

Association of Level of Amputation and Use of Prosthesis with Depression: A Multi-Centered Study



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Abstract

Background: Amputation is the surgery of "Removal of limb or its part from the body" due to medical reasons. The loss of a limb is indubitably a distressing lifetime experience. Several studies have shown that depression is higher in patients with amputations. The objective of this study is to determine the association of depression with level of amputation, use of prosthesis and sociodemographic characteristics.

Methods: A cross-sectional research study was conducted in three physical rehabilitation centers of Quetta in a time span of three months. Non probability convenient sampling was used to collect data from 54 participants having traumatic or non-traumatic unilateral amputation. Depression was measured using the validated tool, Hospital Anxiety and Depression Scale (HADS).

Results: Total 54 participants, Males = 47(87%) and Females = 7(13%) and were surveyed. Among them 44(81.5%) were married. Majority of the patients 30(55.5%) were between the age of 15-45 while 28 (51.9%) were educated. Majority of the participants (91%) were with lower-limb amputation. Trans-tibial Amputation (TTA) and Trans-Femoral Amputation (TFA) were 27(50%) and 20(37%) respectively. Use of prosthesis was found among 38(70.4%) patients, while 16(29.6%) did not use prosthesis. Statistically significant relationship was found between married participants and depression (p-value 0.047). Our results showed that depression was less in patients using prosthesis compared to the ones not using prosthesis.

Conclusion: Structured psychological and psychosocial support to the patients with amputations is needed before and after surgery, involving multidisciplinary teams. More emphasis should be given to the mental health of the married participants, as they showed higher levels of depression.

Keywords: Amputation, Depression, Prosthesis, Sociodemographic

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Introduction

Globally the percentage of people living with depression is swiftly surging, specifically ill persons, victims from wars and survivors of road-traffic accidents (RTA). Amputation is "Removal of limb or its part from a body owing to medical reasons." It is essential when limb's ailment could not be treated or when there is a life-threatening situation (1) Majority (82%) of all the amputations happen as a result of diabetes, any trauma or peripheral vascular disease (2).

Worsened law & order circumstances besides wars round the globe, has not only resulted havoc but has also surged the overall proportion of casualties amongst populace (3). Furthermore, RTA are also among the reasons of up-surging number of trauma related injuries (including neck & head region). RTAs are responsible for almost, 1.25 million persons being capitulated annually and about 20-50 million getting extreme injuries including some disability for their remaining lives (4).

As per World Health Organization, almost 300

million folks around the globe, are affected by psychiatric disorders including depression and they are not living their life in normal way. Globally, it is ranked amongst one of common health condition (5).

Disables can be affected by depression easily and they are also extra-vulnerable to contract other illnesses, show risky behaviors, and may even pass away at younger age. Almost more than 01 billion individuals are considered disable worldwide, facing extreme physical functional limitations in their lives. Almost 190 million people (3.8%) above the age of 15 years and 110 million persons (2.2%) less than fifteen years, suffers from numerous physical functional limitations. Roughly 15% persons are disable in globe, out of which 2.54% are from Pakistan, as per census of 1998 (6). As per the past research, nearly 20-60% disable folks who seek treatment for their diseases are found as anxious and depressive (1). In Indians, occurrence of psychiatric maladies is 32-84%, which is one of highest rates so far (7).

With the aim of improving the quality of life of

amputees, it's vital to understand their problems and support them psychosocially. It will play a dynamic role in supporting them to face everyday challenges in improved way (8). Hence, there is a dire need for prompt physical and psychological assistance to help the people in successfully overcoming their depression and other problems (9).

Fractures including those of maxillofacial region are common round the world owing to sports injuries, inter-personal assaults, greater incidence of RTA's and falling from height. Esmer and his colleagues found that nearly 25% of those seriously injured, also suffered from maxillofacial trauma (10-12).

Different types of amputation are the upper limb amputation and lower limb amputation, which includes Knee Disarticulation Amputation (KDA), Partial foot Articulation (PFA), Shoulder Disarticulation Amputation (SDA), Transtibial Amputation (TTA), Transfemoral Amputation (TFA), Trans radial Amputation (TRA) (13). Limb loss has been intensified in many nations. Rehabilitation after an amputation is a multi-factorial process including functional physical adaptation as well as psychosocial schemes (14). The National Institutes of Health documented that the rate of use of prosthesis vary from 27-56% for an upper- extremity amputation & from 49-95% for lower limb amputation (15). Nearly 150000 patients undergo a lower-extremity amputation annually in USA (16).

Traumatic injuries or surgeries that end-up with loss of any appendage, can have various mental responses. Some surveys have focused on psychological perspective and how to adapt to these post-removal mental states. In accordance with the removal, four possible proportions of the psychosocial change include melancholy, self-perception tension, social distress, and prosthetic alteration. Despite the fact that the managements are getting better, removal rates don't appear to be declining (17,18)

Methodology

This cross-sectional research study was conducted in three physical rehabilitation centers of Quetta in a span of three months. Two centers were NGO based while one was from public sector, working under a social welfare department. Non probability convenient sampling was used to collect data from 54 participants.

A self-constructed questionnaire was used having two parts. First part was about sociodemographic information. Second part included a validated tool, Hospital Anxiety and Depression Scale (HADS) for measuring depression. Data was collected by the principal investigator along with trained data collectors from the patients visiting any of the three Physical Rehabilitation Centers. These patients had amputations either due to traumatic or non-traumatic causes.

Uni-lateral amputation of lower and upper limb, newly amputees to 10-years, amputees having a no previous psychiatric illness were included in the study. While amputees having bi-lateral amputation, amputees from Afghanistan and amputation because of congenital malformation were excluded from the study.

The quantitative variables were tabularized and analyzed by calculating mean and standard deviation. While

frequency and percentages were calculated for descriptive variables. For all tests, P value < 0.05 considered statistically significant.

This research study was carried out after approval from Ethical review committee, Health services academy, Islamabad. Written informed consent was taken from all participants before collecting data.

Results

Sociodemographic Characteristics:

Total 54 participants, Males =47(87%) and Females = 7(13%) and were surveyed. Among them 44(81.5%) were married. Majority of the patients 30(55.5%) were between the age of 15-45 while 28 (51.9%) were educated. Majority 30 (55.5%) of the patients were between 15-45 years of age while 28 (51.9%) had some kind of education. Rural verses urban residents were 35 (64.9%) and 19 (35.1%) respectively. Sociodemographic characteristics are summarized in table 1.

Table 1: Sociodemographic characteristics of participants

Sociodemographic Characteristics	Frequency (%)
Gender	
Male	47 (87)
Female	07 (13)
Age	
15-25	15 (27.8)
26-35	8 (14.8)
36-45	7 (13.0)
46-55	11 (20.3)
56-65	10 (18.5)
66-75	3 (5.6)
Marital Status	
Single	10 (18.5)
Married	44 (81.5)
Living area/conditions	
City plane	17 (31.5)
City hilly	2 (3.7)
Village hilly	11 (20.4)
Village plane	24 (44.4)
Education	
Un-educated	26 (48.1)
Primary	11 (20.4)
Matric	10 (18.5)
Graduation & Higher	1 (1.9)
Religious Studies, Madrassa,	6 (11.1)

Level of Amputation:

Non traumatic amputees and traumatic amputees were 18(33.3%) and 36 (66.7 %) respectively. Majority 49(91%) were with lower-limb amputation while only 5(9%) with upper-limb amputation. Trans-tibial Amputation (TTA) and Trans-Femoral Amputation (TFA) were 27 (50%) and 20(37%) respectively as shown in Figure 1

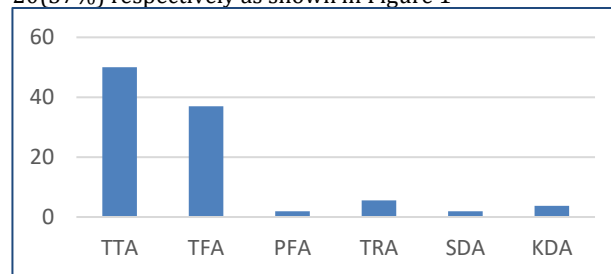


Figure 1. Level of amputation

Use of Prosthesis:

Use of prosthesis was found in 38(70.4%) participants compared to 16(29.6%), who did not use prosthesis as shown in Figure 2.

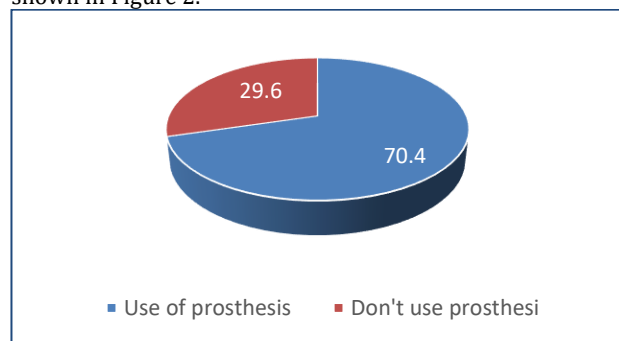


Figure 2: Prosthesis use among participants

Association of Sociodemographic characteristics with depression:

Based on HADS data, our study showed that 17 (31.5%) were normal having no depression or mild depression and 37 (68.5 %) were having moderate to severe depression. Regarding gender, females were found more affected as 5 out of 7 (71.42%) were in the category of moderate or severe depression in comparison to 32 out of 47 (68%) men. Statistically significant relationship was found only between married participants & depression (p-value 0.047). The association of sociodemographic characteristics with depression are shown in table 2.

Table 2. Association of sociodemographic characteristics with depression

Sociodemographic Characteristics	Level of Depression [n (%)]				p-value
	Normal or Mild	Moderate	Severe	Total	
Gender					0.42
Female	02(11.8%)	2(9.1%)	3(20%)	7(13%)	
Male	15(88.2%)	20(90.9%)	12(80%)	47(87%)	
Total	17(31.5%)	22(40.7%)	15(27.7%)	54(100%)	
Marital status					0.047
Married	10(76.66%)	22(100%)	12(80%)	44(81.48%)	
Single	7(23.33%)	0(0)	3 (20%)	10(18.52%)	
Total	17(31.5%)	22(40.7%)	15(27.8%)	54(100%)	
Living area					0.87
Village	13(24%)	13(24%)	9(16.6%)	35(64.81%)	
City	4(7.4%)	9(16.6%)	6(11.11%)	19(35.19%)	
Total	17(31.4)	22(40.7)	15(27.7%)	54(100%)	
Education					0.58
Un-educated	9(52.9%)	8(36.4%)	9(60.0%)	26(48.1%)	
Primary	0(0%)	8(36.4%)	3(20.0%)	11(20.4%)	
Secondary School	4(16.7%)	5(33.3%)	1(13.3%)	10(18.5%)	
Graduation or higher	0(0.0%)	0(0%)	1(6.7%)	1(1.9%)	
Madrassa, religious studies	4(13.3%)	1(0%)	1(13.3%)	6(11%)	
Total	17(31.48%)	2(40.74%)	15(27.77%)	54(100%)	

Association of level of amputation with depression

There was no statistically significant relationship found between level of amputation and depression. Results are shown in Table 3

Table 3. Association of level of amputation with depression

Table 3: Association of Level of amputation with depression									
Level of amputation	Level of Depression [n (%)]								P value
	Normal or Mild %		Moderate %		Severe %		Total %		
Transtibial	9	52.9	11	50.0	7	46.7	27	50	0.335
Transfemoral	4	23.5	8	36.4	8	53.3	20	37.0	
Partial foot Articulation	0	0.0	1	4.5	0	0.0	1	1.9	
Trans radial	2	11.8	1	4.5	0	0.0	3	5.6	
Shoulder Disarticulation	0	0.0	1	4.5	1	6.7	1	1.9	
Knee Disarticulation	2	11.8	0	0.0	0	0.0	2	3.7	
Total	17	31.5	22	40.8	15	27.8	54	4.35	

Association between use of prostheses and Depression

Results construe that level of depression amongst participants was less among those using prosthesis compared to those who were not using prosthesis despite of the non-significant relationship. Results are shown in table 4

Table 4: Association between use of prostheses and Depression

Use of prostheses	Level of Depression [n (%)]				P value
	Normal	Moderate	Severe	Total	
Yes	13(76.5)	16(72.7)	9(60.0)	38(70.4)	0.56
No	4(23.5)	6(27.2)	6(40.0)	16(29.6)	
Total	17(31.48)	22(40.74)	15(27.77)	54(100)	

Discussion

Amputation is considered one of the greatest public health concerns, as it escalates burden on society and health services (5). Our results showed that majority (68.5%) amputees had depression. Approximately 1 in 300 people of western nations underwent true removal, hence psychological changes in amputees may be perceived as a key medical issue (19). Globally 16% of all illnesses are caused by trauma (8).

In this study, traumatic injuries caused 18(33.3%) amputations, while 66.7 % were due to non-traumatic causes. This is close to results indicated by Barth and his colleagues, where traumatic amputations accounts for 73.4% (20). In 2017, worldwide, 57.7 million people were living with the limb amputation as a result of traumatic causes (21)

RTA is main reason for a facial trauma. In conjunction with skeletal fractures, face trauma may also include a stern damage to the soft tissue or an amputation which can lead to functional & aesthetic issues. Subsequently traumatic amputation, a reconstruction of these facial parts is of particular interest due to functional and psychological implications these accidents have on patients (22)

Amputation of lower-limb is associated with poor quality of life, decreased life expectancy plus high treatment costs. Hence, reliable data on incidence of amputation is of utmost importance for health planning, policy and also economics in the efforts to produce structural improvements for care of people (23).

Only 18.5% participants of our study were unmarried, which is half as compared to results of another study. Only 1.9% of the participants in our study did graduation or masters, which is far less than another research study data (15%) (24).

In our research, trans-tibial Amputation (TTA) and Trans-Femoral Amputation (TFA) were 27 (50%) and 20 (37%) respectively, which is comparable to that described by other researcher, where 70% for transtibial amputees while 30% for transfemoral amputees (24). One more investigation revealed that transtibial amputees were 66% and transfemoral amputees were 14% (25).

Post-traumatic amputees have more susceptibility to depression. If a person experiences a traumatic amputation, memories of that incident can also be the source for them to suffer from "PTSD (posttraumatic stress disorder)" or similar psychological situation. In addition, multiple psychosocial, socioeconomic and physical conditions can occur in patients, who have undergone amputation as a result of trauma or an accident (26,27).

Our study found a statistically significant association between married participants and depression (p-value 0.047). Significant association of depression with being single (p-value < 0.01) was also told by Iqbal M et al (28). This is in accordance to Falaj IM, where scientists expected few sociodemographic factors to be associated with psychiatric comorbidities (29).

In this research, 38 (70.4%) subjects used prostheses whereas 16 (29.6%) did not use prosthesis, which is same as that of Columbo et al result (24). Prosthetic use has an imperative role in both physical & psychological recovery, having an impact not only on quality of life but mortality too. It was observed that getting and successfully using a prosthetic-leg was closely tied to perception of successful functional recovery.

Conclusion

Structured psychological and psychosocial support to the patients with amputations is needed before and after surgery, involving multidisciplinary teams. More emphasis should be given to the mental health of the married participants, as they showed higher levels of depression. It is highly recommended to have regular periodic counselling of all the people with amputations. There is strong need that these recommendations should be implemented at policy level by the government and other stakeholders.

Limitations

This study was done in three month's time period, so sample size was small. Also only unilateral amputees were included in the study. Exact duration since the amputation was done, is not mentioned in the study. Due to specific hours of

rehabilitation at physical rehabilitation centers, it was hard to gain the trust of most of the participants. More extensive studies including bilateral amputees and bigger sample size are suggested in future.

References

1. Şimsek N, Küçük Öztürk G, Nahya ZN. The Mental Health of Individuals with Post-Traumatic Lower Limb Amputation: A Qualitative Study. *Journal of Patient Experience*. 2020, Vol. 7(6) 1665-1670. <https://doi.org/10.1177/2374373520932451>
2. Terry Canale S, Beaty JH. Campbell's Operative Orthopaedics. Başbozkurt M, Yıldız C, c, eviri editörleri. Güneş, Tıp Kitapevleri, 11. 2011:561-639.
3. Ghous M, Gul S, Siddiqi FA, Pervaiz S, Bano S. Depression ; Prevalence Among Depression ; Prof Med J. 2015;22(2):263-6. <https://doi.org/10.29309/TPMJ/2015.22.02.1399>
4. WHO | Road traffic injuries. WHO, 2017; Available from: <http://www.who.int/mediacentre/factsheets/fs358/en/> (accessed on May 2021)
5. WHO | Depression. WHO [Internet]. 2017; Available from: <http://www.who.int/mediacentre/factsheets/fs369/en/> (accessed on May 2021)
6. WHO | Disability and health. WHO [Internet]. 2018; Available from: <http://www.who.int/mediacentre/factsheets/fs352/en/> (accessed on May 2021)
7. Sahu A, Sagar R, Sarkar S, Sagar S. Psychological effects of amputation: A review of studies from India. *Industrial psychiatry journal*. 2016 Jan; 25(1):4-10. <https://doi.org/10.4103/0972-6748.196041>
8. Bhutani S, Bhutani J, Chhabra A, Uppal R. Living with amputation: anxiety and depression correlates. *Journal of clinical and diagnostic research: JCDR*. 2016 Sep;10(9):09-12. <https://doi.org/10.7860/JCDR/2016/20316.8417>
9. Pedras S, Carvalho R, Pereira MG. A predictive model of anxiety and depression symptoms after a lower limb amputation. *Disabil Health J [Internet]*. 2016;11(1):79-85. Available from: <https://doi.org/10.1016/j.dhjo.2017.03.013>
10. Devakumari S, Thanasekar V, Biradar N, Dominic N. Patterns of maxillofacial fractures treated in a tertiary care government hospital of Puducherry—A descriptive cross-sectional study. *Asian Journal of Medical Sciences*. 2021 Apr 1; 12(4):92-7. <https://doi.org/10.3126/ajms.v12i4.33983>
11. Pietzka S, Kämmerer PW, Pietzka S, Schramm A, Lampl L, Lefering R, et al. Maxillofacial injuries in severely injured patients after road traffic accidents—a retrospective evaluation of the Trauma Register DGU@ 1993–2014. *Clinical oral investigations*. 2020 Jan; 24(1):503-13. <https://doi.org/10.1007/s00784-019-03024-6>
12. Rothweiler R, Bayer J, Zwingmann J, Suedkamp NP, Kalbhenn J, Schmelzeisen R, et al. Outcome and complications after treatment of facial fractures at different times in polytrauma patients. *Journal of Cranio-Maxillofacial Surgery*. 2018 Feb 1; 46(2):283-7. <https://doi.org/10.1016/j.jcms.2017.11.027>
13. Sarvestani AS, Azam aT. Amputation: a ten-year survey. *Trauma monthly*. 2013 Dec;18(3):126-9 doi: 10.5812/traumamon.11693
14. Kizilkurt OK, Kizilkurt T, Gulec MY, Giynas FE, Polat G, Kilicoglu OI, et al. Quality of life after lower extremity amputation due to diabetic foot ulcer: the role of prosthesis-related factors, body image, self-esteem, and coping styles. *Dusunen adam: Journal of psychiatry & neurological sciences*. 2020 Apr 1;33(2): 109-19. DOI: 10.14744/DAJPNS.2020.00070
15. McGimpsey G, Bradford TC. Limb prosthetics services and devices. *Bioengineering Institute Center for Neuroprosthetics Worcester Polytechnic Institution*. 2008 Jan: 1-35
16. Molina CS, Faulk J. Lower extremity amputation. *StatPearls [Internet]*. Treasure Island: StatPearls. 2021.
17. Desteli EE, İmren Y, Erdoğan M, Sarısoy G, Coşgun S. Comparison of upper limb amputees and lower limb amputees: a psychosocial perspective. *Eur J Trauma Emerg Surg*. 2014;40(6):735-9. <https://doi.org/10.1007/s00068-014-0418-3>
18. Copanitsanou P, Drakoutos E, Kechagias V. Posttraumatic stress, depressive emotions, and satisfaction with life after a road traffic accident. *Otrhop. Nurs*. 2018; 37:43-53. doi: 10.1097/NOR.0000000000000417.
19. Donovan-Hall MK, Yardley L, Watts RJ. Engagement in activities revealing the body and psychosocial adjustment in adults with a trans-tibial

- prosthesis. *Prosthet Orthot Int*. 2002;26(1):15–22. <https://doi.org/10.1080/03093640208726617>
20. Barth CA, Wladis A, Blake C, Bhandarkar P, Perone SA, O'Sullivan C. Retrospective observational study of characteristics of persons with amputations accessing International Committee of the Red Cross (ICRC) rehabilitation centres in five conflict and postconflict countries. *BMJ open*. 2021 Dec 1; 11(12):1-16. <https://doi.org/10.1136/bmjopen-2021-049533>
21. McDonald CL, Westcott-McCoy S, Weaver MR, Haagsma J, Kartin D. Global prevalence of traumatic non-fatal limb amputation. *Prosthetics and orthotics international*. 2020 Dec 4: <https://doi.org/10.1177/0309364620972258>
22. AlQahtani FA, Bishawi K, Jaber M. Analysis of the pattern of maxillofacial injuries in Saudi Arabia: a systematic review. *The Saudi dental journal*. 2020 Feb 1;32(2):61-7. <https://doi.org/10.1016/j.sdentj.2019.08.008>
23. Rümenapf G, Morbach S. Amputation statistics—how to interpret them? *Deutsches Ärzteblatt Int*. 2017 Feb;114(8):128-9. doi: 10.3238/arztebl.2017.0128
- Cumbo JA, Davies L, Kang R, Barnes JA, Leinweber KA, Suckow BD, Goodney PP, Stone DH. Patient experience of recovery after major leg amputation for arterial disease. *Vasc. Endovasc Surg*. 2018 May;52(4):262-8. doi: 10.1177/1538574418761984.
25. MacKay C, Cimino SR, Guilcher SJ, Mayo AL, Devlin M, Dilkas S, Payne MW, Viana R, Hitzig SL. A qualitative study exploring individuals' experiences living with dysvascular lower limb amputation. *Disabil. Rehabil*. 2022 May 8;44(10):1812-20. doi: 10.1080/09638288.2020.1803999.
26. Baqi A, Zia Q, Shaikh SP, Shoaib M, Javaid MM, Malik MS. Determinants of anxiety in amputees owed to traumatic & non-traumatic causes. *Ann Pak Inst Med Sci*. 2022;18 (3):175-80. doi. 10.48036/apims. v18i3.671
27. Mckechnie PS, John A. Anxiety and depression following traumatic limb amputation: A systematic review. *Injury [Internet]*. 2014 Dec [cited 2018 Feb 20];45(12):1859–66. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/25294119>. <https://doi.org/10.1016/j.injury.2014.09.015>.
28. Iqbal MM, Mohamed S, Mohamad M Depression and Its Associated Factors among Lower Limb Amputees at Hospital Kuala Lumpur and Hospital Sultanah Bahiyah: A Cross Sectional Study. *J Depress Anxiety* 2019 8 (2): 338.
29. Faraj IM, Mutavi TN, Gitau CW. Prevalence of Anxiety, Depression, and Post-Traumatic Stress Disorder Among Amputees Attending Jaipur Foot Trust Artificial Limb Centre in Kenya. *East African Journal of Health and Science*. 2022 Mar 8;5(1):49-64. <https://doi.org/10.37284/eajhs.5.1.572>