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Psychological Morbidity and Rehabilitation Status in Individuals with Limb Amputation

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ABSTRACT

Background: Limb amputation is a life-altering event associated with profound physical disability, functional dependence and psychological morbidity. Depression is one of the most common and under-recognized mental health conditions among amputees and may adversely influence rehabilitation outcomes, prosthetic adaptation and quality of life. Understanding the psychosocial and functional determinants of depression is essential for planning comprehensive amputee care.

Objectives: To assess the severity of depression among individuals with limb amputation and to examine its association with selected socio-demographic, clinical, functional and rehabilitation-related variables.

Methods: A cross-sectional analytical study was conducted among 193 adult amputees attending a tertiary care teaching hospital. Data were collected using a pre-tested semi-structured interview schedule capturing socio-demographic details, clinical profile, and rehabilitation characteristics including prosthetic use, assistive devices, employment status, sleep satisfaction, and rehabilitation attendance. Depression severity was assessed using the Patient Health Questionnaire-9 (PHQ-9). Descriptive statistics were expressed as frequencies and percentages. Associations were tested using Chi-square test/Fisher's Exact test, with $p<0.05$ considered statistically significant.

Results: The majority of participants were males (69.9%) and aged above 60 years. Gangrene was the leading cause of amputation, and 71% experienced phantom limb pain. Minimal depression was most common, followed by mild and moderate depression. Duration since amputation showed a significant association with depression severity ($p=0.047$), with higher depressive symptoms observed in the early post-amputation period. Return to employment demonstrated a highly significant protective association ($p=0.001$). Sleep dissatisfaction was also significantly associated with higher depression levels ($p=0.009$). Phantom limb pain and prosthetic limb use did not show statistically significant associations.

Conclusion: Depression among amputees is influenced by psychosocial reintegration and functional factors rather than prosthetic use alone. Vocational rehabilitation, sleep management, and long-term psychosocial support play critical roles in improving mental health outcomes. Integrating psychological screening into routine amputee rehabilitation services is essential for holistic care.

Keywords*:* Amputation; Depression; PHQ-9; Rehabilitation; Phantom limb pain; Prosthesis; Quality of life.

INTRODUCTION

Limb amputation is one of the most debilitating physical disabilities, producing profound and permanent effects on an individual's functional ability, psychological wellbeing and overall quality of life. The global burden of limb loss continues to increase, largely driven by the rising prevalence of diabetes mellitus, peripheral vascular disease, trauma, infections and chronic non-healing ulcers.[1]

In low- and middle-income countries, including India, vascular complications related to diabetes account for a substantial proportion of non-traumatic amputations, while road traffic injuries and occupational hazards remain leading causes of traumatic limb loss.[2] Beyond the immediate surgical consequences, individuals with amputation experience a wide range of long-term complications such as phantom limb pain, residual limb pain, impaired mobility, sleep disturbances and dependence in activities of daily living.[3] Phantom limb pain, in particular, affects a significant proportion of amputees and contributes to functional limitation as well as emotional distress.[4] These physical and functional impairments frequently result in social isolation, reduced employability, economic insecurity and diminished community participation.[5]

Psychological morbidities, especially depression are therefore highly prevalent among amputees and represent a major but often under-recognized component of post-amputation morbidity.[6] Depression adversely influences prosthetic adaptation, rehabilitation participation, functional recovery and long-term reintegration outcomes.[7] Psychosocial adjustment following amputation is multifactorial and influenced by variables such as duration since amputation, vocational reintegration, chronic pain, sleep quality and access to rehabilitation services.[8]

Comprehensive amputee care thus requires not only surgical and prosthetic management but also structured rehabilitation and psychosocial support aimed at restoring functional independence and mental wellbeing.[9] However, existing literature has largely focused on surgical techniques and prosthetic advancements, with comparatively limited emphasis on psychosocial determinants of depression, particularly in resource-constrained settings. Understanding the association between clinical characteristics, rehabilitation status and psychological outcomes is essential for planning holistic, multidisciplinary amputee care services.

In this context, the present study was undertaken to assess the severity of depression among individuals with limb amputation and to examine its association with selected socio-demographic, clinical, functional, and rehabilitation-related variables in a tertiary care setting.

MATERIALSANDMETHODS

This cross-sectional analytical study was conducted among individuals with limb amputation attending the outpatient and inpatient services of a tertiary care teaching hospital over a period of 3 months from September to November 2026. Adult amputees aged 18 years and above, with a post-amputation duration of at least six months and willing to provide informed consent, were included in the study. Patients who were critically ill, had severe pre-existing psychiatric illness, or had cognitive impairment affecting their ability to respond reliably were excluded.

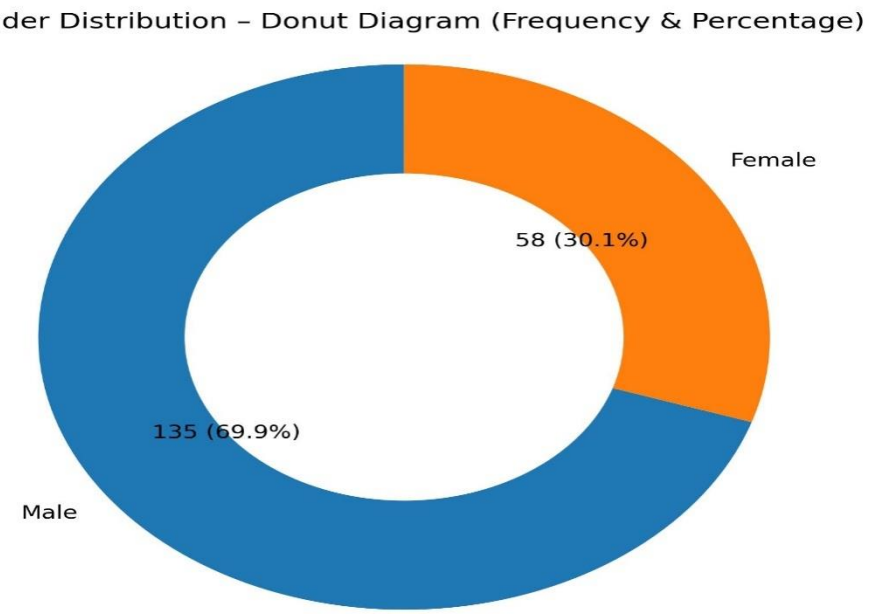
A total of 193 eligible participants were recruited using a consecutive sampling technique. Data were collected using a pre-tested semi-structured interview schedule that captured socio-demographic details, clinical characteristics (side and cause of amputation, duration since amputation, phantom limb pain, and self-perceived physical health), and functional and rehabilitation variables including prosthetic limb use, assistive device utilization, ability to perform daily activities, need for medical assistance, return to employment, participation in rehabilitation programmes, and sleep satisfaction.

Depression severity was assessed using the validated Patient Health Questionnaire-9 (PHQ-9) scale and categorized into minimal, mild, and moderate depression as per standard scoring guidelines. Ethical approval was obtained from the Institutional Ethics Committee(MMCH&RC/IEC/2025/06/SP/21), prior to study initiation and written informed consent was secured from all participants. Data were entered into Microsoft Excel and analyzed using Spss statistical software 20. Descriptive statistics were expressed as frequencies and percentages, and associations between depression severity and selected variables were tested using Chi-square test or Fisher's Exact test, with a p-value <0.05 considered statistically significant.

RESULTS

The socio-demographic profile of the study participants with regard to gender distribution, the majority of the participants were males, comprising 135 individuals (69.9%), while females accounted for 58 participants (30.1%). This marked male predominance indicates that limb amputation was considerably more common among men in the study population, which may reflect higher exposure to occupational hazards, trauma, and lifestyle-related vascular risk factors among males.

Fig 1 :Frequency &Percentage of gender distribution of study subjects.



Analysis of the **age distribution** showed that the study population was largely concentrated in the older age groups. The highest proportion of participants belonged to the 61–70 years age category, accounting for 66 individuals (34.2%). This was followed by those aged 71–80 years, comprising 57 participants (29.5%). Participants in the 51–60 years age group constituted 47 individuals (24.4%), while only 16 participants (8.3%) were in the 40–50 years category. The least represented group was the oldest age bracket of 81–90 years, with 7 participants (3.6%).

The distribution of participants according to the **side of amputation** revealed that more than half had undergone right-sided amputation (54%), followed by left-sided amputation (32%), while bilateral amputations constituted 14% of the study population. This indicates a predominance of unilateral limb loss, particularly involving the right side.With respect to the **cause of amputation**, gangrene emerged as the leading indication, accounting for the majority of cases, followed by trauma, infection, and chronic ulceration. This pattern suggests a substantial contribution of vascular and diabetes-related complications to limb loss, with injuries forming the next major etiological category.

Assessment of the **experience of phantom limb pain** showed that a significant proportion of participants (71%) reported experiencing phantom sensations or pain, whereas 29% did not report such symptoms . This highlights phantom limb pain as a common post-amputation morbidity within the cohort.Regarding**overall physical health status**, nearly half of the participants (49%) perceived their physical health as good, while 37% rated it as fair and 14% as poor . Although a considerable proportion reported satisfactory health, over half perceived their health as suboptimal, indicating persistent physical morbidity following amputation.

Evaluation of **sleep satisfaction** demonstrated variability in sleep quality among participants. A substantial segment reported dissatisfaction with sleep, while others reported neutral or satisfied sleep status, reflecting the impact of pain, discomfort, or psychological distress on restorative sleep.In terms of the **frequency of need for medical assistance to perform daily activities**, responses ranged from “never” to “always,” with notable proportions requiring assistance either often or sometimes . This finding indicates varying levels of functional dependence and highlights the rehabilitative needs of amputees in routine self-care and mobility.Assessment of the **ability to perform daily tasks** showed that while a segment of participants reported satisfaction with their functional ability, others expressed neutrality or dissatisfaction.This variation reflects differences in rehabilitation outcomes, prosthetic adaptation and residual functional capacity.

The **use of prosthetic limbs** was reported by 78% of participants, whereas 22% were non-users. The relatively high uptake of prosthesis suggests accessibility to assistive rehabilitation services, though a notable minority remained without prosthetic support. Similarly, **assistive device utilization** (such as crutches, walkers, or canes) was reported by 79% of participants, with 21% not using any assistive aids. This indicates that a large proportion required additional mobility support beyond or instead of prosthetic limbs.Only 22% of participants reported having attended a structured **rehabilitation programme**, while the majority (78%) had not undergone formal rehabilitation. This reveals a substantial gap in post-amputation rehabilitative care utilization despite evident functional and psychological needs.

Table1:AssociationBetweenDepression(PHQ-9Score)and OtherVariables

	PHQ-9SCORE			CHI SQUARE/FISCHER EXACT	P VALUE
	1-MINIMAL DEPRESSION	2-MILD DEPRESSION	3-MODERATE DEPRESSION	16.023*	**0.047**
DURATIONOFAMPUTATION					
0-10	53	23	1		
11-20	40	19	0		
21-30	27	21	0		
31-40	5	2	1		
41-50	0	1	0		
PHANTOMLIMBPAIN				7.642*	0.112
YES	87	47	2		
NO	38	16	0		
RETURNTOPREVIOUSEMPLOYMENT/NEWWORK				16.131*	**0.001**
YES	46	11	0		
NO	79	51	2		
USEOFPROSTHETICLIMB				2.455*	0.288
YES	34	24	1		
NO	91	42	1		
QUALITYOFSLEEP				19.684*	**0.009**
SATISFIED	68	19	1		
NEUTRAL	13	12	0		
DISSATISFIED	44	35	1		

The association between severity of depression, as assessed by PHQ-9 categories, and selected clinical and rehabilitation variables among amputees is presented in the table. A statistically significant relationship was observed between **duration since amputation and depression severity** ($\chi^2 = 16.023$, $p = 0.047$). Individuals in the early post-amputation period (0–10 years) demonstrated relatively higher proportions of mild and moderate depression compared to those with longer durations, suggesting that psychological distress is more pronounced in the initial years following limb loss, with gradual emotional adaptation over time. The presence of **phantom limb pain** did not show a statistically significant association with depression severity ($\chi^2 = 7.642$, $p = 0.112$), although descriptively, individuals experiencing phantom pain had higher frequencies of mild and moderate depressive symptoms than those without pain. This lack of statistical significance may be attributable to the small number of moderate depression cases or limited subgroup sample sizes, despite the clinical plausibility of pain contributing to psychological morbidity.

A highly significant association was identified between **return to previous employment or engagement in new work and depression severity** ($\chi^2 = 16.131$, $p = 0.001$). Amputees who had successfully reintegrated into employment exhibited markedly lower levels of depressive symptoms, with no cases of moderate depression reported in this group. In contrast, those who had not resumed work demonstrated substantially higher proportions of mild and moderate depression. This finding underscores the protective role of vocational rehabilitation, financial independence and social reintegration in mitigating post-amputation psychological distress.No statistically significant association was observed between **use of a prosthetic limb and depression severity** ($\chi^2 = 2.455$, $p = 0.288$). Although non-users showed a marginally higher distribution of depressive symptoms, the difference was not significant, indicating that prosthesis utilization alone may not determine psychological wellbeing. Factors such as prosthetic comfort, functional utility, accessibility of rehabilitation services, and individual adaptation likely influence mental health outcomes beyond mere usage status.

In contrast, **quality of sleep demonstrated a statistically significant association with depression severity** ($\chi^2 = 19.684$, $p = 0.009$). Participants reporting dissatisfaction with sleep had notably higher levels of mild and moderate depression compared to those satisfied with their sleep quality. This highlights sleep disturbance as an important correlate of psychological morbidity in amputees, potentially mediated through chronic pain, phantom sensations, anxiety, and adjustment difficulties. Overall, the analysis indicates that psychosocial reintegration variables, particularly employment

status and sleep quality along with temporal adaptation following amputation, play significant roles in determining depression severity, whereas phantom limb pain and prosthetic limb use did not show statistically significant associations within this study population.

DISCUSSION

The present study examined the psychosocial and functional correlates of depression among individuals with limb amputation and identified several clinically relevant determinants. The findings demonstrated a clear male predominance among amputees, with the majority belonging to older age groups, particularly above 60 years. This demographic pattern is consistent with previous epidemiological evidence indicating that vascular etiologies, diabetes mellitus, and peripheral arterial disease conditions more prevalent in advancing age constitute leading causes of limb loss globally.[9]

Gangrene emerged as the most common cause of amputation in the present study, followed by trauma and infection. Similar etiological distributions have been documented in earlier studies, especially from low- and middle-income settings where delayed presentation and poor glycemic control contribute substantially to diabetes-related amputations.[10] The high prevalence of phantom limb pain observed among participants further aligns with prior reports indicating that a majority of amputees experience phantom sensations, often contributing to long-term discomfort and functional limitation.[11]A key finding of this study was the significant association between duration since amputation and depression severity. Participants in the early post-amputation period exhibited higher depressive symptoms compared to those with longer durations since limb loss. This trend suggests gradual psychological adaptation and coping over time, a phenomenon well documented in rehabilitation literature. [12] Adjustment processes such as acceptance of body image changes, functional retraining and social reintegration may contribute to this temporal decline in depressive morbidity.

Vocational reintegration emerged as one of the strongest protective factors against depression. Individuals who had returned to previous employment or engaged in new work demonstrated significantly lower depression levels. Employment not only ensures financial independence but also restores self-esteem, social identity, and purpose, thereby facilitating psychological recovery. Comparable findings have been reported in rehabilitation outcome studies highlighting work reintegration as a major determinant of post-amputation quality of life.[13]Sleep quality also showed a significant association with depression severity. Participants reporting dissatisfaction with sleep had higher levels of depressive symptoms. Sleep disturbances in amputees may arise from chronic pain, phantom limb sensations, prosthetic discomfort, or anxiety related to disability. Prior studies have similarly emphasized the bidirectional relationship between sleep impairment and psychological distress in individuals with chronic physical disabilities.[11]

Interestingly, prosthetic limb use did not demonstrate a statistically significant association with depression in the present study. Although prostheses are essential for mobility restoration, psychological wellbeing appears to depend more on functional effectiveness, comfort, accessibility of rehabilitation training, and social reintegration rather than mere prosthesis possession. Earlier research has also highlighted that prosthetic satisfaction, rather than prosthetic use alone, determines psychosocial outcomes.[14]Despite the functional needs identified, only a minority of participants had attended structured rehabilitation programmes, indicating a substantial gap in rehabilitative service utilization. Limited access, financial constraints, lack of awareness and inadequate referral systems may contribute to poor rehabilitation uptake in resource-constrained settings. Strengthening multidisciplinary rehabilitation services is therefore essential to improve both functional independence and mental health outcomes among amputees.

Overall, the study underscores that post-amputation depression is multifactorial, influenced by clinical, functional, and psychosocial determinants. Interventions focusing on vocational rehabilitation, pain management, sleep improvement, and long-term psychosocial support are critical for holistic amputee care.

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