

A STUDY OF PHYSICAL AND MENTAL OUTCOME IN SINGLE LOWER LIMB AMPUTATIONS FOLLOWING TRAUMA

K.Arunprasanth¹, P.Magesh Babu², P.Muthukumar², D.Santhana Kumaran³

¹Assistant Professor, Department of Orthopedics, Sri Manakula Vinayagar Medical College, Pondicherry, India

²Assistant Professor, Department of Orthopedics, Government Mohan Kumaramangalam Medical College, Salem, Tamilnadu, India

³Assistant Professor, Department of Orthopedics, Government Thiruvannamalai Medical College, Thiruvannamalai, Tamilnadu, India

Received : 13/06/2023
Received in revised form : 29/07/2023
Accepted : 12/08/2023

Keywords:

Lower limb amputations; Physical and mental component score; SF-12; Trauma.

Corresponding Author:

Dr. D. Santhana kumaran,
Email: drsan23@gmail.com

DOI: 10.47009/jamp.2023.5.4.375

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (4); 1881-1884



Abstract

Background: Lower extremity amputations greatly impact an individual's psychological and physical well-being after major trauma. This study was conducted on lower limb trauma amputees to assess their quality of life after amputation. **Materials and Methods:** This qualitative study was conducted from July 2020 to July 2021 on lower limb amputees attending disability camps. A total of 47 individuals with post-traumatic lower extremity amputation were interviewed. The data were collected using the personal information form and the interview form that includes questions on the effect of amputation on mental health, which the researchers had designed. Data obtained from the survey were assessed for mental and physical well-being by SF 12 score (Physical and Mental component score). **Result:** Male predominance (n=40) was reported, with a mean age of 44.08. Road traffic accidents were our study's main reason for trauma and amputations (39 cases). In 47 cases, below-knee amputees (n=21) have better physical and mental component scores than above-knee amputees (n=26). Only 7% (n=3) have returned to their pre-injury occupation and were all below-knee amputees. **Conclusion:** Amputation stump length significantly impacts physical and mental health outcomes in lower limb amputations. Pre-prosthetic counselling is needed for better outcomes.

INTRODUCTION

The most often reported causes of lower limb amputations include trauma, complications of diabetes mellitus, and peripheral vascular disease.¹ In low-income nations, there are about 30 million amputees. There are now 23,500 amputees in India, 20,200 men and 3,300 women.² As life expectancy has increased and transportation infrastructure has improved, there has been a rise in the frequency of amputations.³

Amputations harm people's lives and lower their quality of life. People may encounter certain variations in their life due to physical mobility limitations brought on by illnesses or organ losses.⁴ Additionally, it is well recognised that an individual's mental health will suffer due to the influence on their entire life. Amputation results in loss of function, self-esteem, career, relationships, and organ loss.⁵ Following an amputation, individuals may quickly lose basic physical functions, leading to a sense of threat to their life goals. This situation can trigger complex and intense emotions, including anxiety

about dependence on assistive devices, fear of mortality, sadness, anger, helplessness, despair, remorse, and guilt. Additionally, these intense emotions, coupled with changes in body image and damage to body perception and self-esteem, can negatively impact the individual's mental health and create challenges in maintaining social relationships.⁶ Amputation is a sad and traumatic experience that causes long-term severe stress and physical harm.⁷ Not just a limb but also a sense or set of senses are gone. Therefore, sadness, anger, helplessness, unceasing crying, despair, anxiety, introversion, loss of a role in family and career, decreased self-esteem, fear of death, the anxiety of not being self-sufficient/becoming dependent, depressive appearance and social isolation are among the mental issues seen in people after physical injury.⁸ Long-term care is provided by the specialties of orthopaedics and traumatology, where nurses with expertise in nurse-patient partnerships play a crucial role in preventing and treating potential mental health issues.⁹

Trauma is the cause of sudden changes in lifestyle and life quality compared to other chronic diseases that lead to amputation. We conducted this study on traumatic amputations. Since bilateral amputations have a more dramatic impact on a person's life and with difficulties of bilateral prosthesis fitting, only unilateral amputations were included.

MATERIALS AND METHODS

We conducted this study on patients attending disability camps between July 2020 to July 2021 conducted by the District disability board for disability aids and the issue of ID cards.

Inclusion Criteria

Patients with traumatic single lower limb major amputations (above the knee, below the knee, through the knee). In addition, patients with early primary amputations and delayed amputations were included.

Exclusion Criteria

Patients with non-traumatic and bilateral lower limb amputations were excluded.

Methodology

A comprehensive screening process was conducted for all amputees, encompassing a detailed history that included the reason for amputation, level of amputation, information about prosthetic usage, pre-injury and post-injury occupation, lifestyle, income, and available discharge summaries. Participants were selected based on our inclusion criteria, and their evaluation involved completing a questionnaire that included the SF-12 score, a measure of health-related

quality of life. The SF-12 score provides overall and separate physical component scores (PCS) and mental component scores (MCS), each ranging from 0 to 100, with higher scores indicating a better quality of life. The questionnaire was explained in the regional language to ensure clarity, as participants came from rural areas.

Data Analysis

The data collected during the study was formulated into a master chart in Microsoft office excel, and statistical analysis was done with the computer's help using the statistical software SPSS-18 for Windows. Frequencies, range, mean, standard deviation and P value were calculated through student's t-test, one-way ANOVA, Pearson correlation and chi-square test. A p-value of < 0.05 was taken as significant.

RESULTS

A total of 47 amputees were included in our study after proper selection. Of these, 60 % were in the age group of 30 to 60, and the mean age was 44.08. Male amputees predominate in our study; only 7 were females. Road traffic accidents (RTA) were the predominant reason for trauma and amputations in our study (39 cases), 6 cases were due to train transport accidents (TTA), and 2 cases were workplace injuries; among the amputations, above knee (AK) amputees were 55% (n =26) and below knee (BK) amputees were 45% (n =21). Regarding employment status, only 7% (n=3) of persons returned to their pre-injury occupation and all of them were below-knee (BK) amputees (**Table 1**).

Table 1: Observation of demographic and other parameters of patients

Variable	Observation (n=47)	
	Male - 40	Female-7
Sex	Male - 40	Female-7
Age	Lowest - 18 years	Highest – 83 years
Level of amputation	Below knee (Bk) -26	Above knee (Ak) -21
RTA	35 (87 %)	-
TTA	12 (13%)	-
Phantom pain	19 cases	Bk – 40%, AK -44% cases
Stump pain	7 cases	BK -10%, AK – 20% cases
Return to occupation	3 cases	All Bk amputees
PCS (average)	Bk – 43.84	Ak – 38.47
MCS (average)	Bk – 43.91	Ak – 39.43

Table 2: Observation of Physical and mental component score

Physical Component Score		MEAN	SD	P value
Type of Amputation	Below Knee	43.84	7.2	
	Above Knee	38.47	8.07	
Mental Component Score				0.039
Type of Amputation	Below Knee	43.91	7.89	
	Above Knee	39.43	6.26	

There is a significant difference in Physical Component Scores, with below-knee amputation patients having better scores than above-knee patients, which is also statistically significant with a P value of 0.025. There is a significant difference in Mental Component Scores, with below-knee amputation patients having better scores than above-knee amputees, which is also statistically significant with a P value of 0.039 (**Table 2**).

DISCUSSION

The mean age of the patient in our study was 44.08 years, ranging from 13 to 83, whereas **Walker et al.**

reported 30.83 years as average.¹⁰ **Dillingham et al.** reported average age of 32.9 years, and **Pezzin et al.** reported mean age of 32 years.^{11,12} This can probably be attributed to the fact that the disability camp

attracts elderly patients, as they have more comorbidities and are prone to more complications compared to the rest of the general population. Our series had male preponderance with a 40:7 male: female ratio (85%). **Walker et al.** reported a 72:15, male: female ratio.¹⁰ **Dillingham et al.** reported male dominance with 87%.¹¹ **Pezzin et al.** reported similar results of 86% with male preponderance, and this reflects the trauma pattern, with males more commonly affected than females in the Indian population.¹²

The most common mode of injury was road traffic accidents at 83%, followed by train traffic accidents at 17%. **Pooja Ghosh D et al.** 70% of amputations were accounted for due to trauma.¹³ The number of above-knee to below-knee amputees was 26:21. **Walker et al.** reported 47 below-knee amputees, 24 above-knee, and 7 cases of bilateral amputees.¹⁰ **Pezzin et al.** reported 23 below-knee to 10 above-knee amputee cases.¹²

Stump pain was experienced by 7 out of 47 patients. 10% of below-knee amputees and 20% of above-knee amputees experienced stump pain. **Walker et al.** reported that 40% of below-knee amputees and 46% of above-knee amputees had stump pain.¹⁰ In a meta-analysis by **Penn-Barwell**, 52% of below-knee amputees and 58% of knee amputees experienced painful symptoms associated with the stump.¹⁴

Phantom pain was experienced by 19 out of 47 patients. 40% of below-knee and 44% of above-knee amputees experienced phantom pain. **Walker et al.** reported that 68% of the knee and 75% of knee amputees had phantom pain.¹⁰ **Pezzin et al.** reported that 23% of the knee and 10% above knee amputees experienced phantom pain.¹²

95% of below-knee and 72% of above-knee amputees had more than 500 metres of mobility. **Walker et al.** reported that 36% of the knee and 46% of above-knee amputees had more than 500 metres of mobility. **Penn-Barwell** meta-analysis revealed that 75% of patients with below-knee and through-knee amputations had more than 500 metres of mobility.¹⁴ These Studies have shown that the more proximal the level of amputation, the worse the mobility and conclude that maintaining maximal limb length significantly improves the patient's functional outcome.

15% of below-knee and 54.55% of above-knee amputees wear prostheses less than 4 hours daily. **Walker et al.** reported that 4.2% of below-knee and above-knee amputees wear prostheses less than 4 hours daily.¹⁰ In **Penn-barwell** meta-analysis, patients with below-knee amputees wore prostheses significantly more than above-knee amputees.¹⁴ In our study, it was found that the failure in compliance of 12 (25.5%) patients to wear prostheses for less than 4 hours was found to correlate with those patients who failed to avail of the pre-prosthetic gait training from the hospital due to various social, economic barriers. In contrast, the remaining 35 (74.5%) patients received in-patient or outpatient gait training before prosthesis fitting. Other reasons for

failure to comply with prosthesis include high temperature, increased sweat leading to irritation, and pain in the stump-prosthesis interface.

In our study, only three below-knee amputees had returned to occupation and no above-knee patients. However, these patients were forced to pursue occupations more suited to their disability. **Walker et al.** reported that 25% of below-knee and 21% of above-knee amputees were employed.¹⁰ In **Penn Barwell** meta-analysis, 74% below the knee and 70% above the knee returned to work.¹⁴

Quality of life measured by SF12 score revealed a significantly better physical component score (PCS) of below-knee amputees (43.84) compared to that of above knees (38.47) patients. Similarly, the mental component score (MCS) revealed a better score of below-knee amputees (43.91) compared to that of above-knee amputees (39.43). The present study revealed a significant lowering of PCS as the amputation level becomes more proximal.

CONCLUSION

Our study concludes that below-knee amputees have a better quality of life than above-knee amputees, supporting the surgical strategy of maintaining maximum length, which is decided primarily by the nature of injury following trauma. Developing an awareness programme regarding rehabilitation services like pre-prosthetic gait training exercises and early prosthetic fitting helps to improve the quality of health and vocational prospects of amputated patients. New developments in prosthetic interface and stump pain management significantly improve quality of life and need further study.

REFERENCES

1. Akiode O, Shonubi AO, Musa A, Sule G. Major limb amputations: an audit of indications in a suburban surgical practice. *J Natl Med Assoc.* 2005;97(1):74.
2. Mohan D. A report on amputees in India. *Orthot Prosthet* 1986;40(1): 16–32.
3. Singh SK. Road traffic accidents in India: issues and challenges. *Transp Res Proc* 2017;25C:4712–23.
4. Berman A, Snyder S. *Fundamentals of Nursing: Concepts, Process and Practice.* 6th ed. Pearson Education; 2012: 906–911.
5. Anderson M, Deighan F. *Coping Strategies in Conjunction with Amputation.* Thesis. Division for Health and Caring Sciences. Karlstads University; 2006.
6. Pezzin LE, Dillingham TR, MacKenzie EJ. Rehabilitation and the long-term outcomes of persons with trauma-related amputations. *Arch Phys Med Rehabil* 2000;81(3):292–300.
7. Yazicioglu K, Taskaynatan MA, Guzelkucuk U, Tugcu I. Effect of playing football on balance, strength and quality of life in unilateral below-knee amputees. *Am J Phys Med Rehab.* 2007;86(10):800–5.
8. Şimsek N, Öztürk GK, Nahya ZN. The Mental Health of Individuals with Post-Traumatic Lower Limb Amputation: A Qualitative Study. *J Patient Exp* 2020; 7(6):1665–70.
9. Tekin L, Safaz Y, Goktepe AS, Yazicyodlu K. Comparison of quality of life and functionality in patients with traumatic unilateral below knee amputation and salvage surgery. *Prosthet Orthot Int* 2009;33(1):17–24.

10. Walker CR, Ingram RR, Hullin MG, McCreath SW. Lower limb amputation following injury: A survey of long term functional outcome. *Injury*. 1994;25(6):387-92.
11. Dillingham TR, Pezzin LE, Mackenzie EJ, Burgess AR. Use and satisfaction with prosthetic devices among persons with trauma-related amputations – *Am J Phys Med Rehabil* 2001;80(8):563-571.
12. Pezzin LE, Dillingham TR, Mackenzie EJ. Rehabilitation and the Long-Term Outcomes of Persons with Trauma-Related Amputations. *Arch Phys Med Rehabil*. 2000; 81(3):292-300.
13. Pooja GD, Sangeeta L. Prevalence and aetiology of amputation in Kolkata, India: A retrospective analysis. *Hong Kong Physiother J*. 2013;31(3): 36-40.
14. Penn-Barwell JG. Outcomes in lower limb amputation following trauma: A systematic review and meta-analysis. *Injury*. 2011;42(12):1474-9.