



Original Article

Status of Mobility in Patients with Lower Limb Amputation Using Prostheses

 Fazal Rehman¹, Ghulam Hussain², Muheebur Rehman^{3*}, Rida Shabbir⁴, Zardad Khan⁵, Saif Ullah² and Majeeda Ghani⁶
¹Khyber Teaching Hospital, Peshawar, Pakistan²Mardan Medical Complex, Mardan, Pakistan³Abasyn University, Peshawar, Pakistan⁴Khyber Medical University, Peshawar, Pakistan⁵Khyber Medical University, Institute of Health Sciences, Mardan, Pakistan⁶Rafsan Neuro Rehab Center, Peshawar, Pakistan

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*Corresponding Author:

Muheebur Rehman

Abasyn University, Peshawar, Pakistan

muheebjan291@yahoo.com

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ABSTRACT

Amputation a loss of limb, results in chronic pain and disability of the limbs. People with amputations are limited in their daily mobility, and quality of life. **Objective:** To determine the mobility status in people with lower limb amputation using prosthesis. **Methods:** A total of 37 participants, both male and female with lower limb amputation and using lower limb prosthesis for four weeks or longer, took part in this cross-sectional study, conducted at the Pakistan Institute of Prosthetic and Orthotic Sciences Peshawar from 2020. Demographic data together with cause for amputation, time of use of prosthesis and employment status was determined by the researchers via a structured pre tested questionnaire after consent. **Results:** A total sample of 37 participants, 27 males (73%) and 10 females (27%), was collected where the mean age of participants was 43.65 ± 14.72. Among the 37 participants, 30 (81.1%) were married and 7 (18.9%) were unmarried. A total of 32 (86.5%) participants underwent below-knee amputation while 5 (13.5%) participants had above-knee amputation. The causes of amputation were bomb blast (n=8), diabetes (n=11), RTA (n=9) and bullet injury (n=9). All the participants underwent rehabilitation. A total of 2 participants (5.4%) experienced high difficulty in mobility, 24 participants (64.9 %) had moderate difficulty and 11 participants (29.7 %) had little difficulty. **Conclusions:** Perceived status of mobility was moderate (64.9%) in most of the prosthesis users. About 29.7% had little difficulty and very few number (5.4%) had high difficulty using prosthesis.

INTRODUCTION

The loss of limb called amputation, results in a chronic residual (phantom) limb pain and functional limitations caused by trauma, medical condition or surgery [1]. Physically and psychologically most devastating event that can be experienced by a person is a loss of a body part especially limbs [2]. Individuals with lower limb amputation experience impaired mobility in daily activities and a deficit in quality of life [3]. Thus, the restoration of mobility in lower limb amputation with prosthesis use is one of the major goals of rehabilitation process [4]. Prosthesis is the

artificial device which is used to replace a missing body limb [5]. The use of prosthesis by an individual with lower limb amputation affects walking, physical functions, mobility and balance [6]. Prosthetic limb has the potential to compensate for the loss of mobility and allow individuals to integrate in the environment continuing with their daily activities and social functioning helping them lead a better quality of life [7]. The lower limb amputation incidence is greater than that of the upper limbs. In most of the developed countries, the major cause of lower limb

amputation is vascular diseases that includes diabetes whereas in the developing countries, the major cause that leads to amputation is traumatic accidents [8]. The most common complication of diabetes mellitus (DM) was diabetic foot ulcers which resulted in lower limb amputation [9]. In Northern Europe, Netherlands about 90% of all lower limb amputations were due to vascular diseases mostly diabetes mellitus [10]. The prevalence of amputation in the United States, was approximately 1.7 million [6]. A study conducted in Sindh Pakistan showed that the majority of lower limb amputations were caused by road traffic accidents (38.38%), diabetes (15.42%), infection (14.26%) and trauma (12.37%) [11]. Research conducted in Rawalpindi on quality of life of people using prosthesis, showed that the causes of amputations include traumatic injuries, traffic accidents and various vascular diseases [12]. Another study conducted at Armed Forces Institute of Rehabilitation Medicine (AFIRM) revealed that the causes of amputations in armed forces and civilians were different. In the armed forces 96% amputations were caused by traumatic accidents in which, 73% were caused by mine blast injuries, mostly in the war fought against terrorism. In civilians, the leading cause of amputations were vascular diseases (63%), trauma (23%) and tumors that accounted for (14%) of the causes [13]. According to a study by Spaan *et al.*, majority (59.76%) of the participants had moderate difficulty in mobility with prosthesis, 8.56% had high difficulty and 31.68% had little difficulty [14]. A Study by Miller *et al.*, showed that balance accounted for 70%, 60%, and 55% of the variation in mobility capability, mobility performance, and social activity, respectively. Balance confidence was the only factor associated with mobility capability and performance and social activity in the final adjusted models. Clinicians and researchers should consider this variable in the rehabilitation of amputee patients [15]. Majority of the people with lower limb amputation (LLA) have compromised mobility and physical functioning and may have residual limb pain which causes trouble with the use of prosthesis. Therefore, to determine the effects of lower limb amputation on activities of daily living, mobility, participation and quality of life will help the health care providers to improve their services. In Pakistan, limited data were available about the prosthesis effects on mobility in lower limb amputation. So, it is indeed a topic of interest to determine the problems experienced by the prosthesis users so that they can be properly trained, rehabilitated and facilitated to easily use their prosthesis. So far studies are conducted about quality of life in prosthetic users, but up to authors knowledge studies regarding the status of mobility in prosthesis users are deficient especially in KPK. So, the topic our study was to determine the mobility status in prosthesis users.

METHODS

After the research proposal approval, data were collected from PIPOS Peshawar. The permission for research study was taken from institutional review board of Institute of Physical Medicine and Rehabilitation (IPM&R) Khyber Medical University (KMU), Peshawar. Data was collected from unilateral lower limb amputees using prosthesis. This was a cross sectional study. Study population comprised of all male and female participants at Pakistan Institute of Prosthetic and Orthotic Sciences Peshawar. We conducted our research study at Pakistan Institute of Prosthetic and Orthotic Sciences (PIPOS) Peshawar. The study duration was 06 months (from February 2020 to July 2020). Cross sectional study was done, and Participants were recruited by convenience sampling method. Study sample size was 117 with 95% confidence level. The sample size was calculated using an online calculator "Raosoft" but was reduced to 37 participants because of COVID-19 pandemic lockdown. The participants of this study were selected according to the following inclusion and exclusion criteria. Age above 25. Participants recruited in the study were both men and women. Participants with unilateral lower limb amputation. Participants having used prosthesis for four weeks and longer. Those Subjects who have co-morbidity that limit the use of prosthesis. Those Subjects unwilling to provide informed consent. The data were collected by using prosthesis evaluation questionnaire mobility sub-scale (PEQ-MS 12/5), in which five categories were included. PEQ-MS is a sub scale of Prosthesis Evaluation Questionnaire (PEQ) which only evaluates mobility status in patients using prosthesis. This questionnaire has total 12 questions, each question has 5 grades according to the level of mobility of the patients. The five resulting categories are presented as 0= not able or hardly able to move (less than 5% ability), 1= high difficulty (5-34% ability), 2= moderate difficulty (35-64% ability), 3= little difficulty (65-95% ability), 4= no problems or almost fully able (more than 95% ability). The PEQ-MS has high internal consistency and test-retest reliability and shows convergent validity. The original questionnaire was in English and was provided to the participants in the same language. Questionnaire was introduced to the participants before data collection. The questionnaire was checked by the supervisor of our research and Managing Director of PIPOS before administration to the participants. Data were analyzed using SPSS version 22.0. Mean \pm S.D was calculated for age and time of use of prosthesis. Frequency was calculated for gender, rehabilitation, type of prosthesis, cause of amputation, employment status, marital status and PEQ-MS. Cross tabulation (chi square test) was done between PEQ-MS scale with gender, gender, type of prosthesis, cause of

amputation, employment status.

RESULTS

Demographics are summarized in Table 1. Thirty-seven participants took part in this study. Many had trans tibial amputation (86.5%, n=32) and the remainder had trans femoral amputations. Almost 3/4th of the participants were male (n=27/73%). Mean age of the participants was 43.65 ± 14.72 (Table 1).

Table 1: Demographic characteristics

Characteristics	N (%)
Gender M/F	27/10 (100%)
Age (Mean ± SD)	43.65 ± 14.72
Marital Status Married/Unmarried	30/7(81.1%/18.9%)
Cause of Amputation	
Bomb Blast	8(21.6%)
Diabetes	11(29.7%)
RTA	9(24.3%)
Firearm	9(24.2%)
Employment Status	
Employed	22(59.5%)
Unemployed	8(13.5%)
Housewife	7(17%)
Type of Amputation (M/F)	
Transtibial	32(86.5%)
Transfemoral	5(13.5%)
Rehabilitation Y/N	37(100%)

Various variables were associated with mobility categories to find out how the mobility status scattered was and to what extent it affected the individual with regards to the variables associated. The results were not significant i.e. the association of amputation type, causes, employment status and rehabilitation were p=0.704, 0.704, 0.909 and 0.710 respectively. As all values were greater than p>0.05 so no association was found (Table 2).

Table 2: Status of Mobility

Level of Difficulty		High Difficulty N (%)	Moderate Difficulty N (%)	Little Difficulty N (%)	p-value
Rehabilitation		2 (5.4%)	24 (64.9%)	11 (29.7%)	0.710
		2 (5.4%)	24 (64.9%)	11 (29.7%)	
Type of Amputation	Transtibial	2(5.4%)	20(54%)	10(27%)	0.704*
	Transfemoral	0	4(10.8%)	1(2.7%)	
Cause of Amputation	Bomb Blast	0	6(16.2%)	2(5.4%)	0.704*
	Diabetic	1(2.7%)	8(21.6%)	2(5.4%)	
	RTA	1(2.7%)	4(10.8%)	4(10.8%)	
	Fire Injury	0	6(16.2%)	3(8.1%)	
Employment Status	Employed	1(2.7%)	15(40.5%)	6(16.2%)	0.909*
	Unemployed	0	3(8.1%)	2(5.4%)	
	Housewife	1(2.7%)	6(16.2%)	3(8.1%)	

*= Chi-Square test of Association

DISCUSSION

A study conducted at Ontario Canada, concluded that mobility was affected by decreased confidence level [16]. Another study at the capital of the Republic of Haiti in 2010, stated that over 90% of subjects were physically independent in self-care, fewer were independent while walking on uneven ground or in inclement weather (69%) [17]. A study in Netherlands, stated that after two years of amputation 26% were able to walk outdoors, after five years only 9% were using prosthesis outdoors [18]. Legro et al., reported that most of the participants were men

(85.9%), among them trans tibial amputations were (63%) and 25% were trans femoral [19]. According to a study conducted by Franchignoni et al., showed that the married subjects were 61.9% and unemployed were 74.2% and, in our results, married were 81.1% and unemployed were 13%, so the married subjects were more in both the studies but in the unemployment, status is less because most of the subjects were housewife [20]. A study was conducted in sierra Leone, concluded that patients using prostheses experienced pain and mobility difficulty in walking on challenging surfaces, a sample of 435 individuals, in which 77% responded, male were (71%) with mean age 62 ± 15.7

years (ranges, 23–91yr), having below knee amputation (73%) [15]. In our study out of 37 participants, male were 27(73%) with a mean age was 43.65 with standard deviation of 14.72 had below knee amputation 32(86.5%), so there is no difference between our study and previous study. A survey in UK, showed that the most common cause in developed countries was vascular 85–90% [21], In our study the most common cause was traumatic 26(70.3%). So, there is difference between our study and the previous study, because it is due to the war against terror, poor transportation system in our country. Miller *et al.*, conducted a research study at southwestern Ontario that a patient with above knee amputation had more difficulties with walking and moving around as compared below knee amputation [15].

CONCLUSIONS

According to the findings of our study, patient with below knee amputation had more difficulties as compared to above knee, this may be due to the patient psychogenic affect and false perception.

Authors Contribution

Conceptualization: FR

Methodology: RS, ZK, SU, MG

Formal Analysis: MR

Writing-review and editing: FR, MR, GH

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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