

Trends in Incidence of Lower Extremity Amputations in Malaysia: A Population Based Study

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Abstract: The purpose of this research is to describe about the population-wide trends in the incidence of lower extremity amputation levels in Malaysia tertiary hospitals over a 5-year period between 1 Jan 2012 and 31 Dec 2016. **Methods:** Quantitative research served as the main methodology for this study. The researcher will use the process of non-random which is the convenience sampling or judgment. For this research, the researcher will not use the questionnaires to collect the data, but the researcher will collect the data via the manual data or list of info that extracted from each selected hospital. **Results:** A total of 474 patients in Hospital University Sains Malaysia has undergone the lower limb amputations during the period of the study. The majority of the patient, which is 170, are patients from the range of 16-54 years. Highest number of patients that having a lower limb amputation is the transtibial or below knee amputation with the frequency of 206 cases. **Conclusion:** The population-wide of national trends in the incidence of lower extremity amputation levels in Malaysia tertiary hospitals can be differentiated based on amputation etiology, amputation level, age, gender and race.

Keywords: Amputation, lower extremity amputation, amputation etiology, amputation level.

I. INTRODUCTION

An ischemic appendage of an amputation becomes one of the oldest and the biggest serious surgical operations, although it often portrayed as gruesome, but it become as a necessary procedure for survival especially during times of war. Amputation is mentioned in first Roman texts which refer to the criminal punishment by cutting off one's hands (Kirkup, 2007). Lower-extremity amputation can be one of the oldest surgery procures that performed a long time ago in back prehistoric times (Wilson & Murdoch, 1996; Tooms, 1987). Although many surgical amputations is performed during ancient times, there is no warranted to save lives of the patients as amputation barely resulted in the desired outcome. Many patients experience an amputation often die due to septic shock and hemorrhage (Sanders, 1986).

Based on the newest statistics in the USA, about 1.7 million people lived with amputations (Ziegler et al., 2008) and the number has been increased recently by years (Heck, 2008). German population, it is estimated that 25-27 in 100000 have

been going amputation. The limb amputation that causes from incident of different pathologies has been reported in different populations. Peripheral vascular disease become the major causes of trauma, infections, uncontrolled diabetes mellitus and malignancies and also become the leading the causes of amputation in developing countries. The incidence of dysvascular rates of amputation from the overall rates is rising, while the rates for trauma and malignancy are decreased (Dillingham et al, 2002).

Lower limb amputation can cause of major malformation, be risk of loss of the independence and also can render people mobile as it is most physically and psychological devastating events that can happen to all the people that being diagnosed with limb loss (Institute for Public Health, 2008). Although there are risks of disablement after the amputation, many people can live with high quality of lives and also can learn how to walk of re-function again with the help of appropriate rehabilitation centers. Amputation can divide into two categorises which are major limb loss and minor limb loss. "Major" limb loss usually amputation below the elbow, above the elbow, above the knee, below the knee or the foot while for "minor" limb loss are the amputation of the hand or digits which is toes or fingers (Letchuman et al, 2010). Lower limb of amputations is usually become more frequent than the upper limb amputations, and also become the most results of disease and followed by trauma and the reasons for amputation of the lower extremity are diabetes mellitus, trauma, tumors, infections, peripheral vascular diseases, congenital abnormalities and nerve injuries (Mohamed, 2008).

II. METHOD

Data are extracted from the hospital that involves all patients that underwent the lower limb amputations at Hospital University Sains Malaysia (HUSM) between January 2012 and December 2016. For this research, all diagnoses and surgical procedures that include in the database will coded according to the International Classifications of Diseases-Clinical Modifications 9th edition (ICD9-CM). The hospitalization record for lower extremity amputations that gather will be extracted according to the patient date of birth, patient gender, patient ethnic group, and patient date of amputation, patient level of amputation (ICD-9-CM) and patient cause of amputation. The population of this study are included all the patients of all age groups, gender and ethnic that underwent the major limb amputations at University Sains Malaysia within the period of the study. Other details of the patients which are the patient date of amputation also recorded. The demographic factors of amputees such as educational background and patient employment background are not variables of this study. A suitable method is used to measure each of the variables. Quantitative research served as the main methodology for this study. When data on amputee statistic is gathered from the government and private hospitals, the clearance for the ethical is needed from the National Medical research Register (NMRR) Malaysia and the register raw data that gather will be sort to the information that relevant and needed for this study. The researcher is using the Statistical Software packaged for Social Sciences (SPSS) version 22 to analyze the data which is descriptive analysis.

III. RESULTS

A total of 474 patients in Hospital University Sains Malaysia has undergone the lower limb amputations during the period of the study. The age of the patients is from 6-97 years that show the mean is 3.00 and the median is 3.00. The majority of the patient, which is 170, are patients from the range of 16-54 years while the percentage is 35.9% that shows in table 1 and figure 1. The second highest number of patients is the patients that ranged between 55-64 years are 128 patients and the percentage is 27.0%, while the patient age ranged between 65-74 years become the third highest underwent lower limb amputation with the percentage of 25.1%. The lowest or minority patients that undergo lower limb amputation is the patients age range below the 16 years old with the number of patients are 16 and 3.4% from the total of 100.0% and the patients that age more than 25 years old are 41 patients with 8.6%.

TABLE 1 Age group distribution

Age group (Years)	Number of patients	Percentage
<16	16	3.4
16-54	170	35.9
55-64	128	27.0
65-74	119	25.1
>75	41	8.6
Total	474	100.0

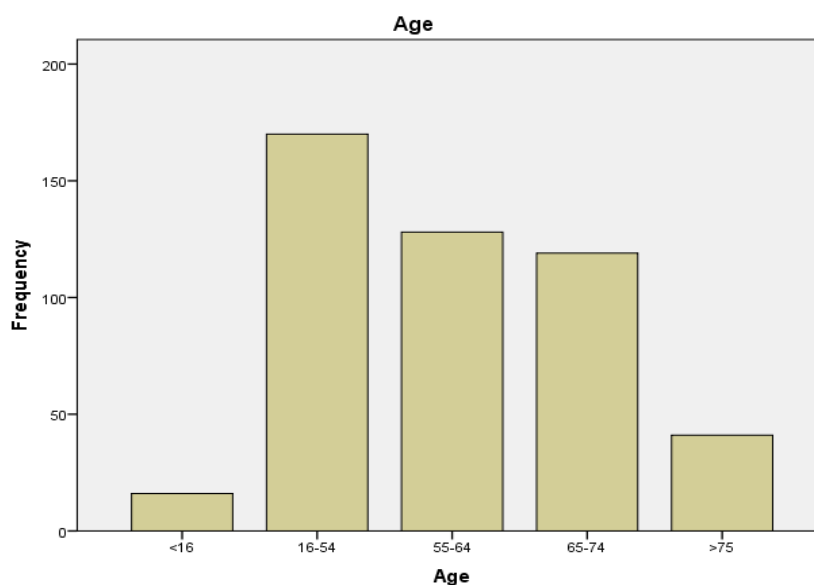


Fig. 1 Age distribution of patients underwent lower limb amputation

From 474 patients, which is the total number of patients and the mean is 1.49 and the median is 1.00, it can divide into female and male that shows in table 2. The result from analysis shows that the male has the highest number of patients which show the frequency number of 242 and the percentage is 51.1%, while the female shows the percentage is 48.9% and the number of female patients is 232 that shows the is less than 10 patients from the number of male patients.

TABLE 2 Gender

Gender	Frequency	Percentage
Male	242	51.1
Female	232	48.9
Total	474	100.0

Patients that have a lower limb amputation in Hospital University Sains Malaysia can be divide into 3 categories which are Malay, Chinese and Indian. In table 3, it shows the number of patients have been divided into 3 categories from 474 of the total number of patients. Result from descriptive for the patient ethnic shows the value of the mean is 1.05 and the median is 1.00. The highest ethnic of the patients is the Malay patients which show the frequency is 452 and the percentage is 95.4 which is almost 100% from the total of all the patients that having a lower limb amputation and it also can be relate that, most people that live in Kelantan is Malay. The Chinese patients take the second places by having 21 patients and the percentage is 4.4 %, while for the Indian, ethnic, there is only one patient from the Indian that underwent lower limb amputation in this hospital and the percentages is only 0.2% from 100%.

TABLE 3 Ethnic

Gender	Frequency	Percentage
Malay	452	95.4
Chinese	21	4.4
Indian	1	0.2
Total	474	100.0

Lower limb amputation, the level of amputation can be divided into 4 categories which is partial foot, transtibial (below-knee), transfemoral (above-knee) and others (disarticulation + transpelvic). Amputation of a toe and amputation through

foot can be classified in Partial foot, while the amputation of ankle through malleoli of tibia and fibula and other amputation below the knee can be classified into Transtibial or below knee. Amputation above the knee can be in the group of transfemoral or above-knee and the group of others or disarticulation and transpelvic, the level of amputation are disarticulation of the knee, disarticulation of hip and abdominopelvic amputation. At the level of amputation, the highest number of patients that having a lower limb amputation is the transtibial or below knee amputation with the frequency of 206 cases and the percentage is 43.5%. The total mean result of this level of amputation is 1.88 and the median is 2.00. The lowest type level of amputation that having by patients in Hospital University Sains Malaysia is the disarticulation and transpelvic or others is 19 cases with percentage 4.0%. Patients that undergo lower limb amputation in partial foot is 172 cases and 36.3% of the percentage while the transfemoral or above knee is 77 cases with the percentage of 16.2% from the total of 100% of the patients.

TABLE 4 Level of amputation

Level of amputation	Frequency	Percentage
Partial foot	172	36.3
Transtibial (Below-knee)	206	43.5
Transfemoral (Above-knee)	77	16.2
Others (Disarticulation + Transpelvic)	19	4.0
Total	474	100.0

Causes of amputation for lower limb amputation in this study can divide into 4 categories which are trauma, dysvascularity, neoplasia and others. 474 from the total number of patients, dysvascularity become the highest number of patients that causes the patients having the amputation with the frequency of 252 and the percentage is 53.2%, which is almost half of the causes from the dysvascularity which is usually caused from the diabetes mellitus. The lowest causes of amputation in this hospital are neoplasia or tumor, which is can be rare for the patient that undergo lower limb amputation that causes from the tumor with the frequency of 2 cases and only 0.4% of the total number of patients. Trauma becomes the second causes that take place on the causes of amputation in this study with percentage of 24.9% and 118 numbers of cases. Trauma is usually happen because of the accident. The others for the causes of amputation become the third causes for amputation with the number of cases is 102 cases and the percentage is 21.5%. The mean of the causes of amputation is 2.19 and the median is 2.00.

TABLE 5 Causes of amputation

Causes of amputation	Frequency	Percentage
Trauma	118	24.9
Dysvascularity	252	53.2
Neoplasia	2	.4
Others	102	21.5
Total	474	100.0

IV. CONCLUSION

The number of lower extremity amputation is increasing, but there is no specific number of cases that being recorded and the representation of accurate number of amputees with the important information is not established and not monitored in Malaysia such as the level and causes of amputation, gender, age and level of activity. However, the population-wide of the trends in the incidence of lower extremity amputation levels in Malaysia tertiary hospitals can be differentiated based on amputation etiology, amputation level, age, gender and race. These studies are very meaningful to all parties such as hospitals, government and also the private company that provide the prosthetic services to the people. Amputation statistic can help the amputees to get a better quality of life as being amputees, they also can become a disabled person as they might need help from other people or a prosthetic device to help them in their daily life.

ACKNOWLEDGEMENT

The authors are grateful to University Malaysia Kelantan for the financial support from Geran Keserakanan UMK-USM (R/MYRA/A11.00/01226A/003/2017/000409).

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