

Lower Extremity Amputations Around the Knee Joint: A Functional Outcome Study

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Primary indications for lower limb amputation at tertiary care hospitals include diabetic & non-diabetic peripheral vascular diseases, trauma, tumors and certain orthopedic deformities. As there is very scarce literature on functional outcome of lower limb amputee from Nepal, this study was designed with an objective to evaluate the functional outcomes irrespective of the causes of amputation and compare outcomes according to the level of amputation i.e. above, through and below knee.

A complete enumeration method was used, and all the amputees between 2005 and 2017 were included in the study. Of the 520 amputees, 275 trauma related amputees were available for interview. Structured questionnaire and SF-36 was used for the general information and functional outcome respectively. Telephone conversation was done to know the functional outcome and some of the participants were called to our centre for the face to face interview. Only above knee, through knee and the below knee amputation cases were included in the study. Of the 275 study participants 214 were male, 166 had below knee, 92 had above knee and 17 had through knee amputation. Data was analyzed using appropriate statistical tools

SPSS 20.

The average age of the amputee was 33 years (ranges from 7 to 90 years). Among total amputees only 46 % used prosthesis. Main reason for not using prosthesis was no access and poor economic status. Main complain among the prosthesis user was difficulty in walking for long distance. 78% of prosthesis users were involved in farming whereas 13% had their own business. 65% amputees belonged to literate group. The average SF-36 score was 88. The score was comparatively less among those who did not use prosthesis.

The most common cause of amputation in our population was trauma. A significant number of patients were not using prosthesis. Very good functional outcomes can be expected (as measured by the SF-36), especially in below knee amputees who were wearing a prosthesis.

Key words: functional outcome, level of amputation, quality of life, tertiary care hospital.

Limb amputation is an ancient surgical procedure with a history dating back more than 2500 years as chronicled by Hippocrates.¹ Primary indications for lower limb amputation include diabetic & non-diabetic peripheral vascular diseases, trauma, tumors and certain orthopedic deformities. The loss of limb has profound economic, social and psychological effects on the patient and their family, compounded by socioeconomic challenges prevalent in low- and middle-income countries (LMIC's).¹ Lower limb amputation secondary to trauma typically involves young patients in productive age groups.² Unfortunately, most often our patients presents late when limb salvage is not a viable option.¹ Two landmark studies on lower limb amputation, the LEAP (Lower Extremity Assessment Project) and the METALS (Military Extremity Trauma Amputation/Limb Salvage) studies state that functional outcomes between groups that underwent amputation versus the group

that underwent reconstruction, were similar and better respectively.^{3,4} The present study was designed to evaluate the functional outcomes of trauma related lower limb amputation around the knee in our population, and compare functional outcomes according to levels of amputation.

Materials and Methods

Between 2005 and 2017, 520 amputations were carried out, of which 300 amputees were available for an interview. A complete enumeration method was used. Out of the 300 amputees, 275 amputees were trauma-related, and were included in this study. Structured questionnaire and SF-36 were used for general information and functional outcome respectively. Most data were collected via telephone interviews, while some through face-to-face interviews. Only amputations around the knee (above knee, through knee and below knee) were included in this study. Data was analyzed using SPSS 20.

Results

The average age of amputees was 33 years (7 to 90 years) and 78 % were males (**Figure 1**). 53 % were between 20 to 40 years, which is a very productive age group (**Figure 2**). Most common level of amputation was below knee amputation (60.33%) followed by above knee (33.6 %) and through knee amputation (6%) (**Figure 3**).

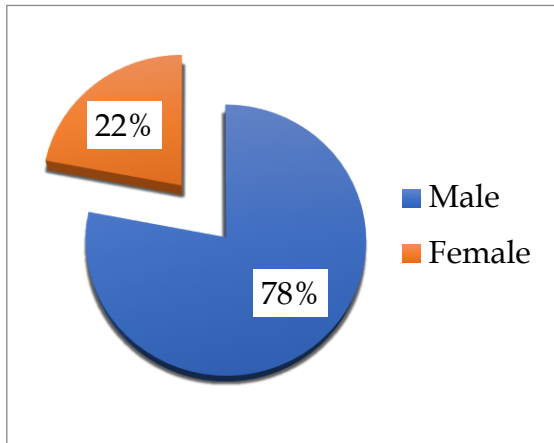


Figure 1: Sex Classification

Only 46 % of all amputees used a prosthesis (**Figure 4**). The main reason for not using prosthesis was lack of access, and poor economic status (**Figure 5**). We had patients from 38 districts of our country (**Figure 6**). The main complain among prosthesis users was difficulty in walking for long distances (**Figure 7**). 45% of amputees had achieved higher education (**Figure 8**). There was a direct positive relationship between education and prosthetic use (of the 45% highly educated patients, 93% used prosthesis) (**Figure 9**). The average SF-36 score was 88 which is very good outcome (**Figure 10-12**). The score was comparatively less among those who did not use prosthesis.

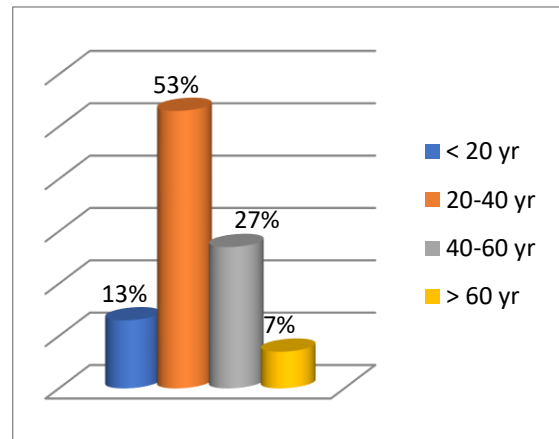


Figure 2: Age Classification

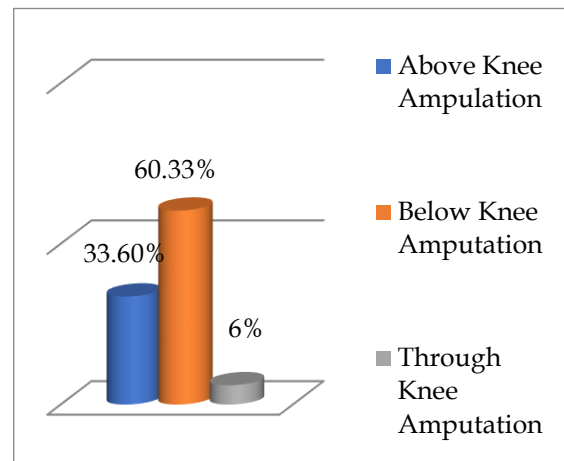


Figure 3: Level of Amputation

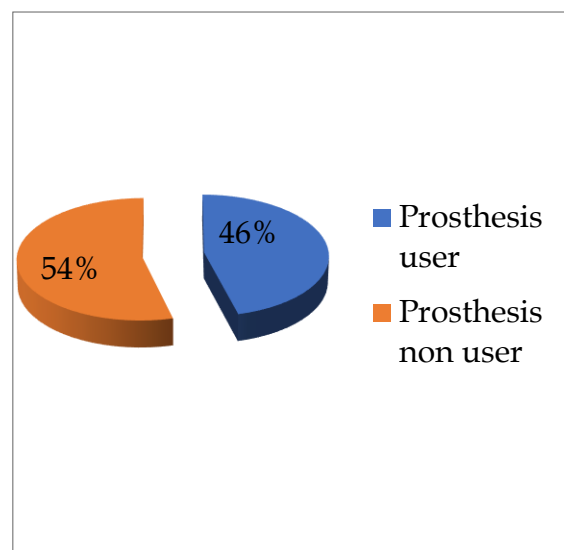


Figure 4: Prosthesis User vs Non User

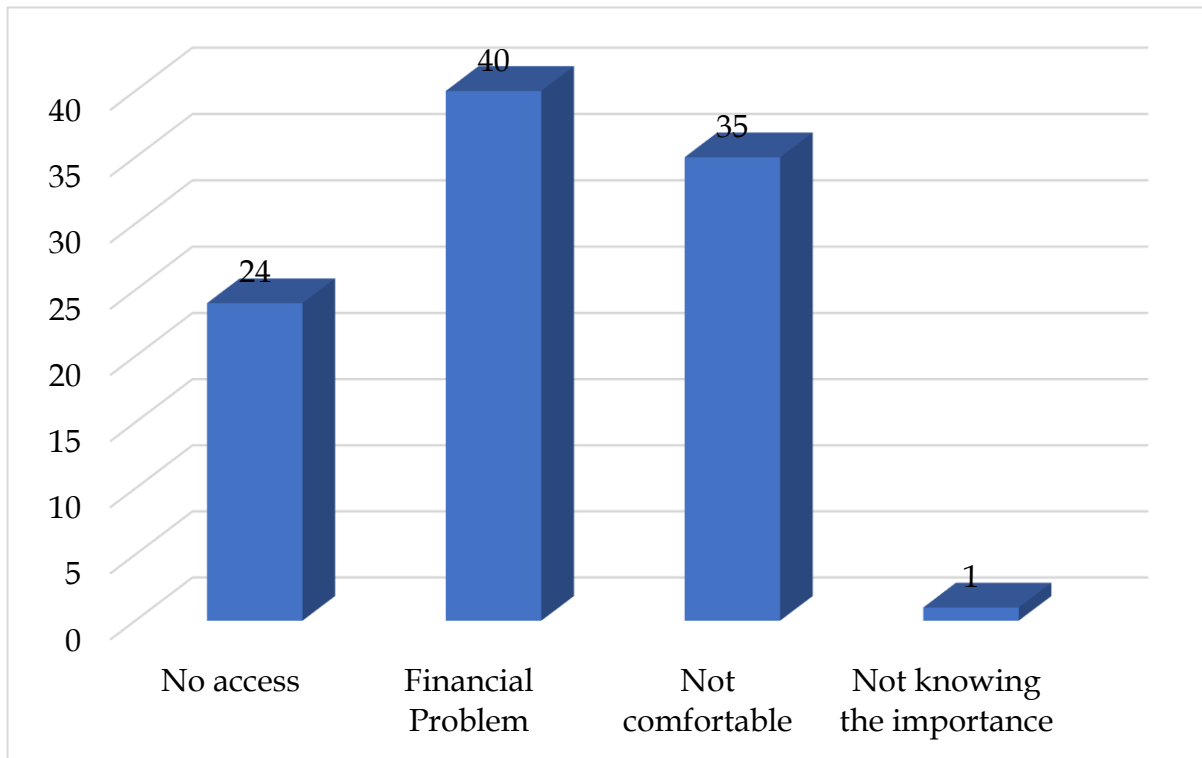


Figure 5: Reasons for not using prosthesis in %

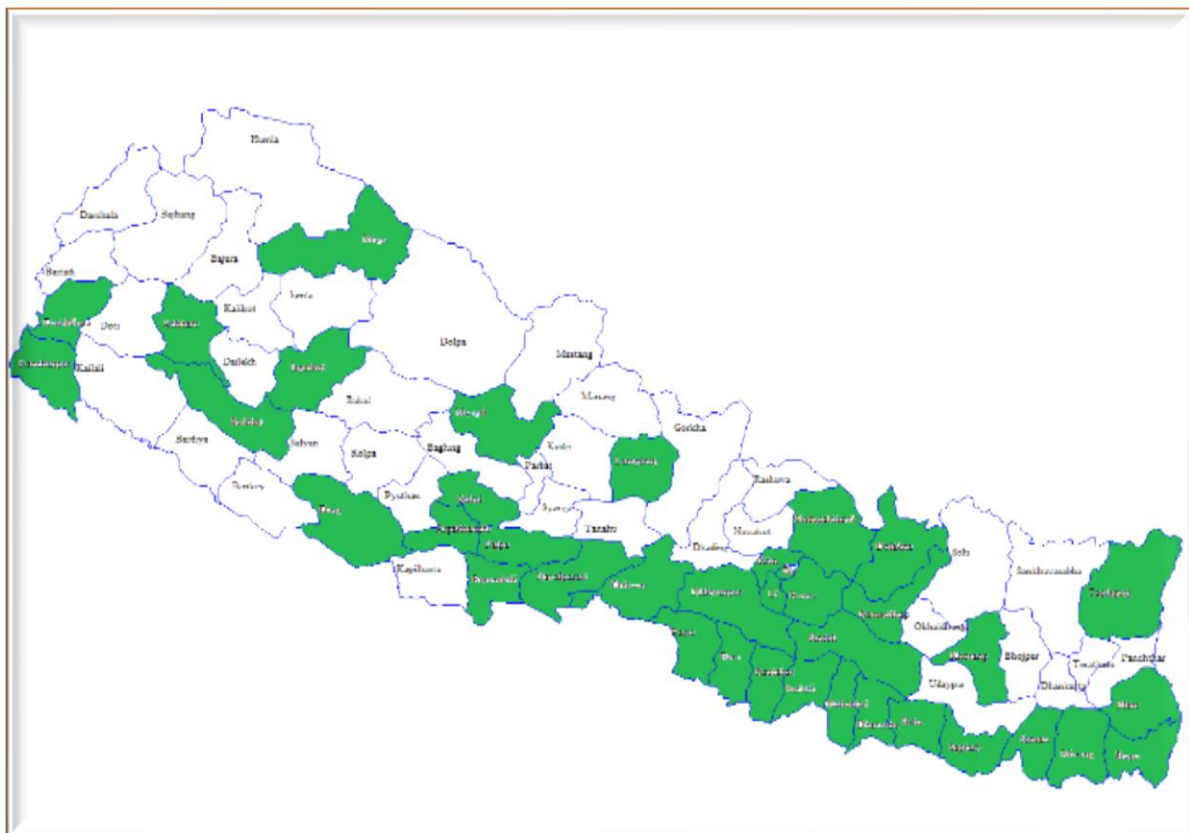


Figure 6: Distribution of participants throughout the country

Lower Extremity Amputations

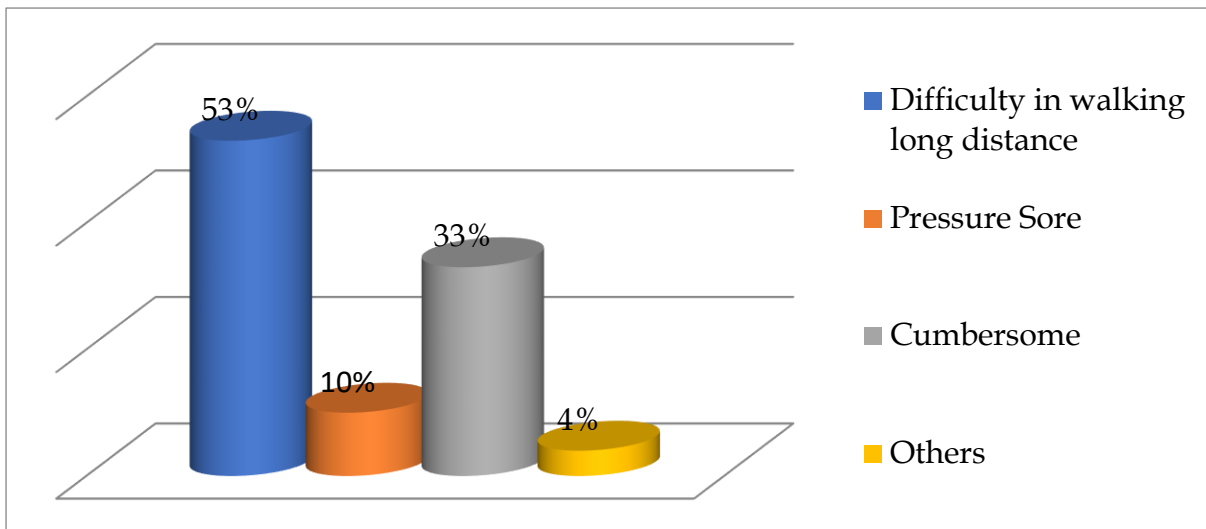


Figure 7: Complains among prosthesis users

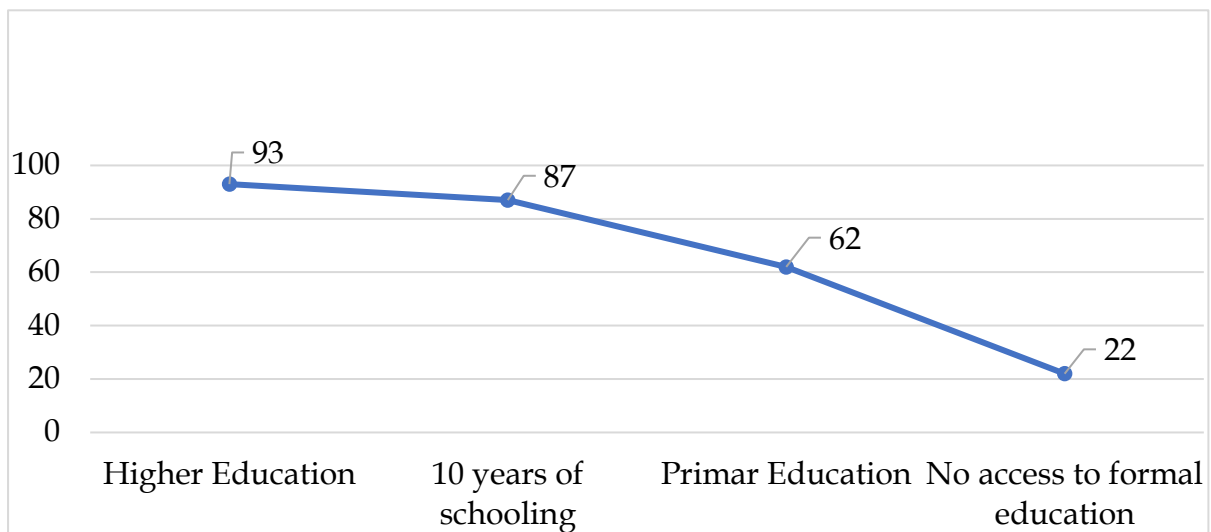


Figure 8: Educational status (in %)

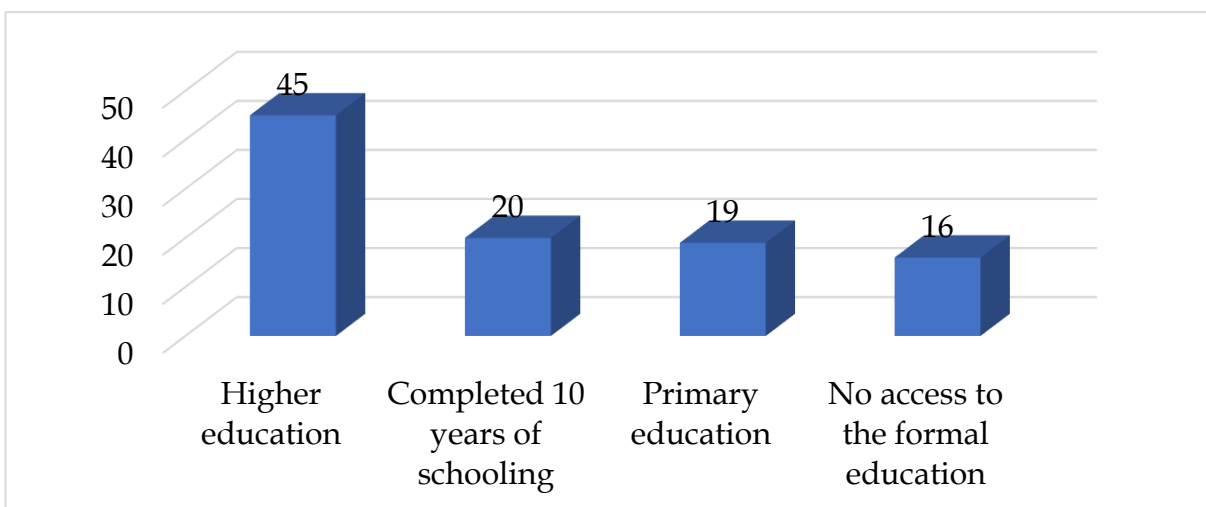


Figure 9: Association between education and prosthesis users (%)

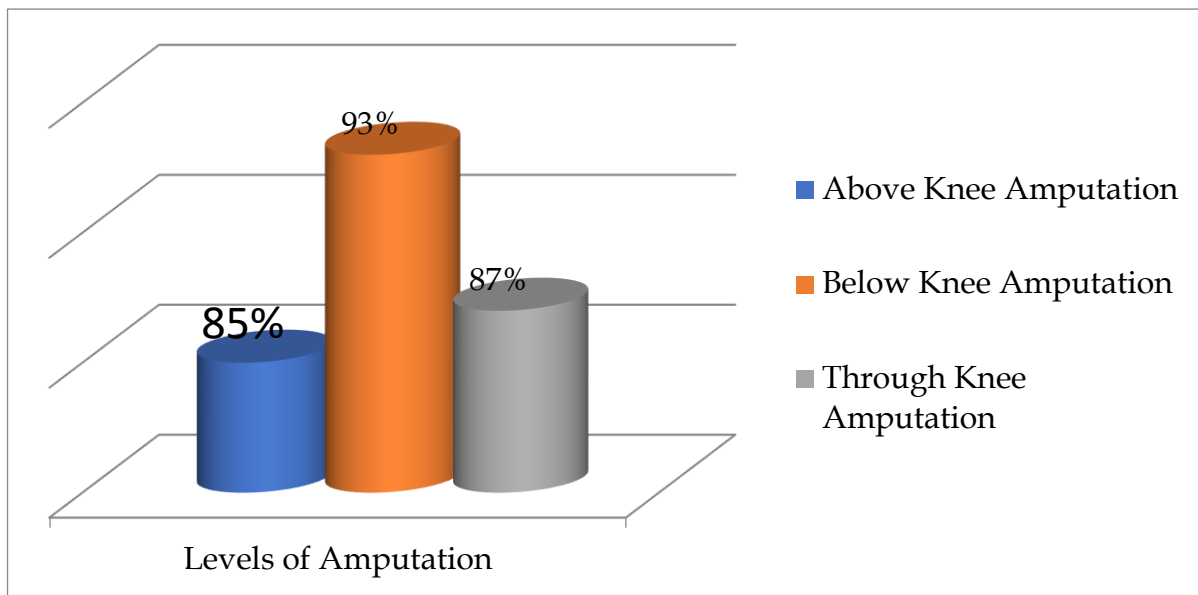


Figure 10: Average SF 36 Score as per levels of amputation

Discussion

Amputation is a common procedure performed by orthopedic, general and vascular surgeons. Trauma related amputations remain among the most common causes of amputation in our population.¹ Unfortunately, most trauma-related amputations involve young adults, and very little is known about the impact on functional outcome and quality of life. Results from Lower Extremity Assessment Project (LEAP) suggest that functional outcomes of reconstruction and amputation are similar in civilians being treated for major lower extremity trauma.³ We used the SF-36 tool, which is a validated measure of functional outcome.⁵

We found that participants with amputation around the knee had good physical and social functional outcomes. Participants who had a 'below knee' amputation had better SF-36 scores compared to those who had a 'through or an above knee' amputation, a finding that was similar to other studies.^{3,4,7}

It was also found that patients with below knee amputations were more prosthesis compliant compared to those with above or a through knee amputation, as reported in another study.⁸ As expected, patients with a below knee amputation who were using a prosthesis had the fastest walking speeds.³ The two most important factors that influence functional outcome are: age, and level of amputation.⁷ The present study showed that lower education levels resulted in less mental component score, and hence use of prosthesis. Less use of prosthesis is, in turn, associated with lower physical component scores.⁶

As in other studies, the below knee amputees in this study had significantly higher levels of functional independence and quality of life measures compared to other levels of amputations around the knee.⁸

Limitations

This study failed to link between outcomes and problems with stump and technological

sophistication of prosthetic device used by amputees.



Figure 11: Case 1: Below knee amputation with below knee prosthesis at 18 months follow up; SF-36 score 91.



Figure 12: Case 2: Above knee amputation with above knee prosthesis at 2 years follow up; SF-36 score 90.

Conclusion

Trauma was found to be the most common cause of amputation around the knees. More than half the patients were not using prosthesis. Amputees using prosthesis, had better physical and mental health functional outcomes (SF-36 score 91). Below-knee amputation performed the best in terms of functional outcomes. A strategy to reduce trauma-related amputation and better prosthetic services for amputee is urgently needed.

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