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RESEARCH ARTICLE

A 13-YEAR REVIEW OF CASES OF LIMB AMPUTATION MANAGED IN OBAFEMI AWOLOWO UNIVERSITY TEACHING HOSPITALS' COMPLEX, ILE-IFE

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ABSTRACT

Limb amputation is a life-changing event that signifies long-term physical, social, psychological, and environmental changes. Various studies have described different indications as the leading cause of amputation in different parts of this country but there is paucity of literature revealing the incidence and pattern of limb amputation in Obafemi Awolowo University Teaching Hospital Complex (OAUTHC), Ile-Ife especially in the last thirteen years, hence the impetus for this study. Case notes of patients who had undergone limb amputation and hospitalized at Obafemi Awolowo University Teaching Hospitals' Complex between January 2002 and December 2014 were reviewed and relevant data such as age, sex, occupation, type of amputation, level of amputation, indication for amputation, date of admission, date of discharge, status at the time of discharge, referral for physiotherapy on the ward and physiotherapy treatment on ward were retrieved. The data was analysed using Statistical Package for Social Sciences (SPSS) and summarized using descriptive statistics. A total of 132 patients had limb amputation. The prevalence of amputation among all orthopaedic surgeries within the period was 6.4%. The age range of patients who underwent amputation was between 1 month to 90 years with a mean of 39.87 ± 20.82years and a mean duration of hospitalization of 54.12 ± 38.41 days while the mortality rate was 14.4%. The male to female ratio was 2.3:1. Road traffic accident was the most common indication for amputation with 50 (37.9%) cases followed by diabetes with 31.1% cases. Below knee amputation was the most common level of amputation (41.7%). Fifty-nine (44.7%) patients were referred for physiotherapy on the ward although, they were all lower limb amputees. In conclusion, there was a low prevalence of limb amputation in this study with road traffic accident/trauma being a leading cause.

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INTRODUCTION

Limb amputation is a life-changing event that signifies long-term physical, social, psychological and environmental changes (Horgan & MacLachlan, 2004). Adjustment to disability is not based solely on the degree of impairment but is also impacted by psychological and psychosocial factors (Horgan & MacLachlan, 2004). Psychological sequelae demonstrate an important role in determining the quality of life (QOL) and level of disability (Donnell, *et al*., 2005). An important indicator of subjective well-being after amputation is the ability of an individual to perform daily activities and regain independence (Bosmans *et al*., 2007) which is one if the major cause of permanent disability. Amputation can often be associated with anxiety, isolation and depression that may change the social and free time activities of the person with limb amputation (Sarah *et al*., 2015). Trauma has been the major indication for limb amputation in almost all studies emanating from the different parts of Nigeria (Abbas & Musa, 2007). Amputation could be described as the removal of a body extremity by surgery or trauma. (Mifflin 2002). If amputation is taken as a surgical measure, it is used to control pain or disease process in the affected limb (Wald & Alvaro, 2004). Amputation is one of the most common acquired disabilities (Rybarczyk *et al*., 2004). Amputation can involve either the upper or lower limb and occurs at a variety of levels. Lower limb amputation may be unilateral, involving a single limb, or bilateral, involving both lower limbs, and can be performed at a minor or major level (Salwa & Amany, 2014). Many researchers stress the importance of the arms and hands (Salwa & Amany, 2014). Rybarczyk & Behel (2008) write that "arm and hand amputations appear to entail qualitatively different experiences than lower limb amputations for several reasons." These researchers highlight the vast importance of the arm and the hand for activities such as cooking and holding and for nonverbal communication such as gesturing and physical contact (Salwa & Amany, 2014). There are many potential causes of amputation; the four primary etiological factors necessitating this procedure are vascular disease and infection, trauma, tumours, and congenital abnormalities

(Rybarczyk *et al*., 2000). Dysvascularity resulting from cardiovascular disease (CVD) and/or diabetes mellitus is the foremost cause of amputation in most developed countries, followed by trauma (Ziegler-Graham *et al*., 2008). Limb amputation is considered the last resort when limb salvage is impossible or when the limb is dead or dying, viable but nonfunctional or endangering the patient's life (Paudel *et al*., 2005). The loss of a limb by any individual, especially in developing countries where theprosthetic services are poor often has profound economic, social and psychological effects on the patient and their family (Essoh *et al*., 2007; Nwankwo & Katchy, 2004; Onuminya *et al*., 2000; Yinusa & Ugbeye, 2003). Major limb amputations are essentially disfiguring operations that carry a fairly high perioperative mortality and morbidity and persons who have undergone amputations are often viewed as incomplete individuals (Masood *et al*., 2008). The incidences of different pathologies leading to limb amputation have been reported to vary from one place to the other. An ancient surgical procedure, amputation retains its relevance in modern time to save life or remove a dead or useless limb. The physical disability that is associated with the procedure has been mitigated by sophisticated modern prosthetic technology, which sadly is poorly available and often non-affordable in developing countries (Ajibade *et al*., 2013). Knowledge of indications and complications of amputation is helpful in instituting preventive strategies. Indications for amputation vary between and within countries (Akinyoola *et al*., 2006; Banza *et al*., 2009). In the Western world, peripheral vascular disease is the commonest indication for amputation (Gregory-Dean, 1991). In Nigeria, however, trauma and traditional bone setter (TBS) gangrene were reported as the leading indications in the time past (Kidmas *et al*., 2004; Onuminya *et al*., 2000; Ekere, 2003; Umaru *et al*., 2004). Temporal change in indications also occurs (Abbas & Musa, 2007). Complications of amputation may involve the skin, muscle, artery, nerve, joint or bone which may interfere with proper use of prosthesis (Ajibade *et al*., 2013).

Older age is associated with higher levels of amputation reflecting the progression of vascular disease with advancing age. The risk of losing the contralateral limb following unilateral amputation ranges from 15-20% in the first two years after the initial procedure and rises to 40% by four years post-amputation (Cutson & Bongiorni, 1996), patients with amputation secondary to diabetes have elevated morbidity (Schofield *et al*., 2006).

The patient's overall health status complicates the challenge of amputation rehabilitation. Indications for amputation in children differ from those in adults (Paudel *et al*., 2005) and vary between and within countries (Akinyoola *et al*., 2006; Banza *et al*., 2009). In Africa, most studies on amputation have been performed in Nigeria on adults (Thanni & Tade, 2007), and little published data exist on children. Child amputees have fewer complications, better outcomes (Yinusa & Ugbeye, 2003), are more likely to be successfully rehabilitated compared with the adults, and a large number will adapt well to their prostheses (Boonstra *et al*., 2000; Kuyper *et al*., 2001). Although retrospective studies have been done in the past on amputation but not much work have been done in recent time on the retrospective study to know the incidence and pattern of limb amputation in Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, hence the impetus for my study.

MATERIAL AND METHODS

SUBJECTS: The case notes of all patients who had undergone either upper or lower amputation and hospitalized between January 2002 and December 2014 was used for the study.

SITE OF STUDY: The study was conducted at Obafemi Awolowo University Teaching Hospital Complex (OAUTHC) situated at Ile-Ife, Osun State, Nigeria.

INCLUSION CRITERIA: Case notes of patients who had undergone either upper or lower limb amputation and hospitalized at Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife between January 2002 and December 2014 will be included in the study.

EXCLUSION CRITERIA: Case notes of patients who had undergone any other form of amputation other than limb amputation will be excluded from the study.

RESEARCH DESIGN: A retrospective study.

PROCEDURE: The study was a thirteen-year retrospective hospital-based study which was carried out at Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, a teaching hospital in the western part of Nigeria. Ethical approval for this study was sought and obtained from the Obafemi Awolowo University Teaching Hospitals' complex Ethics and research committee, Clinical Services and Training before the commencement of data collection. Also, a letter of introduction was collected from the Department of Medical Rehabilitation to the Head, Medical Records department, Obafemi Awolowo University Teaching Hospital Complex (OAUTHC) Ile-Ife. In this letter, the field of study was stated to facilitate the retrieval of cards and case notes within the period under review i.e. January 2002 to December 2014. The total number and the hospital number of patients who had undergone either upper or lower limb amputation over a period of thirteen years (January 2002 to December 2014) was obtained from the Medical Records department of the hospital while the individual case notes were obtained from the MedicalRecords Library. Thereafter, the case notes were scrutinized, and relevant information were retrieved. In order to facilitate data collection, a proforma which contains the following items was used:

Patient's initials, hospital number, age, sex, occupation, type of amputation, level of amputation, indication for amputation, date of admission, date of operation, status at the time of discharge, referral for physiotherapy on the ward and physiotherapy treatment on ward. Over the period of review (January 2002 till December 2014), patients' case notes were classified into groups according to the year of amputation. These years were categorized based on the aforementioned proforma. The resulting data were organized, and various aspects of the data were tabulated.

DATA ANALYSIS: The data was analysed using Statistical Package for Social Sciences (SPSS) and summarizedusing descriptive statistics of mean, frequency distribution range and percentages.

RESULTS

MEAN AGE AND DURATION OF HOSPITALIZATION: Presented in table 1 is the mean age and duration of hospitalization of patients. The mean age of the patients for the year 2002 was 18.42±26.64 years and the mean duration of hospitalization was 35.33±14.01 days. The mean age of the patients for the year 2007 was 54.00±17.39 years and the mean duration of hospitalization was 39.66±21.43 days. Also, the mean age of the patients for the year 2014 was 45.60±24.28 years and the mean duration of hospitalization was 48.40±39.10 days.

AGE GROUP DISTRIBUTION: Presented in table 2 is the age group distribution of patients. The ages of the patient range from 1 month to 90 years and the peak age was 21-30 years with a total number of 34 (25.8%) patients. This was followed by the age range of 31-40 years with a total of 18 (13.6%) patients and then closely followed by 41-50 years range with a total of 17 (12.9%) patients. Majority of the patients, 121 (91.7%) were aged above 11 years of age. The lowest incidence was recorded among the 81-90 years group which had only 3 cases.

Table 1. Mean Age And Duration Of Hospitalization According To Year

Years	Age (Mean) in years	Duration of Hospitalization (Mean) in days
2002	18.42±26.64	35.33±14.01
2003	35.71±24.47	52.71±28.40
2004	45.66±14.01	57.33±26.08
2005	33.41±19.35	73.75±74.25
2006	46.84±20.71	72.15±50.66
2007	54.00±17.39	39.66±21.43
2008	41.30±26.27	49.92±29.72
2009	34.66±16.37	70.55±44.28
2010	41.73±23.75	67.13±68.86
2011	34.76±24.72	37.50±26.82
2012	45.44±16.64	53.66±56.75
2013	40.75±16.04	45.50±19.03
2014	45.60±24.28	48.40±39.10

Table 2. Age Disrtibution

Years	No of Patients	Percentage
0-10	11	8.3%
11-20		
21-30	9	6.8%
31-40		
41-50	34	25.8%
51-60		
61-70	18	13.6%
71-80		
81-90	17	12.9%
	15	11.4%
	13	9.8%
	12	9.1%
	3	2.3%
	132	**100%**

SEX DISTRIBUTION OF LIMB AMPUTATION: Distribution of patient according to sex as shown in table 3 reveals that in year 2002, 3 Male patients underwent amputation and no female underwent amputation. In year 2008, 7 male and 6 female patients underwent amputation, making it the year with the highest number of female amputees. In year 2012, 13 male and 5 female patients underwent amputation, thereby making it the year with the highest number of male amputee and the year with the highest no of amputee, with a total number of 18 amputees. In year 2014, 6 male and 4 female patients underwent amputation. The table below shows that of the total number (132) of people that underwent amputation between the year under review (2002 till 2014), 93(69.77%) were male while 39(30.23%) were female; this proportion gives as approximate ratio of 2.3:1.

OCCUPATIONAL DISTRIBUTION OF LIMB AMPUTATION: Presented in table 4 is the occupational distribution of patients as documented in the case note per year. It was revealed that in 2002, schooling and others (which includes sawmilling, neonate, okada riders, driving, operator, police officer, engineer, electrician among others) were the occupation that were affected with 1 and 2 amputees in each occupation respectively. The highest number of amputees was recorded in 2012 with 5, 5, 1, 3, 2, 2 amputees from trading, farming, schooling, teaching, civil servant and others, making it a total of 18 amputees. In general, excluding others (which includes saw milling, neonate, okada rider, driving, operator, old age, dependent, house wife, brick laying, police officer, printing, tailoring, vulcanizer, hair dressing, banking, contractor, engineer, electrician) with 48 (36.4%) amputees, trading was the occupation that has the highest number of amputee with a total number of 24 (18.2%) followed by schooling with a total number of 20 (15.2%). Teaching and clergyman were the occupation with the lowest number of amputees, accounting for 5 (3.8%) amputees each.

INDICATION FOR AMPUTATION: Indication for amputation as shown in table 5 reveals that RTA/trauma accounted for the highest number of causes of amputation with a total of 50 (37.9%) cases, followed by diabetes with a total of 41 (31.1%) cases. Other causes of amputation included infection, sarcoma, Peripheral Vascular Disease (PVD) and congenital deformity with a total of 14 (10.6%), 12 (9.1%), 6 (4.5%) and 6 (4.5%) cases respectively. Amputation resulting from 'unknown cause' accounted for about 2.3% (3 cases). This is also illustrated in fig 4.1. The highest number of road traffic accidents was recorded in year 2010 and 2012 with a total number of 7 patients in each year, while the lowest number of road traffic accidents was recorded in the year 2002 with 1 patient in that year. Also, the highest number of diabetes was recorded in the year 2010 and 2012 with a total number of 6 patients in each year. No case of diabetes was recorded in year 2003.

AGE RANGE AND PERCENTAGE DISTRIBUTION OF THE INDICATION FOR AMPUTATION: Age range and percentage distribution of the indication for amputation as shown in table 6 reveals that majority of the indications for amputation found in the over 50 years group are diabetes, PVD and unknown causes while the indication for amputation found in the under 50 years group are congenital deformity, road traffic accident/trauma, sarcoma and infection.

DISTRIBUTION ACCORDING TO TYPE OF LIMB AMPUTATION: Table 7 shows the distribution of the type of limb amputation per year. Of the 132 patients who had undergone limb amputation, lower limb amputation accounted for the highest number of the type of limb amputation with 99 cases (75%), while lower limb amputation accounted for 33

Table 3. Distribution According To Sex Per Year

Years	Male N (%)	Female N (%)	Total N (%)
2002	3 (100)	0	3 (100)
2003	3 (42.9)	4(57.1)	7(100)
2004	2(66.7)	1(33.3)	3(100)
2005	11(91.7)	1(8.3)	12(100)
2006	11(84.6)	2(15.4)	13(100)
2007	5(55.6)	4(44.4)	9(100)
2008	7(53.8)	6(46.2)	13(100)
2009	8(88.9)	1(11.1)	9(100)
2010	12(80)	3(20)	15(100)
2011	9(75)	3(25)	12(100)
2012	13(72.2)	5(27.8)	18(100)
2013	3(37.5)	5(62.5)	8(100)
2014	6(60)	4(40)	10(100)
Total	**93 (69.77%)**	**39 (30.23%)**	**132 (100%)**

cases (25%). In year 2002, no case of upper limb amputation was recorded while the highest number of upper limb amputations was recorded in 2006 and 2011 with a total number of 6 cases each. The highest number of lower limb amputations was recorded in 2012 with 17 cases followed by 2010 with 13 cases while the lowest number was recorded in 2004 with 2 cases.

DISTRIBUTION ACCORDING TO LEVEL OF AMPUTATION: Presented in table 8 is the levels of amputation per year. Eight different levels of amputation were identified in this study. It was revealed that the most common level of amputation was below knee amputation (BKA) with 55 (41.6%) cases followed by above knee amputation (AKA) with 33 (25%) cases. Others included above elbow amputation (AEA) with 16 cases (12.1%), fingers amputation (FA) with 10 (7.6%) cases, below elbow amputation with 9 (6.8%) cases, toes amputation (TA) with 5 (3.8%) cases. Hip disarticulation (HD) and knee disarticulation (KD) were the least common level of amputation with 2 (1.5%) cases each.

PREVALENCE OF LIMB AMPUTATION: Prevalence of limb amputation as shown in table 9 reveals that 73751 patients were admitted into the hospital within the years under review while 2075 patients underwent orthopedic surgery which is 2.81% of the total hospital admission. Also, only 132 patients underwent amputation surgery, which is 6.4% of the total orthopedic surgery and 0.18% of the total hospital admission. In 2002, 3611 patients were admitted into the hospital, 102 patients underwent orthopedic surgery while 3 patients underwent amputation surgery. In 2008, 6586 patients

Table 4. Distribution according to occupation per year

Years	Trading	Farming	Schooling	Teaching	Civil servant	clergyman	Retired	Others*	Total
2002	0	0	1	0	0	0	0	2	3
2003	1	1	2	0	0	1	0	2	7
2004	0	0	0	0	0	1	1	1	3
2005	3	1	2	0	1	0	1	4	12
2006	2	1	0	0	2	0	1	7	13
2007	1	2	0	1	1	0	0	4	9
2008	3	0	3	0	0	1	0	6	13
2009	2	0	1	0	0	0	0	6	9
2010	2	3	5	0	0	0	0	5	15
2011	1	2	3	0	0	1	2	3	12
2012	5	5	1	3	2	0	0	2	18
2013	1	0	1	0	1	0	1	4	8
2014	3	1	1	1	0	1	1	2	10
Total	24 (18.2%)	16 (12.1%)	20 (15.2%)	5 (3.8%)	7 (5.3%)	5 (3.8%)	7 (5.3%)	48 (36.4%)	132

Table 5. Indication for Amputation According To Year

Years	Diabetes	Congenital deformity	RTA/ Trauma	Infection	PVD	Sarcoma	Unknown Cause	Total
2002	1	1	1	0	0	0	0	3
2003	0	0	2	3	1	1	0	7
2004	1	0	1	0	0	1	0	3
2005	2	2	4	2	0	1	1	12
2006	5	0	6	1	0	1	0	13
2007	4	0	2	0	0	2	1	9
2008	4	1	5	1	0	2	0	13
2009	2	0	4	3	0	0	0	9
2010	6	0	7	2	0	0	0	15
2011	5	2	4	0	0	1	0	12
2012	6	0	7	1	3	1	0	18
2013	2	0	4	1	1	0	0	8
2014	3	0	3	0	1	2	1	10
Total	41 (31.1%)	6 (4.5%)	50 (37.9%)	14 (10.6%)	6 (4.5%)	12 (9.1%)	3 (2.3%)	132

RTA- Road Traffic Accident; PVD- Peripheral Vascular Disease

Table 6. Age range and percentage distribution of the indication for amputation

	Under 50 years N (%)	Over 50 years N (%)
DIABETES	12 (29.3%)	29 (70.7%)
CONGENITAL DEFORMITY	6 (100%)	0 (0%)
RTA/TRAUMA	45 (90%)	5 (10%)
INFECTION	13 (92.9%)	1 (7.1%)
PVD	1 (16.7%)	5 (83.3%)
SARCOMA	7 (58.3%)	5 (41.7%)
UNKNOWN CAUSE	1 (33.3%)	2 (66.7%)

Table 7. Disrtibution according to type of limb amputation per year

Years	Upper Limb	Lower limb	Total
2002	0	3	3
2003	2	5	7
2004	1	2	3
2005	2	10	12
2006	6	7	13
2007	2	7	9
2008	2	11	13
2009	3	6	9
2010	2	13	15
2011	6	6	12
2012	1	17	18
2013	3	5	8
2014	3	7	10
	33 (25%)	**99 (75%)**	**132**

Table 8. Levels of Limb Amputation Per Year

Years	AEA	BEA	AKA	BKA	HD	KD	FA	TA	Total
2002	1	0	0	1	0	0	0	1	3
2003	2	0	1	3	0	1	0	0	7
2004	1	0	1	1	0	0	0	0	3
2005	1	0	5	2	2	0	1	1	12
2006	0	6	4	2	0	1	0	0	13
2007	2	0	1	6	0	0	0	0	9
2008	0	1	2	8	0	0	1	1	13
2009	1	1	2	4	0	0	1	0	9
2010	2	0	6	7	0	0	0	0	15
2011	3	0	2	3	0	0	3	1	12
2012	0	1	5	11	0	0	1	0	18
2013	1	0	1	3	0	0	2	1	8
2014	2	0	3	4	0	0	1	0	10
Total	16 (12.1%)	9 (6.8%)	33 (25%)	55 (41.7%)	2 (1.5%)	2 (1.5%)	10 (7.6%)	5 (3.8%)	132

KEY: AEA- Above Elbow Amputation, BEA- Below Elbow Amputation, AKA- Above Knee Amputation, BKA- Below Knee Amputation, HD- Hip Disarticulation, KD- Knee Disarticulation FA- Fingers Amputation, TA- Toes Amputation.

Table 9. Prevalence Of Limb Amputation Per Year

Years	Total amputation surgery	Total hospital admission	% of amp in total admission	Total Ortho surgery	% of amp in total ortho surgery
2002	3	3611	0.08	102	2.94
2003	7	4582	0.15	123	5.69
2004	3	4437	0.07	121	2.48
2005	12	4183	0.29	115	10.43
2006	13	5309	0.24	206	6.31
2007	9	5310	0.17	180	5.00
2008	13	6586	0.20	55	23.64
2009	9	6153	0.15	197	4.57
2010	15	6253	0.24	199	7.54
2011	12	7502	0.16	197	6.09
2012	18	8177	0.22	263	6.84
2013	8	6316	0.13	158	5.06
2014	10	5332	0.19	159	6.29
Total	**132**	**73751**		**2075**	

Table 10. Referral for Physiotherapy on The Ward

Years	Total	No of patients*	Percentage (%) **
2002	3	0	0
2003	7	3	42.9
2004	3	0	0
2005	12	5	41.7
2006	13	4	30.8
2007	9	3	33.3
2008	13	9	69.2
2009	9	3	33.3
2010	15	9	60
2011	12	5	41.7
2012	18	11	61.1
2013	8	3	37.5
2014	10	4	40.0
Total	**132**	**59 (44.7%)**	

*Number of patients referred to for physiotherapy
**Percentage of total number of patients referred to for physiotherapy each year.

Table 11. Status At The Time of Discharge Per Year

Years	Total	Alive N (%)	Dead N (%)
2002	3	3	0
2003	7	6	1
2004	3	2	1
2005	12	11	1
2006	13	12	1
2007	9	6	3
2008	13	12	1
2009	9	8	1
2010	15	13	2
2011	12	11	1
2012	18	14	4
2013	8	7	1
2014	10	8	2
Total	**132**	**113 (85.6%)**	**19 (14.4%)**

Table 13. Physiotherapy Treatment on the Ward

Years	Physiotherapy treatment on the ward
2002	No referral on the ward
2003	Crutch walking, Stump exercises, Strengthening exercises, Active exercises
2004	No referral on the ward
2005	Psychotherapy, Crutch walking, Stump exercises, strengthening exercises, Passive movement, Standing reeducation, Stump bandaging
2006	Crutch walking, Stump exercises, strengthening exercise, Standing reeducation
2007	Passive movement, Stump exercises, Free active exercises, Elevation, Standing reeducation, Stump bandaging
2008	Crutch walking, Stump exercises, strengthening exercise, Standing reeducation, Free active exercises, Ambulation, Positioning
2009	Static quadriceps contraction, Position, Crutch walking, Free active exercises, Strengthening exercise
2010	Stump exercises, strengthening exercise, Standing reeducation, Straight leg raising, Static quadriceps contraction, walking Reeducation
2011	Stump positioning, Passive movement, Assistive Range of motion, Resisted active exercise
2012	Soft tissue massage, Free active exercise, Crutch walking, Stump exercises, walking reeducation, Straight leg raising, Static quadriceps contraction, walking Reeducation
2013	Free active exercise, walking reeducation, Straight leg raising, Active assistive exercise
2014	Patella mobilization, soft tissue massage, walking reeducation, Passive movement, Strengthening exercise

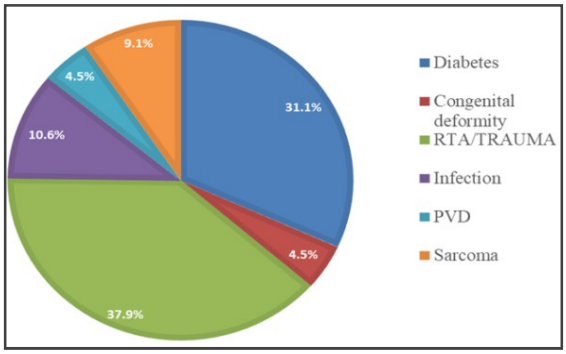

Fig 4.1. Indication for amputation rta- road traffic accident, pvd- peripheral vascular disease

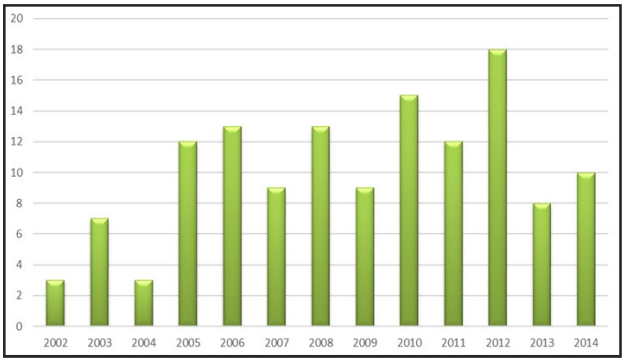

Fig 4.2. Annual distribution of limb amputation

Table 12. Annual Distribution Of Limb Amputation

Years	Total
2002	3
2003	7
2004	3
2005	12
2006	13
2007	9
2008	13
2009	9
2010	15
2011	12
2012	18
2013	8
2014	10
Total	**132**

were admitted into the hospital, 55 patients underwent orthopedic surgery while 13 patients underwent amputation surgery. Also in 2014, 5332 patients were admitted into the hospital, 159 patients underwent orthopedic surgery while 10 patients underwent amputation surgery.

TOTAL NUMBER OF PATIENTS REFERRED FOR PHYSIOTHERAPY ON THE WARD: Table 10 represents the number of people referred to physiotherapy during their stay in the hospital ward and it showed that out of 132 patients that were amputated, 59 (44.7%) patients were referred to physiotherapy and all the 59 patients were lower limb amputee because it was observed no upper limb amputee was referred for physiotherapy on the ward. No patient was referred to for physiotherapy in 2002 and 2004. Out of 13 amputated patients in 2008, 9 (69.2%) were referred to for physiotherapy. In 2010, 9 (60%) out of the 15 amputees were referred and 11(61%) out of 18 amputees were referred for physiotherapy in 2012.

STATUS AT THE TIME OF DISCHARGE: Status at the time of discharge as shown in table 11 revealed that of the 132 patients that had undergone amputation in year 2002-2014, 113 (85.6%) patients were alive while 19 patients (14.4%) were dead at the time of discharge. No death record of patient in year 2002 while 1 patient each died in year 2003-2006 and years 2008, 2009, 2011, 2013. In the year 2012, 4 patients died making 2012 the year with the highest number of deaths at the time of discharge.

ANNUAL DISTRIBUTION OF LIMB AMPUTATION: Table 12 shows the annual distribution of patients. The highest number of surgeries was performed in 2012 on 18 patients while the lowest number was performed in 2002 on 3 patients. Although the bar chart (fig 4.2) did not show any definite pattern, a gradual increase was observed from 2004-2006.

PHYSIOTHERAPY MANAGEMENT ON THE WARD: Presented in table 13 is the physiotherapy management of the

amputees on the ward. It was revealed in this study that physiotherapy management includes stump exercises, crutch walking, stump bandaging, strengthening exercises, Positioning techniques, active exercises, psychotherapy, standing reeducation, chest physiotherapy, Passive movement, sitting reeducation, elevation technique, among others.

DISCUSSION AND CONCLUSION

RECOMMENDATIONS AND DISCUSSION

This study was carried out to identify the incidence and pattern of limb amputation in Obafemi Awolowo University Teaching Hospitals' complex (OAUTHC), Ile-Ife between January 2002 and December 2014. Limb amputation accounted for 6.4% of the total orthopedic surgery performed in this center within the years under review, as revealed by the study. Previous studies also recorded low prevalence of amputations though these were among all surgical procedures without isolating orthopedic surgeries (Gregory-Dean, 1991). However, limb amputation has been shown in several studies to be a common orthopedic surgical procedure (Dada *et al*., 2010; Obalum *et al*., 2009; Onyemaechi *et al*., 2012; Ogbera *et al*., 2006). The leading cause of amputation identified from this study was RTA/trauma which accounted for 37.9% of the cause of amputation followed by diabetes accounting for 31.1%. This is due to the high incidence of Road Traffic Accident (RTA) in our environment. High incidence of road traffic accidents can be due to bad roads, poor road network and poor vehicular maintenance. This result in accordance with Kidmas *et al* (2004) in his study at Jos University Teaching Hospital which found that Trauma and diabetes topped the list of indications for lower limb amputations accounting for 29.9% and 26.4% respectively. These findings also supported the result of the study by Olaogun *et al* (2005), Abbas *et al* (2007) and Olasehinde *et al* (2002) that the leading cause of amputation was trauma. Also, a review of the results of studies on amputations in Nigeria over a 15- year period done by Thanni *et al*., (2007) showed that 34% of the amputations during that period were due to trauma and 12.3% from diabetic gangrene. However, the findings in some studies were more than this, with trauma accounting for 73.4% and 70.5% of the series from Ile-Ife and Port Harcourt respectively (Olasehinde *et al*., 2002; Ekere, 2003). This differs from studies in developed countries where vascular problems is reported to be the most common indication for amputations (Ziegler-Graham *et al*., 2008; Pernot *et al*., 2000) and those from recent studies in some part of Africa showing that diabetic gangrene is a leading cause of amputation (Ahmad *et al*., 2014; Dada *et al*., 2010; Ogbera *et al*., 2006). Other causes of limb amputation according to this study included infection, sarcoma, Peripheral Vascular Disease (PVD), congenital deformity and Unknown cause.

The finding in this study showed that out of the 132 patients that had limb amputations in this center during the study period, 93 were males, thus making the male to female ratio approximately 2.3:1. The high level of male involvement is of immense socioeconomic importance. The male being the major bread winner in most families, the whole family and probably the extended family is as result thrown into deprivation with far reaching effects on the economy and the society. Also, the male sex takes more risk and is involved in more physical exertions, thus predisposing him to more injuries that may result in amputations (Jawaid *et al*., 2008; Adiki *et al*., 2012). Male predominance has thus been the norm in many previous studies on limb amputations. (Jawaid *et al*., 2008; Adiki *et al*., 2012; Dada *et al*., 2010; Abbas *et al*., 2007; Akiode, *et al*., 2005). Below knee amputation (BKA) appears to be the commonest level of amputation which accounted for 41.7% of the cases amputated. This is because it is generally observed that traumatic injuries occur more in the lower limbs and diabetic gangrene is also more common in the lower limb than anywhere else in the body. The findings is in support of the results of the study by Dada *et al*., (2010); Abbas *et al*., (2007); Odatuwa *et al*., (2012). Other local and global studies also report a similar trend (Nwankwor *et al*., 2004; Yinusa *et al*., 2003; Solagberu, 2003; Obalum *et al*., 2009) However, Onyemaechi *et al* (2012) and Umaru *et al* (2004) in Northern Nigeria, reported a higher prevalence of above knee amputations. Of the upper limb amputations, the above elbow amputation (AEA) was performed in 12.1% and below elbow amputation (BEA) performed in 6.8%. Disarticulation accounted for 3.0% (1.5% each for hip and knee disarticulation) of the procedures performed, thereby making the level of amputation with the highest percentage in Upper limb amputation to be above elbow amputation (AEA) followed by below elbow amputation (BEA). Akiode *et al*., 2005 and Murwanashyaka *et al*., 2013 reported a different finding in Nigeria and Rwanda respectively where below elbow amputation (BEA) accounted for the highest number of amputation level followed by above elbow amputation (AEA).
The mortality rate of 14.4% from this study is in the same range with 8.9%, 16.0% and 21.6% found by Onyemaechi *et al*., 2012; Dada *et al*., 2010 and Naaeder *et al*., 1993 respectively. In general, some of the reasons for high mortality rate are diabetic-related complications, wound sepsis and advanced malignancies with metastasis. An important measure of morbidity is the length of patients' hospital stay, which is often largely dictated by post-operative wound complications such as infections, wound dehiscence, flap necrosis, the need for multiple surgeries and the presence and level of control of other comorbid surgical and medical conditions. The average length of hospital stay of amputees in this study was 54.1 days. This is higher than 17.3 days and 26.6 days reported by Jawaid *et al*., 2008 in Pakistan and Dada *et al*., 2010 in Lagos, Nigeria respectively. Estimates of length of hospital stay are important for financial reasons, and accurate early estimates facilitate better financial planning by the payers. The duration of hospital stay has been identified as one of the main determinants of cost associated with amputation (Solomon *et al*., 1994). This study also revealed that 90% of the amputations as a result of trauma occurred more in under 50-year age groups,i.e. productive age groups. On the other hand, Diabetes Mellitus and Peripheral Vascular Disease were indications for amputation in over 50 years age group. This confirms the result of Ham *et al*., (1986) that Peripheral Vascular Disease and Diabetes are diseases associated with elderly and account for the majority of lower limb amputation. From this study, amputation due to congenital deformity occur mainly below 50 years of age especially the 0–10-year group. This also confirms the study by Payton *et al*., (1986) that amputation for congenital deformity and limb length discrepancies is usually performed on children and young adults. In these cases, surgery is best delayed until the patient is old enough to decide whether to have the amputation performed or not (Olaogun *et al*., 2005). It was observed that out of the total number of patients (both upper and lower limb amputee), no upper limb amputee was referred for

physiotherapy on the ward. Also, out of a total number of 99 lower limb amputees, 59.6% was referred for physiotherapy on the ward postoperatively. This shows that the level of awareness of the role of physiotherapy at this stage of rehabilitation is becoming known. Referral of lower limb amputee and non-referral of upper limb amputee on the ward could be due to the fact that lower limb is of great importance in ambulation and other member of the multi-disciplinary team sees the importance of lower limb to human and feels that lower limb should be given more attention in rehabilitation than upper limb, however, the awareness of the role of early physiotherapy in the management of both upper and lower limb amputation should be emphasized especially among other member of the multidisciplinary team because early referral for physiotherapy produces good measurable outcomes, enhances effective prosthesis usage and prevents postoperative complications (Olaogun *et al*., 2005). Physiotherapy management used as revealed in this study includes stump exercises, crutch walking, stump bandaging, strengthening exercises, Positioning techniques, active exercises, psychotherapy, standing reeducation, chest physiotherapy, Passive movement, sitting reeducation, elevation techniques.

CONCLUSION

There were 132 limb amputations out of 2075 orthopedic surgery performed within the study years, accounting for 6.4% of all orthopedic surgery performed during the study period. The leading indication for amputation in Obafemi Awolowo University Teaching Hospitals' complex is trauma, especially those resulting from road traffic accidents (RTA). This indication however is a preventable condition. There should therefore be education for road users and general public at large on the proper use of road and vehicular maintenance through the federal road safety commission (FRSC) to reduce the incidence of road traffic accidents. There is predominance of male sex involvement in amputations over the female sex, and this can be attributed to the fact that male takes more risk and exposed to more physical exertions compared to female. Below knee amputation and above knee amputation were the most commonly performed procedure, though below knee amputations were more common in this center than above knee amputation. Lower limb amputations were more common in Obafemi Awolowo University Teaching Hospitals' Complex compared to upper limb amputation.

RECOMMENDATIONS

- The need for public enlightenment on road safety precautions by the government through various media, the federal road safety commission (FRSC) and other relevant agencies/commission to reduce road traffic accidents is of high importance.
- Alcohol and other forms of intoxication before and while driving should be discouraged by law. Measures should be enforced to punish any driver caught to have flouted the law.
- There is a need for sustained health education to discourage patronage of TBS and encourage utilization of modern health service. Basic training for traditional bone setters (TBS) in safe splintage and early identification of signs of ischemia may not be out of place.
- Regular medical checkups should be encouraged by the populace so that the possibility of peripheral vascular diseases and other factors leading to amputation could be detected early and managed adequately if prevention is not possible. Diabetic patients and elderly should be taught proper hygiene to prevent and properly manage wounds on their bodies.
- Functional rehabilitation centers should be established at several and strategic locations in the country. The centers should be well equipped, and their services should be accessible.

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