

# Prosthetic Satisfaction and Body Image among Lower Limb Amputee: A Cross-sectional Study

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## ABSTRACT

**Introduction:** Limb amputation not only brings functional and sensory loss, but also leads to loss or change of body image. These changes have significant effect on the Quality of Life (QoL) of an individual. Amputee adaptation varies widely between individuals. For an amputee a prosthesis not only bring back near normal physical appearance but also it significantly repair his disturbed body image. There is a significant correlation between body image and life satisfaction.

**Aim:** To investigate the correlation between body image and prosthetic satisfaction among lower limb amputee.

**Materials and Methods:** This cross-sectional study was conducted from July 2018 to January 2020 at King George's Medical University, Lucknow, Uttar Pradesh, India. Participants with unilateral lower limb prosthesis using amputees of either sex from Regional Artificial Limb Centre, Lucknow were included in the study. Each participant was subjected offline questionnaire based assessment of satisfaction with respect to their prosthesis related to it's function, aesthetic (cosmesis), weight of prosthesis and general (overall) by Revised Trinity Amputation and Prosthesis Experience Scale (R-TAPES).

Change in body image was assessed by Amputee Body Image Scale (ABIS). Results were analysed by computer-based software Statistical Package for the Social Sciences (SPSS) windows version 20.0. Analysis of Variance (ANOVA) t-test was used for normally distributed and Mann-Whitney U test was used for abnormally distributed variables.

**Results:** The study enrolled 119 patients in which the most common cause of amputation was an accident (69). Statistically significant difference was found for satisfaction between males and females for weight of prosthesis ( $p$ -value=0.038). Statistically significant difference was found between male and female for amputee body image with ABIS score ( $p$ -value=0.001). Significant correlation was found between ABIS and functional satisfaction ( $p$ -value=0.001;  $r$ =-0.38) and between ABIS and weight satisfaction ( $p$ -value=0.001;  $r$ =-0.36).

**Conclusion:** Amputation causes significantly deterioration of body image among the amputee, with such deteriorated body image prosthetic satisfaction remains a big challenge for healthcare worker and prosthetist.

**Keywords:** Amputee body image scale, Limb loss, Prosthesis experience scale, Revised trinity amputation

## INTRODUCTION

Limb loss (amputation) is of two types congenital (from birth) and acquired. The acquired limb loss means surgical removal of a part or whole of a limb, usually due to injury, disease or surgery [1]. Limb amputation not only brings functional and sensory loss, but also leads to loss or change of body image. For an individual these changes significantly affect the Quality of Life (QoL) [2].

On comparing the incidence of amputations the lower limb amputation is 11 times higher than the upper limb amputations [3]. Globally, the most common cause of lower limb amputation is diabetes mellitus other causes include traumatic injury, cancer, vascular insufficiency and congenital limb deficiency [4]. In developing country, the most common cause of amputation is traumatic accidents [5]. In India, the most common cause of lower limb amputation is traumatic accidents followed by diabetes mellitus [6]. There is very significant variation in adaptation among amputee, although they may face similar physical, social, and emotional adjustments [7]. For amputee prosthesis not only bring back near normal physical appearance but also it significantly repairs his disturbed body image [8].

The independent predictor of QoL, depression, and prosthesis ratings is the body image [9,10]. Amputee's feelings about his or her body image has a very significant correlation with life satisfaction, more negative the amputee feels, lesser will be the satisfaction with life [11]. Body image and prosthetic satisfaction play vital role in amputee rehabilitation. There is no study providing information about prosthetic satisfaction and body image among lower limb amputee in northern part of India. The study hypothesis was that, prosthetic

satisfaction has a strong relation with body image among lower limb amputee patient. Thus, the study was designed with following objective, to collect clinicodemographic data and to investigate the correlation between prosthetic satisfaction and body image among lower limb amputee of North Indian population.

## MATERIALS AND METHODS

This cross-sectional study was conducted from July 2018 to January 2020 at King George's Medical University, Lucknow, Uttar Pradesh, India, after taking clearance from Institutional Ethical Committee (ref. code: 95<sup>th</sup> ECM II A/P2 and Registration No: ECR/262/Inst/UP/2013/RR-16). The patient satisfying the inclusion and exclusion criteria were enrolled from the indoor/outdoor facility of Physical Medicine and Rehabilitation Department at Regional Artificial Limb Centre, Lucknow.

### Inclusion criteria

- Unilateral lower limb amputee of any side and any sex.
- Lower limb amputee using prosthesis.
- Patients giving consent to participate in the study.

### Exclusion criteria

- Patients who refused to participate.
- Amputee with history of psychiatric illness and physical disabilities other than amputation.

After recording the initial clinical and demographic data, all the enrolled patients were subjected questionnaire-based assessment for prosthetic satisfaction and body image. The prosthetic satisfaction was assessed

by Revised Trinity Amputation and Prosthesis Experience Scale (R-TAPES) [12] and body image was assessed by Amputee Body Image Scale (ABIS) [11].

## R-TAPES

The R-TAPES is a multi-dimensional self reported instrument which is designed to help in understanding the adjustment with prosthesis among lower limb amputee. It consists of three subscales of which prosthetic satisfaction is one of the subscale, which is further subcategorized into functional, aesthetic, weight and general satisfaction, all are measured along a 5-point scale {very satisfied (5), satisfied (4), neither dissatisfied nor satisfied (3), dissatisfied (2) and very dissatisfied (1)} and general satisfaction is measured along 10-point scale. The functional satisfaction contains 5 items, with the score range of 5 to 25. The aesthetic satisfaction contains 4 items with the score range of 4 to 20. The weight satisfaction contains only one item, with the score range of 1 to 5. The general satisfaction has score range 1 to 10. Greater prosthetic satisfaction indicates higher scores in each of satisfaction subscales [13].

## ABIS

The ABIS contains 20 questions, which assess amputee's perception and feelings about himself [10,11]. In this scale each questions has score between 1 (none of the time) to 5 (all of the time) and all participants indicate their responses to the questions using a scale. This scale produces total scores from 20 to 100. Lesser scores indicate better body image. Three questions of ABIS are scored reverse [11].

## STATISTICAL ANALYSIS

Parametric test (ANOVA t-test) was used for normally distributed data. For analysing various correlations, Pearson correlation test was used and p-value <0.05 was considered significant. Pearson correlation coefficient (r) -1 to 1 was considered significant correlation. After collection of demographic and clinical data results were analysed by computer-based software Statistical Package for the Social Sciences (SPSS) windows version 20.0.

## RESULTS

This study enrolled 119 patients, 65 male and 54 female with mean age of presentation was 31.76±27.24 year (range 5-69 years). Basic demographic data collected shown in [Table/Fig-1].

Basic demographic data	No. of patients	Mean
<b>Gender</b>		
Male	65	
Female	54	
Total	119	
<b>Age group of amputee (years)</b>		
<20	36	31.76±27.24
20-40	48	
41-60	18	
>60	17	
<b>Type of amputation</b>		
Transfemoral	17	
Knee disarticulation	5	
Transtibial	97	
<b>Cause of amputation</b>		
Accident	69	
Peripheral vascular disease	15	
Congenital	15	
Electric current	9	
Cancer	7	
Diabetes	4	
<b>Duration of prosthetic use (years)</b>		
<5	50	
5 to 10	30	
11 to 15	10	
16 to 20	10	
>20	19	
<b>Mean duration of daily prosthetic use (hours)</b>		

[Table/Fig-1]: Basic demographic data.

On assessing prosthetic satisfaction, there was statistically significant difference between males and females only for weight satisfaction score (p-value=0.038) [Table/Fig-2].

There was statistically significant difference between male and female for ABIS score (p-value=0.001) [Table/Fig-1]. On assessing association between ABIS and Prosthetic satisfaction [Table/Fig-3], significant correlation was found between ABIS and functional satisfaction (p-value=0.001 and r=-0.38) and between ABIS and weight satisfaction (p-value=0.001 and r=-0.36).

Prosthetic satisfaction	Variables							F-value	p-value
	Gender	No. of patients	Minimum	Maximum	Mean	Std. deviation			
Aesthetic satisfaction	Male	65	5.00	9.00	6.6462	1.31614	1.974	0.163	
	Female	54	6.00	9.00	7.0000	1.42749			
	Total	119	5.00	9.00	6.8067	1.37334			
Functional satisfaction	Male	65	5.00	12.00	8.6923	1.76709	3.619	0.060	
	Female	54	8.00	12.00	9.3333	1.90332			
	Total	119	5.00	12.00	8.9832	1.85026			
Weight satisfaction	Male	65	1.00	3.00	2.0462	0.48188	4.422	0.038	
	Female	54	2.00	3.00	2.2222	0.41964			
	Total	119	1.00	3.00	2.1261	0.46129			
General satisfaction	Male	65	5.00	10.00	8.1846	1.32160	0.478	0.491	
	Female	54	7.00	10.00	8.3333	0.95166			
	Total	119	5.00	10.00	8.2521	1.16603			
ABIS	Male	65	38.00	67.00	52.0154	6.00649	19.729	0.001	
	Female	54	52.00	75.00	57.2222	6.77584			
	Total	119	38.00	75.00	54.3782	6.85317			

[Table/Fig-2]: Male and female comparison of prosthetic satisfaction and Amputee Body Image Scale (ABIS). (\*ANOVA t-test)

Prosthetic satisfaction	Pearson correlation	ABIS
Functional satisfaction	Correlation coefficient (r)	-0.38
	p-value	0.001
Aesthetic satisfaction	Correlation coefficient (r)	-0.41
	p-value	0.02
Weight satisfaction	Correlation coefficient (r)	-0.362
	p-value	0.001
General satisfaction	Correlation coefficient (r)	-0.153
	p-value	0.10

**[Table/Fig-3]:** Correlation between prosthetic satisfaction and Amputee Body Image Scale (ABIS) Pearson correlation (r).

## DISCUSSION

This cross-sectional study was carried out among lower limb amputee. People living in this area mostly live in villages, they are less educated and unaware of various prosthetic option also the financial status of these people does not allow them to afford high end prosthesis [14]. Thus, most of them remain dependent either on Government Organisation or Non Governmental Organisation (NGO) for prosthetic fitment. Then prosthesis provided at government setup or by NGO's are usually the most basic prosthesis with aims to reach as many amputee as possible and to provide as many prosthesis as possible, which compromises the quality and thus it only helps amputee in performing the most basic activities of daily living like walking.

Baars EC et al., assessed factors associated with prosthetic satisfaction in lower limb amputees they concluded, the prosthetic satisfaction among transtibial amputee are diverse. The prosthetic factor affecting amputee's satisfaction include it's appearance, fitting, physical and functional properties of prosthesis and personal factor affecting amputee's satisfaction include residual limb condition and functional use of the prosthesis [15]. Cairns N et al., studied satisfaction with cosmesis and priorities for cosmesis by lower limb amputees they indicated, prosthetic satisfaction levels among amputee with aesthetic component of prosthetic are below the community desire and 49-59% of amputees were dissatisfied with the aesthetic component of prosthetic satisfaction and females were less satisfied than males [16]. Dillingham TR et al., concluded that almost all amputees where cause of amputations was trauma were unsatisfied with prosthetic comfort [17]. Similarly, in this study also the most common cause was trauma and the prosthetic satisfaction related to aesthetic and function component among amputee were below their desire. Although overall they were unsatisfied with their prosthesis but weight of the prosthesis was the only component which was up to their desire. This may be because they were unaware of other light weight prosthetic option to compare.

Cairns N et al., found women to be less satisfied with their prosthesis than men [16], which was in contrast this study where although prosthesis was not up to the desire of amputee, women were found to be more satisfied than men with their prosthesis.

Horne CE and Neil JA in their comparative study on QoL in patient with prosthetic leg found amputation not only brings physical loss in the person's life but also changes their body image [2]. Similarly, in this study authors found post amputation there was significant deterioration in the body image among the amputee of either sex.

Dillingham TR et al., in their epidemiological study on unilateral lower-extremity amputations and limb deficiency found toe amputation (33.2%) as the most common type lower limb amputation followed by below knee (transtibial) (28.2%), above knee (transfemoral) (26.1%), foot amputations (10.6%) and ankle disarticulation (Syme), through-knee, hip disarticulation, hemipelvectomy amputations combined (1.5%) of all amputations [18]. Kumar D et al., in their study on lower limb amputees found below knee amputation (transtibial) (56.25%)

as the most common type of amputation followed by above knee amputation (transfemoral) (31.25%) and rest Syme amputation and knee disarticulation [19]. Similarly, in this study transtibial followed by transfemoral amputation was found to be the most common type of amputation.

Globally, the most common cause of lower limb amputation is diabetes mellitus. In India, the most common cause of lower limb amputation is traumatic accidents followed by diabetes mellitus [7]. Kumar D et al., found the most common cause of initial amputation as trauma (43.75%) followed by infection (28.12%), peripheral vascular diseases (12.25), cancer (9.37%) and leprosy (6.25%) [19]. As per Schwarz RJ, the most common cause for initial amputation was trauma followed by vascular disease and complications of leprosy [20]. Similarly, in this study accident (trauma) followed by peripheral vascular disease, congenital, electric current, cancer and diabetes were the common causes of lower limb amputation.

It was found that age, duration of amputation, duration of prosthetic use, and daily prosthetic use does not have any association either with prosthetic satisfaction or with body image of lower limb amputee.

## Limitation(s)

As the present study was single centered and it was conducted at Government Hospital. In such organisation main focus of treatment always remain on number of patients getting benefited with prosthesis all these factors affect the quality of prosthesis. These all limitation can be overcome by doing multicentre study which should not only include Government Institute and Non Governmental Organisation (NGO) but also include Private Prosthetic Institute and Clinic, where focus is on patient satisfaction and quality of prosthesis.

## CONCLUSION(S)

Amputation causes significant deterioration of body image among the amputee, with such deteriorated body image prosthetic satisfaction remains a big challenge for healthcare worker and prosthetist. Improvement in aesthetic and functional component of prosthesis can improve the prosthetic satisfaction which can maximise the restoration of distorted body image among the amputee.

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