows that a majority of the amputees had education up to X standard. This may be due to the fact that the participants included predominantly young serving soldiers whose minimum education level is X standard.

Majority (68%) of the participants were married [Table 1], reflecting the practice of early marriage in the rural areas to which majority of the service personnel belong to.
Majority (72%) of the amputations were urgent because most amputations were due to blast/firearm injuries occurred during counter-insurgency operations and individuals were getting amputated at the time of injury itself. Distribution of causes of amputation shows that majority, i.e., 54% of amputations, were due to war-related injuries. This is in contrast to most of the studies done on amputees previously, where either vascular causes or accidents were the major causes for amputation. This may be due to selection bias of individuals who are mainly physically fit soldiers of younger age group.

A statistically significant association was found between age and cause of amputation [Table 2]. War-related injuries were more common in young age group, whereas PVD was the most common cause of amputation in the age group of >50 years. This is due to the fact that older people are more prone to have PVD than younger people and young people are more exposed to war injuries. Distribution of duration after amputation [Table 2] shows that the maximum representation was in 4–6 months’ period due to the fact that amputees before reaching to ALC for the management of amputation would have spent 2–3 months in other hospitals for the management of primary wound.

### Phantom phenomenon

The finding of “phantom phenomenon” in 72% of patients, of which 64% had “phantom pain,” is in agreement with the findings of Shukla et al. (80% phantom sensation and 60% phantom pain).[21] The other phantom sensations (movement 38%, telescopy 21%, and dreams 16%) were much lower (75% movement and 38% dreams) than those observed in an earlier study.[21] Phantom was reported more in right limb than left, but was not statistically significant [Table 3]. This was not in accordance to an earlier study which may be due to shorter duration of study (6 weeks) and less number of patients (n = 25) in that series.[22] Upper-limb amputees had higher incidence of phantom than lower-limb amputees but not statistically significant, which was dissimilar to the findings of Shukla et al.[23] It was noted that the maximum presence of phantom phenomenon was during the early months after amputation [Table 6], which is in accordance to a study reported by Troel et al.[24] Out of 64% phantom pain, majority were current-like sensation (28.13%), followed by burning (23.44%), stabbing and cutting (15.63% each), and itching sensation (10.94%), along with throbbing and tearing pain (3.13% each). A different pattern (56% burning sensation, 42% current-like sensation, 21% throbbing, 21% itching, 14% cutting sensation and 7% stabbing and tearing pain each) was reported in Shukla et al’s series.[21]

### Psychiatric disorders

The present study found that 66% of amputees could be clinically diagnosed to have psychiatric disorders as per the ICD-10 DCR. This was in accordance to the study by Shukla et al., in which 66.66% of amputees had psychiatric disturbances after excluding phantom phenomenon.[21] On the other hand, much lower figures of 40% of psychiatric disorders had been observed in the study by Douglas et al.[25] and 45.16% by Mall et al.[22] Broadly speaking, 60% of amputees in total were noted to have depressive symptoms including those who were diagnosed to have adjustment disorder with mixed anxiety and depressive reaction and adjustment disorder with prolonged depressive reaction. This was similar to the study by Shukla et al.[21] where 62% of amputees had depressive symptoms. A total of 20% of amputees in the present study were diagnosed to have major depressive disorder. This was similar to a study report of Mall et al.[22] and Parkes and Napier.[26] The incidence of PTSD (6%) was different from the study report of Mall et al.[22] where 30% of amputees

### Table 6: Relation of psychiatric morbidity to site of amputation, type of amputation, age, time since amputation, and income

| Site of amputation | Psychiatric disorders | Chi square test | Significance |
|--------------------|-----------------------|----------------|-------------|
| Unilateral lower limb (n=78) | Present | Absent | X²=1.42, df=1; P>0.05 (S) |
| Unilateral upper limb (n=14) | 7 | 7 |
| Total unilateral (n=92) | 59 | 33 | X²=1.79, df=1; P>0.05 (NS) |
| Total bilateral (n=8) | 7 | 1 |
| Total right side (unilateral) (n=55) | 33 | 22 | X²=1.04, df=1; P>0.05 (NS) |
| Total left side (unilateral) (n=37) | 26 | 11 |
| Type of amputation | Urgent (n=72) | Elective (n=28) | X²=0.21, df=1; P>0.05 (NS) |
| Time since amputation (months) | ≤3 (n=11) | 11 | 0 | X²=4.92; df=1; P<0.05 (S) |
| 4-6 (n=34) | 32 | 2 |
| 7-9 (n=28) | 19 | 9 |
| ≥10 (n=27) | 4 | 23 |
| Age | 0-30 (n=51) | 38 | 13 | X²=3.4; df=2; P>0.05 (NS) |
| 31-50 (n=39) | 22 | 17 |
| >50 (n=10) | 6 | 4 |
| Monthly income | <3000 (n=17) | 9 | 8 | X²=9.90; df=3; P<0.05 (NS) |
| 3000-5000 (n=35) | 30 | 5 |
| 5000-10,000 (n=39) | 21 | 18 |
| >10,000 (n=9) | 6 | 3 |
| Marital status | Married (n=68) | 47 | 21 | X²=0.91; df=3; P>0.05 (NS) |
| Unmarried (n=32) | 19 | 13 |

S - Significant; NS - Not significant
had PTSD. This difference may be due to the fact that the study sample of Mall et al. was small (25 amputees), 92% of amputations were urgent, and amputees were evaluated only for the first 6 weeks after amputation. A systematic review of 12 Indian studies of amputees found that the prevalence of psychiatric disorders varied between 32% and 84% including depression (10.4%–63%), PTSD (3.3%–56.3%), and phantom limb phenomenon (14%–92%), which is in agreement with our findings.\[16\]

**Association of various variables with psychiatric disorders**

When causes of amputation were compared with psychiatric disorders [Table 2], statistically significant relation was not observed though amputees with PVD as the cause of amputation had higher frequency of depression as psychiatric diagnosis. PVD was seen more in elderly age group who are physiologically more prone to have depressive syndrome, and this may increase with the additional stress of amputation. Anxiety symptoms were more frequent in war-related and traffic injuries, though no statistically significant relation was observed. Frequency of depression seen in vascular causes was 42% in the study series of Kashani et al.,\[27\] which was similar to our study.

On analysis of period after amputation with psychiatric disorders, a significant association was noted between less time since amputation and presence of psychiatric disorders, i.e., in ≤3 months’ period, 100% of amputees had psychiatric problems; in 6 months, 94.12% had problems; in 9 months, 67.86% of amputees; and in those who were studied after 10 months of their amputation, only 14.81% had psychiatric problem. This was in consonance to the report by Frank et al.\[10\] This finding can be explained by the phenomenon of physical and mental adjustment, which an amputee makes, to incorporate the new disability into their life and the time taken to adjust to a newly learned disability.

When age of amputees was compared to the presence of psychiatric disorders, the maximum percentage of psychiatric disorders was seen in younger age group. Nearly 91% of psychiatric disorders were seen in the age group below 50 years and 57% of psychiatric disorders in the age group below 30 years, though no statistically significant relation could be found. This was in accordance to the study by Frank et al.\[10\] Similarly, when individual psychiatric disorders were compared with age distribution, no statistically significant association could be found [Table 7].

On analysis of income with psychiatric disorders [Table 6], it was noted that more psychiatric disorders were present in the income bracket of 3000–5000 (85.71%), which was statistically significant (χ² = 9.90, df = 3, P < 0.05) [Table 1]. This can be explained by the presence of the maximum number of young amputees in this income bracket, who were in maximum representation among all amputees. When pain experienced including phantom pain by amputees was assessed with psychiatric disorders, using McGill Pain Questionnaire [Table 8], it was found that those amputees experiencing distressing pain were found to have more psychiatric disorders. The assessment of restriction of daily activities using Dallas Pain Questionnaire revealed statistically significant relation with severe restriction in daily activities with the presence of psychiatric disorder.

In our study, the mean BIS score was 41.81 which is higher than the score of 33.5 reported by Breakay.\[7\] This lower score could be due to the following reasons: (a)

| Table 7: Age and individual psychiatric disorders |
|-----------------------------------------------|
| Range | Adjustment disorder, mixed anxiety depressive reaction | Adjustment disorder, prolonged depressive reaction | Posttraumatic stress disorder | Major depressive episode |
|-------|---------------------------------------------------|--------------------------------------------------|--------------------------------|--------------------------|
| <30 (n=51) | 20 | 5 | 5 | 8 |
| 31-50 (n=39) | 9 | 3 | 1 | 9 |
| >50 (n=10) | 1 | 2 | 0 | 3 |

Fisher’s exact test P=0.277, NS. NS - Not significant

| Table 8: Association of Body Image Scale score and restriction of activities of daily life (as assessed by Dallas Pain Questionnaire) and psychiatric disorders |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scale | Range of scores | Psychiatric disorder | χ² (df) | P |
|-------|----------------|------------------|-------|-------|
| Present | Absent |       |       |       |
| BIS value | 0-20 (n=7) | 1 | 6 | 23.50 (2) | <0.05 |
| 20-40 (n=38) | 18 | 20 |       |       |
| >40 (n=55) | 47 | 8 |       |       |
| Dallas Pain Questionnaire | 50% or above (n=60) | 50 | 10 | 20.08 (1) | <0.05 |
| <50% (n=40) | 16 | 24 |       |       |

BIS - Body Image Scale
the study participants were assessed after a mean time period of 17 years after amputation, (b) the amputees had higher education, and (c) the mean age of amputees was 45 years (higher than our study group). When BIS scores were analyzed with the presence or absence of psychiatric disorders, a statistically significant association was noted with higher BIS values and presence of psychiatric disorders, which is similar to a previous study\cite{11,12,28} [Table 8].

In the present study, most amputees were service personnel, and decision about their job retention had not been finalized before this study; hence, job reintegration as the cause for depressive symptoms could not be assessed. Similarly, most amputees, during this study, had not met their spouse or had engaged in active sexual life after amputation; hence, sexual dysfunction in amputees could not be assessed.

**Effects of treatment**

In Sukhla et al.'s series,\cite{21} 100% of psychotic patients had complete recovery, similar to our study. Comparison could not be made between Sukhla et al.'s series and the current study, in treatment response to depression, due to the different diagnostic approaches used in both studies. However, it was felt that psychotic depressive cases in earlier series might have been similar to major depressive episode of the current study. If that so, 66.6% of the psychotic depressive cases in Shukla et al.'s series had shown complete recovery with treatment, which can be compared to 62% of complete recovery of major depressive episode cases in our study. The depressive neurosis in earlier series can well be compared to adjustment disorder with depressive or anxiety/depressive symptoms, and the treatment response to such cases in Shukla et al.'s series had been poor, with 75% of individuals having residual symptoms. Probably, the better treatment response to adjustment disorders in the present study could be due to aggressive treatment strategy, better overall care of amputees in the present era, and early initiation of psychiatric treatment of such cases.

When mean psychological test values prior to treatment were statistically analyzed with posttreatment values, significant reduction could be found [Table 4], which is in agreement with earlier studies.\cite{11,12,28} Pain assessment in pre- and post-treatment group showed statistically significant difference between the number of amputees suffering from distressing pain, i.e., much less amputees had distressing pain after treatment [Table 5]. Similar results of significant improvement were noted in the number of people suffering from significant restriction of daily activities following treatment [Table 5]. This shows that psychiatric treatment brings in significant improvement in physical and psychological state of amputees.

**Limitations**

The number of amputees was modest and only males could be included. Moreover, they were examined in hospital only and not after final disposal. Patients were seen within a year of amputation and followed up for 6 weeks only. Therefore, long-term effects were not assessed.

**CONCLUSIONS**

There is a high prevalence of psychiatric morbidity among amputees. Psychiatric treatment along with physical treatment and rehabilitation leads to statistically significant reduction in psychopathology which would significantly improve the quality of life and positively impact their rehabilitation and future life. The results of the study were felt to strengthen the importance of treatment of psychiatric problems of amputees at the earliest, thereby helping them to quickly reintegrate with their present world and improve the satisfaction in future life.

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**Conflicts of interest**

There are no conflicts of interest.

**REFERENCES**

1. Scott KK. The Psychological emergency- new onset physical disability and deformity. Jacksonville Med 1998;18:55-76.
2. Friedmann LW. The Surgical rehabilitation of the amputee. In: Thomas CC, editor. The Psychological Rehabilitation of the Amputee. Springfield, Ill. C.C.Thomas 1978.
3. Padula PA, Friedmann LW. Acquired amputation and prosthesis before the sixteenth century. J Vasc Dis 1987;10:350-7.
4. Miroslow V. Amputation and Prosthesis. London, England: Cassel and Co Ltd.; 1978.
5. Kelham RL. Some thoughts on mental effects of amputation. Br Med J 1958;1:354-7.
6. Parkes CM. Components of the reaction to loss of a limb, spouse or home. J Psychosom Res 1978;16:343-8.
7. Breakay JW. Body image: The lower limb amputation. J Prosthet Orthot 1997;9:58-66.
8. Horowitz M. Stress Response Syndrome. North Wale, NJ: Aaronson; 1986.
9. Katz J. Psychophysiological contributions to phantom limbs. Can J Psychiatry 1992;37:282-98.
10. Frank RG, Kashani JH, Kashani SR, Wonderlich SA, Umlauf RL, Ashkanazi GS, et al. Psychological response to amputation as a function of age and time since amputation. Br J Psychiatry 1984;144:493-7.
11. Kashif AW, Walia TS, Saluja SK, Chaudhury S, Sudarsanan S, Raju M, et al. Effect of short-term psychiatric intervention in amputees. Med J Armed Forces India 2004;60:231-4.
12. Srivastava K, Chaudhury S. Rehabilitation after amputation: Psychotherapeutic intervention module in Indian Scenario. ScientificWorldJournal 2014;2014:469385.
13. Muzaffar N, Mansoor I, Hafeez A, Margoob M. Psychiatric comorbidity in amputees with average sociodemographic status and the role of theologic and family support in a conflict
zone. Australas J Disaster Trauma Stud 2012;1:31-8.
14. Sahu A, Gupta R, Sagar S, Kumar M, Sagar R. A study of psychiatric comorbidity after traumatic limb amputation: A neglected entity. Ind Psychiatry J 2017;26:228-32.
15. Sahu A, Sagar R, Sarkar S, Sagar S. Psychological effects of amputation: A review of studies from India. Ind Psychiatry J 2016;25:4-10.
16. Golderberg D, Williams P. A user’s Guide to the General Health Questionnaire. Windsor, UK: NFER-Nelson; 1988.
17. Zigmond AS, Snith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand 1983;67:361-70.
18. Weiss DS, Marmar CR. The Impact of Event Scale – Revised. In: Wilson J, Keane TM, editors. Assessing Psychological Trauma and PTSD. New York: Guilford; 1996. p. 399-411.
19. Melzack R. The McGill Pain Questionnaire: Major properties and scoring methods. Pain 1975;1:277-99.
20. Lawlis GF, Cuencas R, Selby D, McCoy CE. The development of the Dallas Pain Questionnaire. An assessment of the impact of spinal pain on behavior. Spine (Phila Pa 1976) 1989;14:511-6.
21. Shukla GD, Sahu SC, Tripathi RP, Gupta DK. A psychiatric study of amputees. Br J Psychiatry 1982;141:50-3.
22. Mall CP, Trivedi JK, Mishra US, Sharma VP, Dalal PK, Katiyar M. Psychiatric sequelae of amputation: I immediate effects. Indian J Psychiatry 1997;39:313-7.
23. Shukla GD, Sahu SC, Tripathi RP, Gupta DK. Phantom limb: A phenomenological study. Br J Psychiatry 1982;141:54-8.
24. Jensen TS, Krebs B, Nielsen J, Rasmussen P. Immediate and long-term phantom limb pain in amputees: Incidence, clinical characteristics and relationship to pre-amputation limb pain. Pain 1985;21:267-78.
25. Douglas N, Douglas P, Roudebushe ME. Psychiatric manifestation in wounded men. Am J Psychiatry 1952;108:495-7.
26. Parkes CM, Napier MM. Psychiatric Sequale of amputation. J Psychosom Res 1970;20:355-8.
27. Kashani JH, Frank RG, Kashani SR, Wonderlich SA, Reid JC. Depression among amputees. J Clin Psychiatry 1983;44:256-8.
28. Singh R, Hunter J, Philip A. The rapid resolution of depression and anxiety symptoms after lower limb amputation. Clin Rehabil 2007;21:754-9.