

East African Journal of Health and Science

eajhs.eanso.org

Volume 5 Issue 1, 2022

Print ISSN: 2707-3912 | Online ISSN: 2707-3920

Title DOI: <https://doi.org/10.37284/2707-3920>

EANSO

EAST AFRICAN
NATURE &
SCIENCE
ORGANIZATION

Original Article

Prevalence of Anxiety, Depression, and Post-Traumatic Stress Disorder Among Amputees Attending Jaipur Foot Trust Artificial Limb Centre in Kenya.

Dr. Illham Mohamed Faraj, MMed¹, Dr. Teresia Ndilu Mutavi, PhD^{1,2*} & Dr. Catherine Wanja Gitau, MMed^{1,2}

¹ University of Nairobi, P. O. Box 30197, GPO, Nairobi; Kenya.

² Kenyatta National Hospital, P. O. Box 20723 – 00202, Nairobi; Kenya.

*Author for correspondence ORCID ID: <https://orcid.org/0000-0002-2585-6556>; email: mutavi.teresia@uonbi.ac.ke.

Article DOI: <https://doi.org/10.37284/eajhs.5.1.572>

Date Published: ABSTRACT

08 March 2022

Keywords:

*Amputees,
Prevalence of Anxiety,
Depression,
PTSD,
Quality of Life.*

Background: Amputees have been noted to present various psychiatric disorders including anxiety, body image disturbances, depression, and Post-Traumatic Stress Disorder (PTSD). However, there is limited data available on the prevalence of anxiety, depression, and PTSD among amputees in Kenya despite the high incidences of amputations in Kenyan hospitals. This study aimed at finding out the prevalence of anxiety, depression, and post-traumatic stress disorder among amputees attending the Jaipur Foot Trust Centre in Kenya. Method: This study took a cross-sectional descriptive study design. One hundred and forty-one patients attending the Jaipur Foot Trust were recruited to participate in the study after giving informed consent using a non-probability purposive sampling method. A socio-demographic questionnaire was used to collect socio-demographic characteristics. The Patient Health Questionnaire (PHQ-9) was used to assess the patient's depression. The Generalized Anxiety Disorder (GAD-7) scale was used to assess the patient's anxiety level and The Impact of Event Scale (IES-R) was used to assess the severity of post-traumatic stress disorder (PTSD). Data analysis was done using Statistical Package for Social Science (SPSS) version 23. Results: Findings from this study showed high rates of psychiatric morbidity where two-thirds of the patients reported PTSD (65%) with more than three-quarters of patients being diagnosed with depression (89.4%) and anxiety (91.5%). Also, there was a significant correlation between depression, anxiety, and PTSD, such that participants who had higher scores on anxiety and depression had significantly higher

PTSD scores. Conclusion: Anxiety, Depression, and PTSD are very common psychological reactions in patients who have undergone amputation. The researchers expected that some of the sociodemographic factors and some amputation-related characteristics would have a relation with psychiatric comorbidity. However, the findings of this study did not show any such relationship except the relation between anxiety, depression, and PTSD. Early psychological assessment and interventions after amputations will help alleviate psychological distress.

APA CITATION

Fara, I. M., Mutavi, T. N. & Gitau, C. W. (2022). 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*, 5(1), 49-64. <https://doi.org/10.37284/eajhs.5.1.572>.

CHICAGO CITATION

Fara, Illham Mohamed, Teresia Ndilu Mutavi, & Catherine Wanja Gitau. 2022. "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* 5 (1), 49-64. <https://doi.org/10.37284/eajhs.5.1.572>.

HARVARD CITATION

Fara, I. M., Mutavi, T. N., & Gitau, C. W. (2022) "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*, 5(1), pp. 49-64. doi: 10.37284/eajhs.5.1.572.

IEEE CITATION

I. M. Fara, T. N. Mutavi, & C. W. Gitau, "Prevalence of Anxiety, Depression, and Post-Traumatic Stress Disorder Among Amputees Attending Jaipur Foot Trust Artificial Limb Centre in Kenya.", *EAJHS*, vol. 5, no. 1, pp. 49-64, Mar. 2022.

MLA CITATION

Fara, Illham Mohamed, Teresia Ndilu Mutavi, & Catherine Wanja Gitau. "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*, Vol. 5, no. 1, Mar. 2022, pp. 49-64, doi:10.37284/eajhs.5.1.572.

INTRODUCTION

Amputations due to surgical procedural indications or traumatic events often result in a series of complex mental reactions in affected individuals. Most amputees go through these responses as an automatic attempt to cope with the situation but others present with debilitating psychiatric signs and symptoms (Hawamdeh et al., 2008). Individuals who have gone through an amputation experience adverse psychological impacts that significantly affect their Quality of Life (QoL) (O'Donnell et al., 2005). Moreover, The World Health Organization (WHO) postulates that QoL can be influenced by factors relating to an individual's physical, cognitive, personal, social, spiritual, and environmental state (Whoqol Group, 1995).

Amputation has been associated with negative implications in three main ways namely: capacity, self-perception, and sensation. The anguish over the

loss of sensation has been known to exacerbate self-consciousness that impacts one's functionality concerning sexuality and occupation often leading to social and psychosocial impairment (Baby et al., 2018). It has been reported that traumatic limb loss is equivalent to other mainstream forms of loss such as bereavement, separation, divorce, castration anxiety as well as a fragmented sense of self, all of which summit to considerable cognitive disability and reduced quality of life (Sahu et al., 2017).

The incapacitation of amputees to self and their families may in most cases cause psychiatric issues (Sahu et al., 2017). Among lower-limb amputees, factors such as being young, single, having low literacy levels, going through bilateral side amputation, experiencing trauma associated with the amputation, inability to get a prosthesis to aid in walking, shorter amputation duration, absence of medical comorbidity that could have necessitated the amputation, a wanting social support system and

poor quality of life has been correlated to depression prevalence (Iqbal et al., 2019).

A study in a tertiary care hospital in Kashmir showed that in the cases of traumatic experiences resulting in severe amputations, Post-Traumatic Stress Disorder (PTSD) was at a distressing rate of 80% (Marqoob et al., 2008). These findings were replicated in other Western countries (Desmond et al., 2008). A study conducted in 41 countries attributed amputation and consequent PTSD from snakebites, these contributed to the burden of Disability Adjusted Life Years (DALYs) at 1.03 million (Halilu et al., 2019).

A cross-sectional study in 2019 aimed at understanding depression and associated features among 196 lower limb amputees aged 18-86 years showed a 47.4% prevalence of depressive symptoms with 24.5% of them getting a Major Depressive Disorder (Iqbal et al., 2019). Another study on anxiety and depression among 56 lower limb amputees from both inpatient and outpatient hospitals and rehabilitation centres in Jordan showed that anxiety and depression were prevalent at 37% and 20% respectively (Hawamdeh et al., 2008). Being female, poor social support, being unemployed having a traumatic amputation, recency of amputation, and below-knee amputation were found to be significantly related to higher psychological symptoms. Within this context, this study aimed to assess the prevalence of anxiety, depression, and PTSD among amputees attending the Jaipur Foot Trust Centre in Nairobi, Kenya.

METHODOLOGY

The study adopted a descriptive cross-sectional design with a quantitative data collection approach. The study was done at the Jaipur Foot Trust artificial limb centre located next to Kabete Barracks, along Waiyaki Way, Nairobi. It was established by the Rotary Club of Nairobi in the year 1990 to aid amputees to walk again. In this project, amputees are given artificial limbs at no cost. This service is endorsed by local donors that include individuals, groups, and institutions that are sympathetic to the objectives of the project. The population size of amputees that attended the Jaipur foot trust centre was approximately 80 amputees per month translating to 960 amputees per year.

Ethical approval was sought from the University of Nairobi/Kenyatta National Hospital Ethics Review Committee [P678/12/2020]. The population consisted of all adult amputees attending the Jaipur Foot Trust. Those who refused to give consent were excluded. Using Cochran's formula (Cochran, 1977) with an estimated prevalence of depression of 20% among amputees in India (Baby et al., 2018), the margin of error (precision) of 5% and a confidence interval of 95%. The population of amputees attending Jaipur foot trusts centre was approximately 80 amputees per month translating to 240 amputees over three months data collection period. After applying finite population correction, the minimum sample size required was 122 participants. Allowing for a 10% non-response rate the minimum sample size required was 136 participants.

Participants were monitored for signs of respiratory disease and other primary distinguishing symptoms of COVID-19 disease, such as fever, cough, and shortness of breath or trouble breathing, as well as a history of recent exposure to individuals with COVID-19 disease, shortly before the face-to-face appointment. Participants with potential exposure or symptoms indicative of a respiratory condition were not invited for face-to-face visits. The researchers underwent regular temperature checks before entering the research site and correctly always wore a facemask during the face-to-face interactions. Suitable infection prevention control measures were ensured at the site of face-to-face visits, as follows: Temperature checks were carried out using a non-contact thermometer for all participants and other individuals arriving at the research site. There were hand-washing stations and hand sanitizers for all to use. During face-to-face interactions, the researchers ensured that participants correctly wore their face masks. A minimum physical distance of 1.5 meters in the waiting room was maintained.

Study participants were then recruited from patients receiving services at the Jaipur foot trust centre using non probability purposive sampling technique. All eligible participants were recruited both new and those coming for check-ups/follow-ups. The screening was done to assess whether the participants met the stated inclusion criteria. This process entailed giving an informed consent

document with details of the study and the participants were allowed to ask questions they may have regarding the study. Participants who met the inclusion criteria and willing to participate in the study were requested to sign an informed consent form. They then proceeded to fill the Patient Health Questionnaire (PHQ-9), The Impact of Event Scale (IES-R), The Generalized Anxiety Disorder (GAD), and socio-demographic questionnaire.

THE PHQ-9 depression module scores each of the DSM-5 criteria as “Not at all” (“0”) to “Nearly every day” (“3”) (Kroenke et al., 2001). Therefore, the severity measure of the PHQ-9 ranges from 0-27 for depression where higher scores indicate high levels of depression. The depression severity tabulated according to the total score of every participant as a score of 0-4 no depression, 5-9 mild depression, 10-14 moderate depression, 15-19 moderately severe depression, and 20-27 severe depressive disorder.

The GAD-7 seven-item anxiety questionnaire uses a threshold score of 10 and has a sensitivity of 89% and specificity of 82% for GAD (Spitzer et al., 2006). It has scores of “0” (“Not at all”), “1” (“Several days”), “2” (“More than half the days”), and “3” (“Nearly every day”). The scores of 5, 10, and 15 are cut-off points from mild to severe anxiety where further evaluation is recommended for scores above 10.

The Impact of Event Scale (IES-R) is a DSM-5 self-report measure for assessing the subjective distress as a result of traumatic events (Weiss, 2007). The rating of items is on a 5-point scale ranging from “0” (“Not at all”) to “4” (“Extremely”) yielding a total score of 0- 88. This total can be used to assess partial or full PTSD and has cut-off points for moderate and severe PTSD.

Descriptive statistics were used to scrutinize the general distribution of data and the depression and anxiety scores, using means and standard deviations for continuous variables and proportions for categorical variables. Independent samples t-test, One-way Analysis of Variance (ANOVA), was applied to identify group differences. Generalized linear models were used to categorize independent predictors of anxiety, depression, and PTSD. All analyses were conducted using Statistical Package for Social Science (SPSS) version 23. The statistical significance level was set at $p < 0.05$ all tests will be 2-tailed.

RESULTS

The calculated sample size was 136, but 141 participants were interviewed because there was an increase in the number of respondents in the last few days and the researchers opted to assess willing respondents. Consequently, 141 questionnaires were analysed reflecting 104 percent response rate.

Table 1: Socio-demographic Characteristics of the respondents

Variable	Category	Freq (N=141)	%
Sex	Male	78	55.3
	Female	63	44.7
Age in Years	Mean; Median; Range	43.4; 42; 18 to 85	
Age Category	30 and below	27	19.1
	31-40 Years	35	24.8
	41-50 Years	39	27.7
	51-60 Years	20	14.2
	Above 60	20	14.2
Marital Status	Single	45	31.9
	Married	78	55.3
	Divorced/Separated/Widowed	18	12.8
Highest level of Education	Less than Primary School	41	29.3
	Primary School	29	20.7
	Secondary/ High School	49	35.0
	College/ University	21	15.0
	Non-Response	1	

Variable	Category	Freq (N=141)	%
Employment Status	Employed	97	69.3
	Un-Employed	43	30.7
	Non-Response	1	
Monthly Income	No Income	43	33.3
	< 20,000 Ksh	58	45.0
	20,000 and above	28	21.7
	Non-Response	12	

As shown in *Table 1* above the mean age was 43.4 years and ranged from 18-85 years, with the bulk of the participants aged between 31-50 years. More than half of the participants (55.3%) were males and the rest (44.7%) females. The majority of the participants were married (55.3%), 31.9% were single and 12.9% were either divorced/separated/Widowed. In terms of education level 35.0% had completed secondary school,

29.3% had less than primary education, 20.7% had completed primary school and 15.0% had completed college/university education. More than 2/3rds (69.3%) were employed while 30.7% were unemployed. Monthly Income: In terms of monthly income, 45% had an income of <20,000 Ksh, 21.7% had an income of more than 20, 000 Ksh a month while the rest 33.3% had no income.

Table 2: Psychosocial, Biological and other Characteristics of the Respondents

Variable	Category	Freq (N=141)	(%)
Amputation Type	Bilateral	10	7.1
	Unilateral	131	92.9
Level of Amputation	Above the Knee	42	30.0
	Below Knee	98	70.0
	Non-Response	1	
Reason for Amputation	Non-Vasculitis	113	80.7
	Vasculitis	27	19.3
	Non-Response	1	
Type of walking Aid	Wheel Chair	2	1.4
	Prosthesis	103	73.6
	Crutches	35	25.0
	Non-Response	1	
Presence of other illness	Yes	33	23.4
	No	108	76.6
Experience pain at the amputation site	Yes	16	11.3
	No	125	88.7
Rate your pain on a scale of 1-10 (N=16)	2	4	25.0
	3	3	18.8
	4	1	6.3
	5	3	18.8
	6	3	18.8
	7	1	6.3
	9	1	6.3
Receive Support from your family	Yes	124	87.9
	No	17	12.1

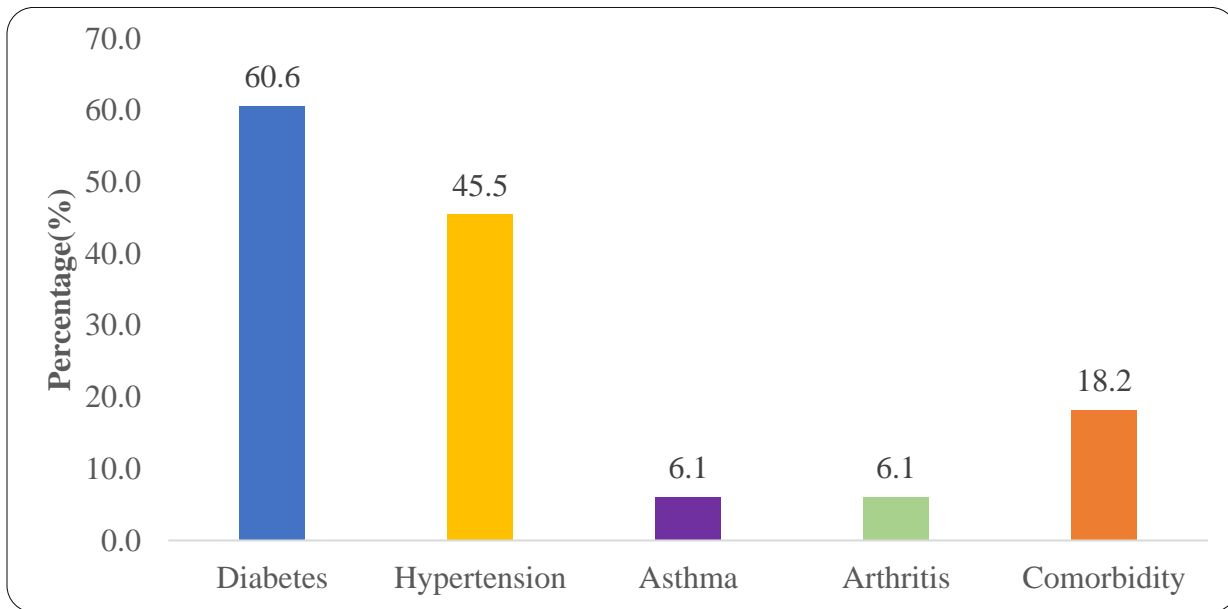
As shown in *Table 2* above, the amputation type consisted of most (92.9%) of the respondents had a

unilateral amputation, while the rest had a bilateral amputation, of which 70% had their amputation

below the knee. Causes of Amputation: Non-vasculitis causes accounted for the majority (80.7%) of amputations of which included (56%) were caused by road traffic accidents, followed by snake bites. Vasculitis causes accounted for 19.3% of the total amputation in which diabetes accounted for (70%) and gangrene (30%). Walking Aid: Prosthesis was used by 73.6% of the respondents as a walking aid, 25% used crutches while 1.4% used a wheelchair. Presence of Other Illnesses: 23.4% of

the respondents indicated that they have been diagnosed with other illnesses, of which 60.6% had diabetes, 45.5% had hypertension, 6.1% had asthma and arthritis respectively. Pain at the Amputation Site: 11.3% of the participants indicated that they experience pain at the amputation site which they rated at a scale of 1 to 10. Social Support: The majority (87.9%) of the respondents indicated that they receive social support from their families.

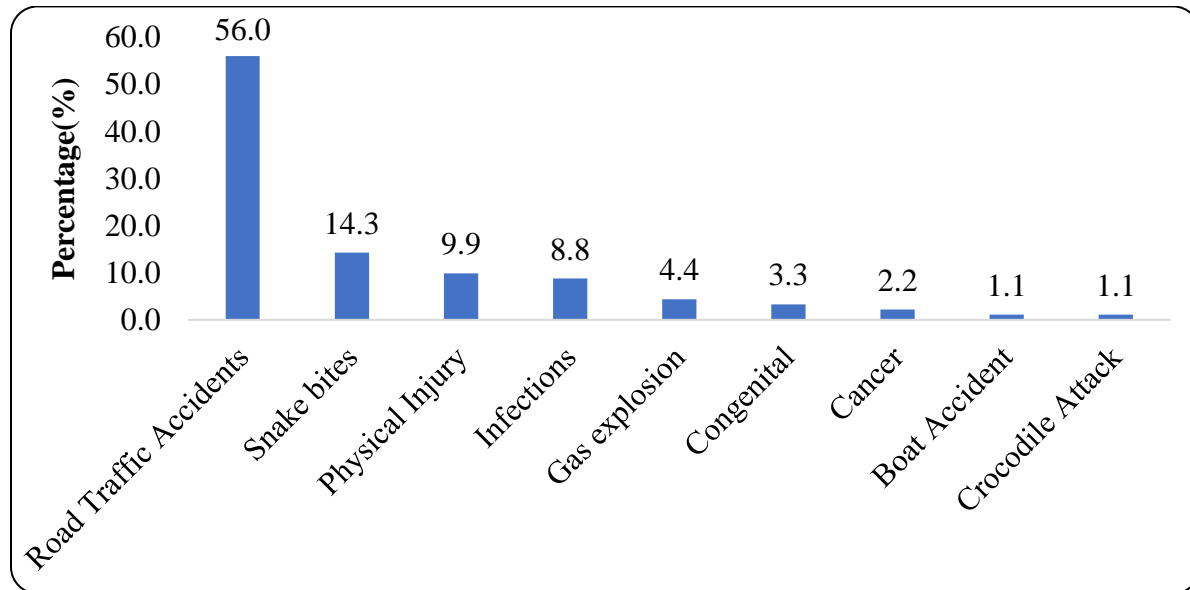
Figure 1: Presence of other illness (n=33)



The respondents were requested to indicate the presence of other illnesses. From the *Figure 1* above, 60.6% indicated diabetes, 45.5% indicated hypertension, 18.2% indicated comorbidity, 6.1% indicated asthma while 6.1% indicated arthritis.

Further, the respondents were requested to indicate the vasculitis that causes of amputation. Majority of the respondents (70%, n=19) indicated diabetes while 30% (n=8) indicated gangrene.

Figure 2: non-Vasculitis amputation (n=91)



The respondents were requested to indicate the non-vasculitis causes of amputation. From the figure above (Figure 2), 56% of the respondents indicated road traffic accidents, 14.3% indicated snake bites, 9.9% indicated physical injury, 8.8% indicated infections, 4.4% indicated gas explosion, 3.3% indicated congenital, 2.2% indicated cancer, 1.1% indicated boat accident while 1.1% indicated crocodile attack.

Prevalence of PTSD, Depression, and Anxiety

A total of 92 participants screened positive for PTSD (Scores ≥ 33) giving a prevalence rate of 65% 95% C.I. 57.4% to 73.0%. while 35% of the

respondents were negative for PTSD as shown in Table 3. This implies that most of the respondents were positive for PTSD.

As shown in Table 3, the prevalence of mild depression was 22.0% 95% C.I. 15.6% to 29.1%; Moderate depression 39.0% 95% C.I. 31.2% to 46.8%; Moderately severe 27.0% 95% C.I. 19.9% to 34.0% and severe depression 1.4% 95% C.I. 0.0% to 3.5%. (Table 3). Among those who endorsed any item on the scale. The level of difficulty in carrying out the tasks was as follows 8.0% indicated that it was not difficult, 65.7% said it was somewhat difficult, 20.9% said it was very difficult and 6.0% said it was extremely difficult.

Table 3: Prevalence of PTSD, Depression, and Anxiety

Measure	Category	Frequency (N=141)	Percentage (%)	95% C.I.	
				Lower	Upper
PTSD	Negative for PTSD (<33)	49	34.8	27.0	42.6
	Positive for PTSD (≥ 33)	92	65.2	57.4	73.0
Depression	None (0-4)	15	10.6	6.4	15.6
	Mild (5-9)	31	22.0	15.6	29.1
	Moderate (10-14)	55	39.0	31.2	46.8
	Moderately Severe (15-19)	38	27.0	19.9	34.0
	Severe (20-27)	2	1.4	0.0	3.5
Anxiety	Minimal Anxiety (0-4)	12	8.5	4.3	13.5
	Mild Anxiety (5-9)	43	30.5	23.4	38.3
	Moderate Anxiety (10-14)	57	40.4	32.6	48.9
	Severe Anxiety (15-21)	29	20.6	13.5	27.7

As shown in *Table 3*, the prevalence of mild anxiety was 30.5% 95% C.I. 23.4% to 38.3%; moderate anxiety 40.4% 95% C.I. 32.6% to 48.9%; and severe anxiety 20.6% 95% C.I. 13.5% to 27.7% (*Table 3*). Among those who endorsed any item on the scale. The level of difficulty in carrying out the tasks was as follows 8.0% indicated that it was not difficult,

65.7% said it was somewhat difficult, 19.7% said it was very difficult and 6.6%.

Descriptive Statistics of Outcome Measures

The mean median, standard deviation, minimum, maximum and interquartile range are presented in *Table 4* below for PTSD, depression and anxiety.

Table 4: Descriptive Statistics of Outcome Measures

Measure	Patient Health Questionnaire	General Anxiety Questionnaire	Impact of Events (IES-R)	Scale-Revised		
	PHQ-9	GAD	IES-R Total	INT	AVD	HYP
Mean	11.4	10.7	37.2	13.9	14.7	8.6
Median	12.0	11.0	37.0	14.0	14.0	9.0
Std. Deviation	4.9	4.3	14.1	5.8	5.6	3.8
Minimum	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	22.0	19.0	75.0	27.0	29.0	19.0
Interquartile Range	7.0	6.0	17.5	8.0	8.0	5.0

Correlation between Depression, Anxiety, and PTSD

Table 5 presents the Correlation between Depression, Anxiety, and PTSD. The Correlation

between PTSD and Depression scores was $r=0.688$; $p < 0.001$; PTSD and Anxiety scores were $r=0.759$; $p < 0.001$, Anxiety and Depression scores were $r=0.719$; $p < 0.001$.

Table 5: Correlation between Depression, Anxiety and PTSD

Pearson Correlation	1	2	3	4	5	6
1. PTSD	1					
2. Depression	0.688**	1				
3. Anxiety	0.759**	0.719**	1			
4. INT-IES-R subscale	0.955**	0.743**	0.756**	1		
5. AVD-IES-R subscale	0.928**	0.529**	0.670**	0.817**	1	
6. HYP-IES-R subscale	0.894**	0.647**	0.681**	0.822**	0.730**	1

Note: **Correlation is significant at the 0.01 level (2-tailed)

Bivariate Analysis

Table 6 presents the socio-demographic and other factors associated with depression (Bivariate analysis). Participants who were employed had

significantly higher depression scores as compared to those who were unemployed ($p=0.025$). Respondents who had unilateral amputation had significantly higher depression scores as compared to those who had bilateral ($p=0.022$).

Table 6: Socio-demographic and Other Factors Associated with Depression

Variable	Category	N	Mean (SD)	p-value
Sex [†]	Male	78	10.9 (5.1)	0.195
	Female	63	12.0 (4.6)	
Age Category [‡]	30 and below	27	10.1 (6.5)	0.140
	31-40 Years	35	12.3 (4.4)	
	41-50 Years	39	12.0 (4.2)	
	51-60 Years	20	12.0 (4.2)	
	Above 60	20	9.6 (4.7)	
Marital Status [‡]	Single	45	11.5 (5.7)	0.670
	Married	78	11.1 (4.5)	
	Divorced/Separated/Widowed	18	12.2 (4.3)	
Highest level of Education [‡]	Less than Primary School	41	11.4 (4.3)	0.578
	Primary School	29	10.4 (4.4)	
	Secondary/ High School	49	11.6 (5.6)	
	College/ University	21	12.3 (5.1)	
Employment Status [†]	Employed	97	12.0 (4.7)	0.025
	Un-Employed	43	10.0 (5.2)	
Monthly Income [‡]	No Income	43	10.0 (5.2)	0.061
	< 20,000 Ksh	58	11.6 (5.1)	
	20,000 and above	28	12.8 (4.1)	
Amputation Type [†]	Bilateral	10	8.0 (7.5)	0.022
	Unilateral	131	11.6 (4.6)	
Level of Amputation [†]	Above the Knee	42	12.1 (4.7)	0.254
	Below Knee	98	11.1 (5.0)	
Reason for Amputation [†]	Non-Vasculitis	113	11.4 (5.2)	0.980
	Vasculitis	27	11.4 (3.5)	
Underlying illness [†]	Yes	33	11.7 (3.4)	0.681
	No	108	11.3 (5.3)	
Experience pain at the amputation site [†]	Yes	17	11.5 (4.8)	0.505
	No	124	10.6(5.6)	

Note: [†]-Independent samples t-test; [‡]-One way analysis of variance-ANOVA

Table 7 presents a Bivariate analysis of the socio-demographic and other factors associated with anxiety. Female participants had significantly higher anxiety scores as compared to males (p=0.024).

Table 7: Socio-demographic and Other Factors Associated with Anxiety

Variable	Category	N	Mean (SD)	p-value
Sex [†]	Male	78	10.0 (4.5)	0.024
	Female	63	11.6 (3.9)	
Age Category [‡]	30 and below	27	10.4 (5.9)	0.957
	31-40 Years	35	11.1 (4.3)	
	41-50 Years	39	10.7 (3.4)	
	51-60 Years	20	10.9 (4.1)	
	Above 60	20	10.2 (4.1)	
Marital Status [‡]	Single	45	10.9 (5.5)	0.823
	Married	78	10.5 (3.7)	
	Divorced/Separated/Widowed	18	11.1 (3.9)	
Highest level of Education [‡]	Less than Primary School	41	10.7 (4.1)	0.915
	Primary School	29	10.2 (3.9)	
	Secondary/ High School	49	10.9 (4.5)	
	College/ University	21	11.0 (5.3)	
Employment Status [†]	Employed	97	11.0 (4.0)	0.154
	Un-Employed	43	9.9 (4.9)	
Monthly Income [‡]	No Income	43	9.9 (4.9)	0.340
	< 20,000 Ksh	58	11.1 (3.8)	
	20,000 and above	28	11.2 (4.8)	
Amputation Type [†]	Bilateral	10	8.3 (6.4)	0.068
	Unilateral	131	10.9 (4.1)	
Level of Amputation [†]	Above the Knee	42	11.0 (4.2)	0.641
	Below Knee	98	10.7 (4.4)	
Reason for Amputation [†]	Non-Vasculitis	113	11.4 (5.2)	0.980
	Vasculitis	27	11.4 (3.5)	
Underlying illness [†]	Yes	33	11.0 (2.7)	0.694
	No	108	10.6 (4.7)	
Experience pain at the amputation site [†]	Yes	17	10.7 (4.3)	0.908
	No	124	10.8 (4.7)	

Note: [†]-Independent samples t-test; [‡]-One way analysis of variance-ANOVA

Table 8 presents the socio-demographic and other factors associated with PTSD (Bivariate analysis). Respondents who had unilateral amputation had significantly higher PTSD scores as compared to those who had bilateral (p=0.034).

Table 8: Socio-demographic and Other Factors Associated with PTSD

Variable	Category	N	Mean (SD)	p-value
Sex [†]	Male	78	36.2 (15.)	0.348
	Female	63	38.5 (13.)	
Age Category [‡]	30 and below	27	38.1 (21.)	0.962
	31-40 Years	35	36.8 (13.)	
	41-50 Years	39	36.8 (11.)	
	51-60 Years	20	38.9 (9.4)	
	Above 60	20	36.0 (13.)	
Marital Status [‡]	Single	45	36.8 (18.)	0.822
	Married	78	37.0 (12.)	
	Divorced/Separated/Widowed	18	39.2 (8.9)	
Highest level of Education [‡]	Less than Primary School	41	34.6 (13.)	0.306
	Primary School	29	36.1 (15.)	
	Secondary/ High School	49	38.1 (13.)	
	College/ University	21	41.5 (16.)	
Employment Status [†]	Employed	97	37.5 (12.)	0.647
	Un-Employed	43	36.3 (17.)	
Monthly Income [‡]	No Income	43	36.3 (17.)	0.554
	< 20,000 Ksh	58	36.5 (13.)	
	20,000 and above	28	39.9 (13.)	
Amputation Type [†]	Bilateral	10	28.1 (22.)	0.034
	Unilateral	131	37.9 (13.)	
Level of Amputation [†]	Above the Knee	42	36.9 (14.)	0.840
	Below Knee	98	37.5 (14.)	
Reason for Amputation [†]	Non-Vasculitis	113	11.4 (5.2)	0.980
	Vasculitis	27	11.4 (3.5)	
Underlying illness [†]	Yes	33	38.4 (11.)	0.576
	No	108	36.8 (14.)	
Experience pain at the amputation site [†]	Yes	17	36.8 (13.)	0.378
	No	124	40.1 (16.)	

Note: [†]-Independent samples t-test; [‡]-One way analysis of variance-ANOVA

Multivariate Analysis

Table 9 presents the independent predictors of depression after adjusting for all other variables that were associated with anxiety at the bivariate level. Participants who were employed had significantly higher depression scores as compared to those who

were unemployed ($\beta = 1.33$; 95% C.I. 0.16 to 2.49; $p=0.030$). Participants who had higher scores of anxieties and PTSD had significantly higher depression scores ($\beta = -0.50$; 95% C.I. 0.31 to 0.69; $p < 0.001$) and ($\beta = -0.12$; 95% C.I. 0.06 to 0.17; $p < 0.001$) respectively.

Table 9: Independent Predictors of Depression

Variable	Category	β	S.E.	95% Confidence Interval		Sig.
				Lower	Upper	
Gender	Male	0.32	0.56	-0.78	1.41	0.57
	Female	Ref.				
Amputation Type	Bilateral	-1.13	1.05	-3.19	0.94	0.28
	Unilateral	Ref.				
Employment status	Employed	1.33	0.59	0.16	2.49	0.030
	Unemployed	Ref.				
Anxiety		0.50	0.10	0.31	0.69	<0.001
PTSD		0.12	0.03	0.06	0.17	<0.001

Table 10: presents the independent predictors of depression after adjusting for all other variables that were associated with PTSD at the bivariate level. Participants who had higher scores of anxieties and

depression had significantly higher PTSD scores ($\beta = -1.81$; 95% C.I. 1.32 to 2.29; $p < 0.001$) and ($\beta = -0.87$; 95% C.I. 0.44 to 1.30; $p < 0.001$) respectively.

Table 10: Independent Predictors of PTSD

Variable	Category	β	S.E.	95% Confidence Interval		Sig.
				Lower	Upper	
Gender	Male	1.29	1.53	-1.71	4.29	0.400
	Female	Ref.				
Amputation Type	Bilateral	-2.37	2.89	-8.03	3.29	0.412
	Unilateral	Ref.				
Employment status	Employed	-2.37	1.65	-5.60	0.86	0.150
	Unemployed	Ref.				
Anxiety		1.81	0.25	1.32	2.29	<0.001
Depression		0.87	0.22	0.44	1.30	<0.001

Note: †-Independent samples t-test; ‡-One way analysis of variance-ANOVA

DISCUSSION

Amputations are surgeries that mutilate and disrupt the patients' everyday lives. These procedures are also considered distasteful (Mosaku et al., 2009). Moreover, most of them are necessitated in developing countries following trauma and diseases, while amputations in more developed countries are considered for trauma, diabetes, and peripheral vascular disease (Onuminya et al., 2000). Findings from this study revealed that middle-aged men (mean age of 43.4 years) among the study participants have undergone amputation. This can be compared to a similar study done in Italy where the population had a mean age of 43.8 years (Falgares et al., 2019). However, this differs from most of the other studies, where most of the study participants were of the younger age group

(Vázquez et al., 2018; Padovani et al., 2015). Most of the participants were male in this study. This is similar to another study done in Ireland (Gallagher et al., 2011). Nevertheless, most studies have shown little disparity in regards to the clinical results of men and women in terms of psychological well-being following amputation.

At the bivariate level, female participants had significantly higher anxiety scores as compared to males at ($p=0.024$). Similarly, a study done in Jordan showed that 44% of females had anxiety compared to 36% of males (Hawamdeh et al., 2008). Non-vasculitis causes accounted for the majority (80.7%) of amputations. Trauma was postulated to be the common cause of amputations in more than 50% of cases, with a significant percentage being as a result of road traffic accidents as earlier reported (Ogeng'O et al., 2009). This may

be used to explain why anxiety, depression, and Post Traumatic Stress Disorder (PTSD) were reported to be higher in this population than in others (Vázquez et al., 2018; Sahu et al., 2017).

Our study found that while adjusting for gender and amputation type, employment was a risk factor for depression and was also highly associated with anxiety and PTSD. We included factors such as gender, amputation type, and employment status in our final model due to the reported increased risk of loss of functionality for male participants as they may be breadwinners for their families, and thus amputations significantly affect their employability based on their severity (Washington, 2013). It is also consistent that people who experience amputation-related motor skills loss tend to make them more susceptible to adverse reactions (Physiopedia, 2018). Most of the participants reported stigma at the workplace that affected their emotional well-being. In this study, no association was reported between the demographic parameters such as age, marital status, income, level of amputation, the reason for amputation, pain at the amputation site, and depression. Similarly, another study did not find a correlation between age, gender, level of amputation and, aetiology of amputation with development of psychiatric morbidity (Singh et al., 2009). On the contrary, a study in Malaysia found that factors such as being young, single, having low literacy levels, going through bilateral side amputation, experiencing trauma associated with the amputation, inability to get a prosthesis to aid in walking, shorter amputation duration, absence of medical comorbidity that could have necessitated the amputation, a wanting social support system, and poor quality of life were correlated to the prevalence of depression (Iqbal et al., 2019).

The findings of this study revealed that a high proportion of individuals who undergo amputation suffered from anxiety, depression, and PTSD. The observed rates of psychiatric morbidity where two-thirds of the patients reported PTSD with more than three-quarters of patients being diagnosed with depression and anxiety is alarming. This finding is not distant from what other previous studies have found where researchers reported depression as a highly prevalent psychiatric comorbid condition in amputees, ranging between 13% and 32%. According to a study done by Vázquez et al. (2018),

depression prevalence among amputees in Mexico was reported to be as high as 92.5% which is comparable to what has been found in this study though the sample size was smaller compared to this study by 40. Amputees may present depressive symptoms (Cavanagh et al., 2006; Phelps et al., 2008). Moreover, it has been shown that the presence of depressive symptoms may be linked to an array of debilitating outcomes like increased pain intensity, restriction of activity, self-consciousness, body image associated anxiety, and a significantly reduced quality of life (Asano et al., 2008; Hanley et al., 2004).

Some studies propose that between 15% and 26% of persons with limb loss might experience PTSD (Phelps et al., 2008). In another study from Kashmir Valley, researchers reported the occurrence of psychiatric comorbidity in people with traumatic amputation from PTSD prevalence to be at 20% (Muzaffa et al., 2012). This prevalence differs to what was found in this study since trauma accounted for more than fifty percent of the reason for the amputations. The causes for the elevated PTSD prevalence can be related to the amputation itself, or the incident that led to the amputation, or a mixture of both factors (Marqoob et al., 2008). Moreover, there was a significant correlation between depression, anxiety, and PTSD such that participants who had higher scores on anxiety and depression had significantly higher PTSD scores and vice versa. A study done to provide conclusive information concerning the psychological distress among amputees in India established that a considerable number of people who undergo an amputation tend to develop psychological distress and psychiatric disorders (Sahu et al., 2017).

CONCLUSION

In summary, depression, anxiety, and PTSD are very common psychological reactions in patients who have undergone amputation. We expected that some of the sociodemographic factors and some amputation-related characteristics would have had a relation with psychiatric comorbidity, but the findings of this study did not show any such relationship except relation between PTSD, depression, and anxiety.

Recommendations

- There is a need to lay down hospital policies that screen for mental illness in patients undergoing amputations.
- Early psychological assessment and interventions after amputations will help prevent psychological illnesses.
- Given the high level of depression, anxiety, and PTSD among amputees, the surgical treatment providers need to liaise with psychiatrists and psychologists so that a comprehensive psychological evaluation can be done when required, and treatment of psychiatric disorders if identified can be initiated. Hence necessary steps to identify and manage psychiatric illness in amputees be initiated in clinical settings.
- Implementation of stringent road safety regulations would be a feasible control measure.
- Employers need to make work-related adjustments for employees with disabilities such as accessible lifts and ramps.

Strengths and Limitations of the Study

The strengths of the study include a relatively large number of amputees, and the use of a structured interview scale adds to the study's strengths. There are few important limitations of the current study that need to be mentioned and addressed in future studies, i.e., poor representation of the female gender, short duration of amputation history, and lack of control group (nontraumatic amputation cases).

Data collection took place amid the Covid-19 pandemic, which has greatly contributed to the high prevalence rate. The pandemic has significant social, economic, and cultural impacts on people's lives. Measures that were taken to combat the pandemic affected day-to-day activities. Containment measures like lockdowns that were imposed by the government, to mitigate Covid-19 spread were not conducive to production and processing industries and hence some of the workers were dismissed, [26]. For the majority of amputees, transport fees had to be sent through

mobile money transfer to facilitate the fixing of the prosthesis.

ACKNOWLEDGEMENT

We would like to thank the staff of Jaipur Foot Trust who gave us the opportunity to collect data at their institution, special thanks also to all the participants who consented to participate in the study.

REFERENCES

- Arias Vázquez, P. I., Castillo Avila, R. G., Dominguez Zentella, M., Hernández-Díaz, Y., González-Castro, T. B., Tovilla-Zárate, C. A., Juárez-Rojop, I. E., López-Narváez, M. L., & Fréсан, A. (2018). Prevalence and correlations between suicide attempt, depression, substance use, and functionality among patients with limb amputations. *International Journal of Rehabilitation Research*, 41(1), 52–56. <https://doi.org/10.1097/MRR.0000000000000259>
- Asano, M., Rushton, P., Miller, W. C., & Deathe, B. A. (2008). Predictors of quality of life among individuals who have a lower limb amputation. *Prosthetics and Orthotics International*, 32(2), 231–243. <https://doi.org/10.1080/03093640802024955>
- Baby, S., Chaudhury, S., & Walia, T. S. (2018). Evaluation of treatment of psychiatric morbidity among limb amputees. *Industrial Psychiatry Journal*, 27(2), 240.
- Cavanagh, S. R., Shin, L. M., Karamouz, N., & Rauch, S. L. (2006). Psychiatric and emotional sequelae of surgical amputation. *Psychosomatics*, 47(6), 459–464. <https://doi.org/10.1176/appi.psy.47.6.459>
- Cochran, W. G. (1977). *Sampling Techniques*. New York: John Wiley & Sons, Inc.
- Desmond, D., Gallagher, P., Henderson-Slater, D., & Chatfield, R. (2008). Pain and psychosocial adjustment to lower limb amputation amongst prosthesis users. *Prosthetics and Orthotics International*, 32(2), 244–252. <https://doi.org/10.1080/03093640802067046>

- Falgares, G., Lo Gioco, A., Verrocchio, M. C., & Marchetti, D. (2019). Anxiety and depression among adult amputees: the role of attachment insecurity, coping strategies, and social support. *Psychology, Health & Medicine*, *24*(3), 281–293. <https://doi.org/10.1080/13548506.2018.1529324>
- Gallagher, P., O'Donovan, M. A., Doyle, A., & Desmond, D. (2011). Environmental barriers, activity limitations, and participation restrictions experienced by people with major limb amputation. *Prosthetics and Orthotics International*, *35*(3), 278–284. <https://doi.org/10.1177/0309364611407108>
- Halilu, S., Iliyasu, G., Hamza, M., Chippaux, J. P., Kuznik, A., & Habib, A. G. (2019). Snakebite burden in Sub-Saharan Africa: estimates from 41 countries. *Toxicon*, *159*, 1–4. <https://doi.org/10.1016/j.toxicon.2018.12.002>
- Hanley, M. A., Jensen, M. P., Ehde, D. M., Hoffman, A. J., Patterson, D. R., & Robinson, L. R. (2004). Psychosocial predictors of long-term adjustment to lower-limb amputation and phantom limb pain. *Disability and Rehabilitation*, *26*(14–15), 882–893. <https://doi.org/10.1080/09638280410001708896>
- Hawamdeh, Z. M., Othman, Y. S., & Ibrahim, A. I. (2008). Assessment of anxiety and depression after lower limb amputation in Jordanian patients. *Neuropsychiatric Disease and Treatment*, *4*(3), 627.
- Iqbal, M., Mohamed, S., & Mohamad, M. (2019). Depression and its associated factors among lower limb amputees at Hospital Kuala Lumpur and Hospital Sultanah Bahiyah: A Cross Sectional Study. *Journal of Depress Anxiety*, *8*(338), 2.
- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606–613.
- Marqoob, M. A., Khan, A. Y., Majid, A., Mansur, I., Gani, N., Farooq, M., Mushtaq, H., Nehra, D., & Jeelani, H. (2008). Prevalence of post-traumatic stress disorder after amputation: A Preliminary Study from Kashmir. *JK Pract*, *15*, 5–7.
- Mosaku, K. S., Akinyoola, A. L., Fatoye, F. O., & Adegbehingbe, O. O. (2009a). Psychological reactions to amputation in a sample of Nigerian amputees. *General Hospital Psychiatry*, *31*(1), 20–24. <https://doi.org/10.1016/j.genhosppsy.2008.08.004>
- Muzaffar, N., Mansoor, I., Hafeez, A., & Margoob, M. (2012). Psychiatric comorbidity in amputees with average sociodemographic status and the role of theologic and family support in a conflict zone. *Australasian Journal of Disaster and Trauma Studies*, *2012*(1), 31–38.
- O'Donnell, M. L., Creamer, M., Elliott, P., Atkin, C., & Kossman, T. (2005). Determinants of quality of life and role-related disability after injury: impact of acute psychological responses. *Journal of Trauma and Acute Care Surgery*, *59*(6), 1328–1335.
- Ogeng'O, J. A., Obimbo, M. M., & King'ori, J. (2009). A pattern of limb amputation in a Kenyan rural hospital. *International Orthopaedics*, *33*(5), 1449–1453. <https://doi.org/10.1007/s00264-009-0810-5>
- Onuminya, J. E., Obekpa, P. O., Ihezue, H. C., Ukegbu, N. D., & Onabowale, B. O. (2000). Major amputations in Nigeria: A plea to educate traditional bonesetters. *Tropical Doctor*, *30*(3), 133–135. <https://doi.org/10.1177/004947550003000306>
- Padovani, M. T., Martins, M. R. I., Venâncio, A., & Forni, J. E. N. (2015). Anxiety, depression and quality of life in individuals with phantom limb pain. *Acta Ortopedica Brasileira*, *23*(2), 107–110. <https://doi.org/10.1590/1413-78522015230200990>
- Phelps, L. F., Williams, R. M., Raichle, K. A., Turner, A. P., & Ehde, D. M. (2008). The Importance of Cognitive Processing to Adjustment in the 1st Year Following Amputation. *Rehabilitation Psychology*, *53*(1), 28–38. <https://doi.org/10.1037/0090-5550.53.1.28>

Physiopedia. (2018). *Emotional and Psychological Reactions to Amputation*. Physiopedia. https://www.physiopedia.com/Emotional_and_Psychological_Reactions_to_Amputation

Sahu, A., Gupta, R., Sagar, S., Kumar, M., & Sagar, R. (2017). A study of psychiatric comorbidity after traumatic limb amputation: A neglected entity. *Industrial Psychiatry Journal*, 26(2), 228. https://doi.org/10.4103/ipj.ipj_80_16

Singh, R., Ripley, D., Pentland, B., Todd, I., Hunter, J., Hutton, L., & Philip, A. (2009). Depression and anxiety symptoms after lower limb amputation: The rise and fall. *Clinical Rehabilitation*, 23(3), 281–286. <https://doi.org/10.1177/0269215508094710>

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of internal medicine*, 166(10), 1092-1097.

Suleiman, M. A. (2020). Assessing the Economic Security Impacts of Covid-19 Pandemic: Key Responses and Challenges in Kenya.

Washington, J. (2013). The Relations among Psychological and Demographic Factors in Individuals with Lower Limb Amputation. *Senior Theses and Projects*. <https://digitalrepository.trincoll.edu/theses/337>

Weiss, D. S. (2007). The impact of event scale: revised. In *Cross-cultural assessment of psychological trauma and PTSD* (pp. 219-238). Springer, Boston, MA.

Whoqol Group. (1995). The World Health Organization quality of life assessment (WHOQOL): Position paper from the World Health Organization. *Social science & medicine*, 41(10), 1403- 1409. [https://doi.org/10.1016/0277-9536\(95\)00112-K](https://doi.org/10.1016/0277-9536(95)00112-K)