

Influence of amputation type on activity limitation, participation restriction and quality of life among amputees in Kano, Nigeria

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Abstract

Background: Involvement of amputees in societal activities such as sports, recreation, cultural activities and employment will not only reduce stigmatization but also enhance their wellbeing and longevity. However, it is not known whether the type of amputation may influence activity limitation, participation restriction and quality of life of amputees in Kano.

Objective: This study aimed to assess the influence of amputation type on activity limitation, participation restriction and quality of life of amputees in Kano.

Methods: A cross-sectional survey design with 100 participants recruited and assessed was used. Outcome measures used included the Groningen activity restriction scale (GARS) to assess activity limitation, the participation scale (P-scale) to assess participation restriction and the short form health status survey (SF- 12) to assess quality of life of respondents.

Frequency and percentage distribution were used to analyse the descriptive variables, while linear regression was applied to assess the influence of amputation type on activity limitation, participation restriction and quality of life of amputees at $\alpha = 0.05$.

Results: The majority of participants belonged to the age category of 26-39 years (34.4%) and 40-60 years (32.2%) with the mean age of 41.53 ± 15.17 years. The study population included 62.2% of males and 37.8% of females. Above knee amputation (AKA) was most commonly performed (54.4%). The results showed that the amputation type had a significant effect on participation restriction ($B = -0.185$, $p < 0.05$) without any influence on activity limitation and quality of life ($p > 0.05$).

Conclusion: The type of amputation has significant influence on participation restriction yet does not limit the individual's performance in the society and does not affect their self-image and self-esteem.

Keywords: activity limitation, participation restriction, amputation type, quality of life.

Introduction

Amputation is one of the most ancient of all surgical procedures with a history of more than 2500 years, dating back to the time of Hippocrates [1]. It is defined as surgical or spontaneous, partial or complete removal of a limb or a projecting body part covered by skin [2]. Amputation is a common procedure in orthopaedics and trauma practice and is often associated with profound physical, economic, social and psychological effects on patients and their families., leading to activity limitation (AL),

participation restriction (PR) and reduced quality of life (QoL), thereby making reintegration to the society much more difficult or impossible [3]. Individuals with amputations comprise a diverse clinical population, with significant heterogeneity observed in the level, cause, gender, and age distribution, as well as the degree of disability, both physical and psychosocial [4]. Accordingly, amputation may be unilateral, involving a single limb, or bilateral, involving both of the limbs, and can be performed at a minor or major level [5].

A number of factors such as diabetic complications (neuropathic and ischemic foets), peripheral vascular diseases (PVD), trauma, infection, malignancy and congenital lower limb defects were reported as the commonest causes of limb amputation [6, 7]. Other causes include burns, rhabdomyolysis and cellulitis [8]. Moreover, traditional bone setter's interventions contribute to some percentage of amputation cases in developing African countries [9, 10].

The global incidence of amputation is unknown and the available data show considerable inter-country variations. In Madrid, Spain the prevalence is 0.5 per 100,000 women and 2.8 per 100,000 men while in the Navajo region of the United States - 22.4 per 100,000 women and 43.9 per 100,000 men [11,12]. According to the National Health Interview Survey on Disability (1995), the overall prevalence of amputation in the USA is 0.07 per 100,000 population. Similarly, epidemiologic data from Nigeria reveal the incidence and amputation trends in the population. According to Onuba & Udoidoik [13], amputations account for 0.38% of all orthopaedic surgeries in Lagos, Southwest Nigeria, while in Kano, Northwest Nigeria, the cases of amputation increase by 75% over five years; the majority of them are lower limb amputations [14]. Generally, the estimated prevalence of lower limb amputations in Nigeria is 1.6 per 100,000 individuals [15].

The International Classification of Functioning, Disability and Health [16] defines activity limitation as difficulties an individual may experience in executing activity and participation restriction as a problem an individual may encounter while involving in life situations. Disability in the amputees may arise due to activity limitations and restrictions placed upon participation that grow out of the interactions between body structure, function limitations and an unaccommodating

environment. Individuals with amputations have been reported to feel constrained in their performance of daily activities and in their social life such as relationships, education and community involvement [16].

Limb amputation results in a wide range of outcomes, including poor physical function, physical role performance, social function, vitality, general health, and more pain compared to population norms [17]. Everyday competence tends to decrease with age for both males and females following amputations but males usually have better physical function than females [17]. Moreover, individuals with the following features are predominantly not able to live independently in their homes after amputations: the age >70, a high anatomical level of amputation, dementia or preoperative homebound ambulatory status [18]. Additionally, amputation may impact negatively on mobility, emotions, sleep, pain and social functions. Patients with lower limb amputations experience problems with activities of daily living including household chores, hobbies and social relationships [18]. Some can be mobile around their home while others may require a walking aid or use a wheelchair, which may result in an inability to leave home (homebound) even with assistance, thus affecting negatively their involvement in social activities.

Mobility and daily living are important elements of Health-Related Quality of Life (HRQOL). Therefore, declining mobility may have a greater negative impact on HRQOL than any other distinct disease conditions [19]. Whether the amputation type affects activity limitation, participation restriction and quality of life of amputees in Kano has not been determined yet.. Therefore, the aim of this study was to assess activity limitations and participation restrictions among amputee survivors in Kano.

Materials and methods

A cross sectional observational survey design was employed for the study, which recruited and assessed 100 participants. Outcome measures used included the Groningen activity restriction scale (GARS) to assess activity limitation, the participation scale (P-scale) to assess participation restriction and short form health status survey (SF-12) to assess quality of life of respondents.

Frequency and percentage distribution were used to analyse the descriptive variables; linear regression was applied to assess the influence of amputation type on activity limitation, participation restriction and quality of life of amputees at $\alpha = 0.05$.

Results

The majority of participants belonged to age category 26-39 (34.4%) and 40-60 (32.2%) with the mean age of 41.53 ± 15.17 years. Male participants constituted 62.2% and female participants 37.8% of the study population. The majority of participants underwent AKA (54.4%) while 8.9% had upper extremity amputation (UEA) (Table 1)

The table 2 revealed the distribution of activity limitation, participation restriction and quality

Table 1. Descriptive statistics of the studied variables

Variables	n (%)
AGE (years)	
18-25	14 (15.6)
26-39	31 (34.4)
40-60	29 (32.2)
>60	16 (17.8)
GENDER	
Male	56 (62.2)
Female	34 (37.8)
Amputation types	
Above knee	49 (54.4)
Below knee	33 (36.7)
Upper limb	8 (8.9)
Activity limitation	
No	4 (4.4)
Mild	36 (40)
Moderate	45 (50)
Severe	5 (5.6)
Participation restriction	
Mild	9 (10)
Moderate	59 (65.6)
Severe	22 (24.4)
QoL	
Good	36 (40)
Poor	54 (60)

of life across amputation type, age and gender of participants.

Most of the participants had mild to moderate activity limitation, participation restriction and reduced quality of life. The participants

Table 2. Descriptive statistics of the variables in relation to activity limitation, participation restriction and quality of life.

Variables	Activity limitations				Participation restrictions			Quality of life	
	NO	Mild	Moderate	Severe	Mild	Moderate	Severe	Poor	Good
Age									
18-25	1(25)	10(27.8)	2(4.4)	1(20)	3(13.3)	10(16.9)	1(4.5)	3(5.5)	11(30.6)
26-39	1(25)	18(50)	12(26.7)	0	6(6.6)	21(35.6)	4(18.2)	15(27.8)	16(44.4)
40-60	2(50)	4(11.1)	22(48.9)	1(20)	0	19(32.2)	10(45.5)	22(40.7)	7(19.4)
>60	0	4(11.1)	9(20)	3(60)	0	9(15.3)	7(31.8)	14(25.9)	2(5.6)
Total	4	36	45	5	9	59	22	54	36
Gender									
Male	2(50)	23(63.9)	27(60)	4(80)	6(66.7)	34(57.6)	16(72.7)	33(61.1)	23(63.9)
Female	2(50)	13(36.1)	18(40)	1(20)	3(33.3)	25(42.4)	6(27.3)	21(38.9)	13(36.1)
Total	4	36	45	5	9	59	22	54	36
Amp type									
AKA	2(50)	18(50)	26(57.8)	3(60)	3(33.3)	31(52.5)	15(68.2)	26(48.1)	23(63.9)
BKA	2(50)	12(33.3)	17(37.8)	2(40)	3(33.3)	25(42.4)	5(22.7)	26(48.1)	7(19.4)
UEA	0	6(16.7)	2(4.4)	0	3(33.3)	3(5.1)	2(9.1)	2(3.7)	7(19.4)
Total	4	36	45	5	9	59	22	54	36

aged 40-60 years showed the highest activity limitation and participation restriction, 48.9% and 32.2%, respectively. The male participants were characterised by more activity limitation and participation restriction compared with the female participants. In addition, most of the participants had AKA with moderate activity limitation and participation restriction and poor QoL (75.6% and 61.0% of activity limitation and participation restriction, respectively).

Linear regression was used to assess the influence of amputation type on activity limitation, participation restriction and quality of life of amputees in Kano (Table 3). Preliminary analyses were conducted to ensure no violation of assumptions of normality, linearity, multi co-linearity and homoscedasticity. In the models, the amputation type was found to have significant influence on participation restriction (beta= -0.185) without any influence on activity limitation and quality of life (beta= -0.124 for AL, beta=0.016 for QoL $P > 0.05$).

Discussion

Amputation is one of the commonest problems in the present society. Individuals with amputations have to adapt to several losses and changes in their lifestyle, social interactions, and identity [20], which can result in activity limitations, participation restrictions and reduced quality of life. Therefore, the current study was aimed to assess the influence of amputation type on activity limitations, participation restrictions and quality of life among amputees in Kano.

In our study, the mean age for amputation was 41.3 years, which is comparable to other studies revealing that the majority of participants are 14-65 years of age (mean age: 33.29 years) with the younger age group commonly affected [21]; this is contrary to the findings reported by Marzen-Groller and Bartman [22], demonstrating that the majority (75%) of amputations occur in individuals aged more than 65 years.

In our study, males constituted 62.2% and females 37.8% of participants. The following types of amputations were performed: AKA (54.4%), BKA (36.7%) and UEA (8.9%). This supports the findings of the previous studies revealing that lower limb amputations, mostly AKAs were more common among males than females [23,24,25]. Moreover, according to the Global Lower Extremity Study [13], the incidence of amputations, predominantly lower limb amputations, is similar in females and males in some regions and higher in females compared to males in other regions although the overall incidence is higher in males compared to females.

Furthermore, our findings demonstrated that the majority (91.1%) of amputations involved lower extremities, which is similar to the findings of the previous study in Nigeria [15]. Likewise, according to the National Amputee Statistical Database [26], lower limb amputation is significantly more common than upper limb amputation.

In this study, participants in the age group of 40-60 and above 60 years had higher levels of activity limitations, participation restrictions and reduced

Table 3. Influence of amputation type and socio-demographic characteristics on activity limitation, participation restriction and quality of life of amputees.

Predictor	Outcome	Beta	R	R ²	Adjusted		
					R ²	95% CI	P value
Amputation Type	AL	-0.124	0.122 ^a	0.015	0.004	-0.339 to 0.091	0.254
	PR	-0.185	0.121 ^a	0.045	0.034	-0.365 to -0.004	0.045*
	QoL	0.016	0.021 ^a	0.000	-0.011	-0.143 to -0.175	0.845

AL -activity limitation, PR- participation restriction, QoL- quality of life

quality of life as compared to the group aged 18-25 years; i.e. 48.9%, 35.6% and 66.6% of individuals aged 40-60 years had moderate activity limitation, participation restriction and reduced quality of life, as compared to 4.4%, 15.3% and 5.5% in the 18-25-year-old group. The above findings might be due to the fact that older individuals have reduced muscle strength, endurance, stamina, abilities to cope with stress, flexibility, balance and range of joint motion, which can affect the level of activity and participation, as compared to the younger age group. Similar results were reported in the previous study [27], which has demonstrated that the majority of amputated patients aged ≥ 60 had declined levels of activity and participation. Moreover, the sample size of the study differs descriptively across the different age categories in which the participants in adult age group have highest number as compared to the rest of the participants.

Activity limitation, participation restriction and quality of life also differ descriptively across the gender of participants. Most of the participants were males with moderate activity limitation, participation restriction and reduced quality of life (60%, 57.6% and 61.1%, respectively), as compared with their female counterpart (40%, 42.4% and 38.9%, respectively). Moreover, 72.7% of male participants aged 40 years and above were found to have severe participation restrictions, as compared to 27.3% of female participants. This might be as a result of the variation in their numbers in the sample population.

Our findings demonstrated that the amputation type statistically significantly affected participation restrictions, which is likely to be due to the fact that the level of amputation is an important predictor of functional outcome; above-knee amputations result in greater physical impairment [28] and increased energy expenditure when using a prosthesis. The effects of amputation type on participation restrictions in amputees

may be due to decreased speed, reduced range of hip and knee motion, poor vertical ground reaction force, increased amplitude and periods of muscle activation, short single support on the stance limb (amputated), stance instability and decreased proprioception. Furthermore, stump complications, such as open areas, sinus and bone infections, exostoses, dermatitis, and oedema with suspected underlying pathology, soft tissue lesions, necrosis, neuroma, contractures and a phantom limb may also compromise physical well-being and thus have a negative impact on functioning and participation [29].

Conclusion

The amputation type has significant effects on participation restrictions, which could limit the individual's performance in the society and affect their self-image as well as self-esteem, without any influence on activity limitations and quality of life.

Conflicts of interest: The authors declare no conflicts of interest.

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