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### RESEARCH ARTICLE

#### LIMB LOSS: FACTS & STATISTICS - A CROSS SECTIONAL STUDY AMONG AMPUTEES REPORTING TO A TERTIARY CARE CENTRE IN TAMILNADU

**Prof. Dr. T. Jayakumar**

Professor and HOD Department of Physical Medicine and Rehabilitation, Government Institute of Rehabilitation Medicine, KK Nagar, Chennai.

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#### Abstract

**Background:** Despite advances in medical interventions and emphasis on prevention programs, studies have shown that the rate of amputation procedures and prevalence of persons living with limb loss continues to increase. Today, when amputation is necessary, surgery is undertaken with consideration for the functional aspects of the residual limb. The purpose of this study was to describe the etiology and characteristics of major limb amputees at GIRM, a tertiary care centre.

**Materials and Methods:** It is a cross sectional study, including a total of 500 patients, underwent limb amputations for various reasons, who has reported for prosthesis fitting and disability certificate at Government Institute of Rehabilitation Medicine, Chennai for a period of 1 year from January 2022 to December 2022. In this study, we studied several variables including age, sex, side of the limb, level of the amputation, etiology etc.

**Results:** In this study, dysvascular disease was the major reason of amputation, followed by traumatic cause, with a male preponderance, with peaking at the age of 41-60 years. Lower limb, being the most common with predominance of transtibial amputation.

**Conclusion:** In contrast to declining rates of trauma-related and cancer-related amputations, we found evidence of a significant increase in the incidence of amputations due to diabetic foot syndrome. Overall, the risk of amputations increased with age. This was true for all etiologies and for both sexes. Males with an average age of 50 generally at higher risk for limb loss than women.

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#### Introduction:-

Amputation is defined as surgical removal of all or a part of limb or extremity. Lower limb amputations are more common than upper limb amputations. Despite advances in medical interventions and emphasis on prevention programs, studies have shown that the rate of amputation procedures and prevalence of persons living with limb loss continues to increase.

The majority of persons with amputations have acquired their limb loss as a result of a disease process such as diabetes or peripheral vascular disease. Amputations secondary to vascular conditions and diabetes have been

**Corresponding Author:- Prof. Dr. T. Jayakumar**

Address:- Professor and HOD Department of Physical Medicine and Rehabilitation,  
Government Institute of Rehabilitation Medicine, KK Nagar, Chennai.

reported to account for 82% of limb loss discharges, and 97% of vascular-related amputations involve the lower limb.

Within a civilian population, amputation is most often necessitated by complications arising from peripheral vascular disease and/or diabetes, but also occurs due to extremity trauma, and in small numbers from malignancy or other etiologies.(1,2)

The majority of these amputations involve the lower limb but may also include upper limb and/or multiple limb amputations (3).

Most sources agree that amputation at the transtibial level is the most common major amputation level in the lower limb with transfemoral amputations being the second most common major amputation level.

In addition, persons with an amputation are more likely to develop multiple health complications over long term such as obesity, cardiovascular disease, osteoarthritis, residual limb pain and low back pain (4, 5-10).

The purpose of this study was to describe the aetiology and characteristics of major limb amputees reported for prosthesis fitting and disability certificate at Government Institute of Rehabilitation Medicine. Also, to discuss the preventive measures to safeguard the general population.

### Materials and Methods:-

**Study centre** – Government Institute of Rehabilitation Medicine, Madras medical college, Chennai

**Study Design** – Cross Sectional Study

**Study period** - 1 year from January 2022 to December 2022

#### Sample size –

500 Amputee patients reported for prosthesis fitting and disability certificate at Government Institute of Rehabilitation Medicine are selected. Before commencement of the study informed consent is taken from them.

Amputees reported for prosthesis fitting and disability certificate at the department interviewed. Basic data collection includes patients name, age, gender, level of amputation, cause of amputation.

Month	Number of amputees interviewed
January	42
February	35
March	45
April	40
May	44
June	44
July	42
August	42
September	40
October	38
November	48
December	40

#### Statistical Analysis

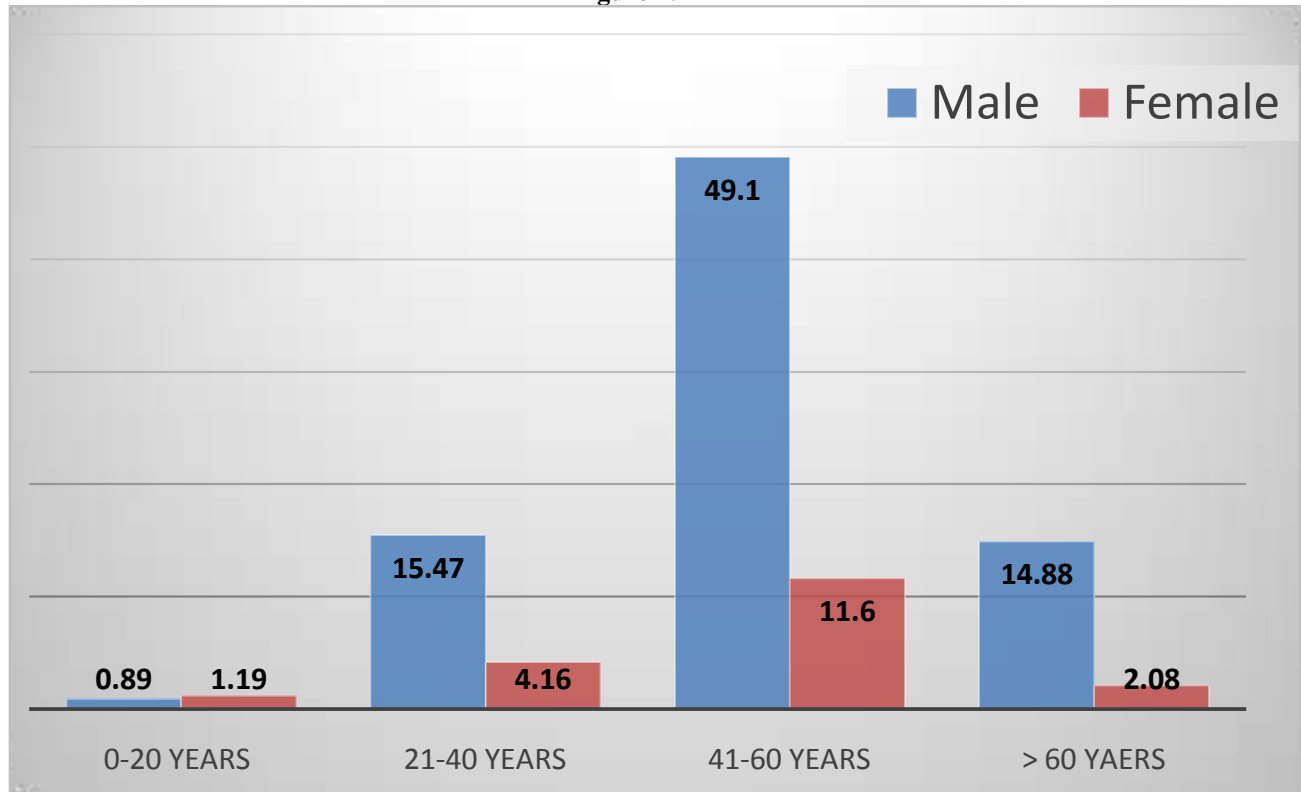
Age of the amputees participated in the studies described as mean. Participants were categorized according to their age into 0-20 years, 21-40 years, 41-60 years and >60 years. Ratio of male to female among the above age group were described as frequency with percentage. Level of amputation among upper and lower limb were described separately as frequency with percentage. Causes of amputation also were described as frequency with percentage.

**Results:-**

**Table 1:-** Age at amputation among patients attended at government institute of rehabilitation in the period of January 2022 to December 2022 (500 in number)

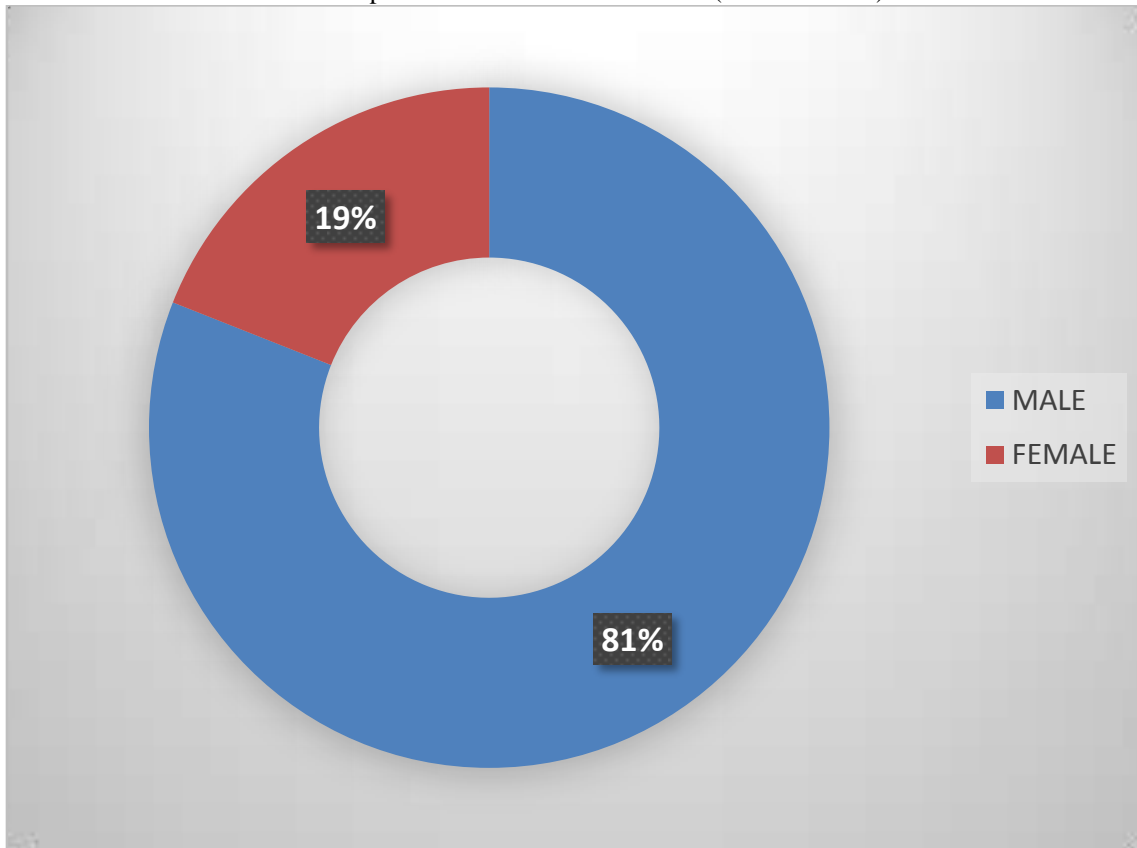
	Male	Female	Total
0-20 years	4	6	10
21-40 years	77	21	99
41-60 years	248	59	307
>60 years	75	10	85

**Figure 1:-**



Out of 500 subjects 307 belongs to age group of 41 to 60 which accounts to almost two third of study group (Table - 1). All age groups show male predominance except 0 to 20 years which shows female predominance (Figure - 1). In the study mean age of patient of patient was found to be 50 years with minimum age being 6 and maximum age being 82. Amputation rates increase steeply with age.

**Figure 2:-** Frequency of amputation by gender among patients attended Govt. Institute of Rehabilitation in the period of Jan 2022 to Dec 2022 (500 in number).



Among the study group there was 405 male and 95 female subjects with male preponderance of 81 percentage with ratio of 4.2:1.0 (Figure 2)

**Table 2:-** Level of amputation among patients attended at government institute of rehabilitation in the period of

	SIDE	MALE	FEMALE	TOTAL	
UPPERLIMB	RIGHT	25	8	33	60
	LEFT	22	4	26	
	BILATERAL	1	0	1	
LOWERLIMB	RIGHT	180	43	223	440
	LEFT	171	42	213	
	BILATERAL	4	0	4	

January 2022 to December 2022 (500 in number)

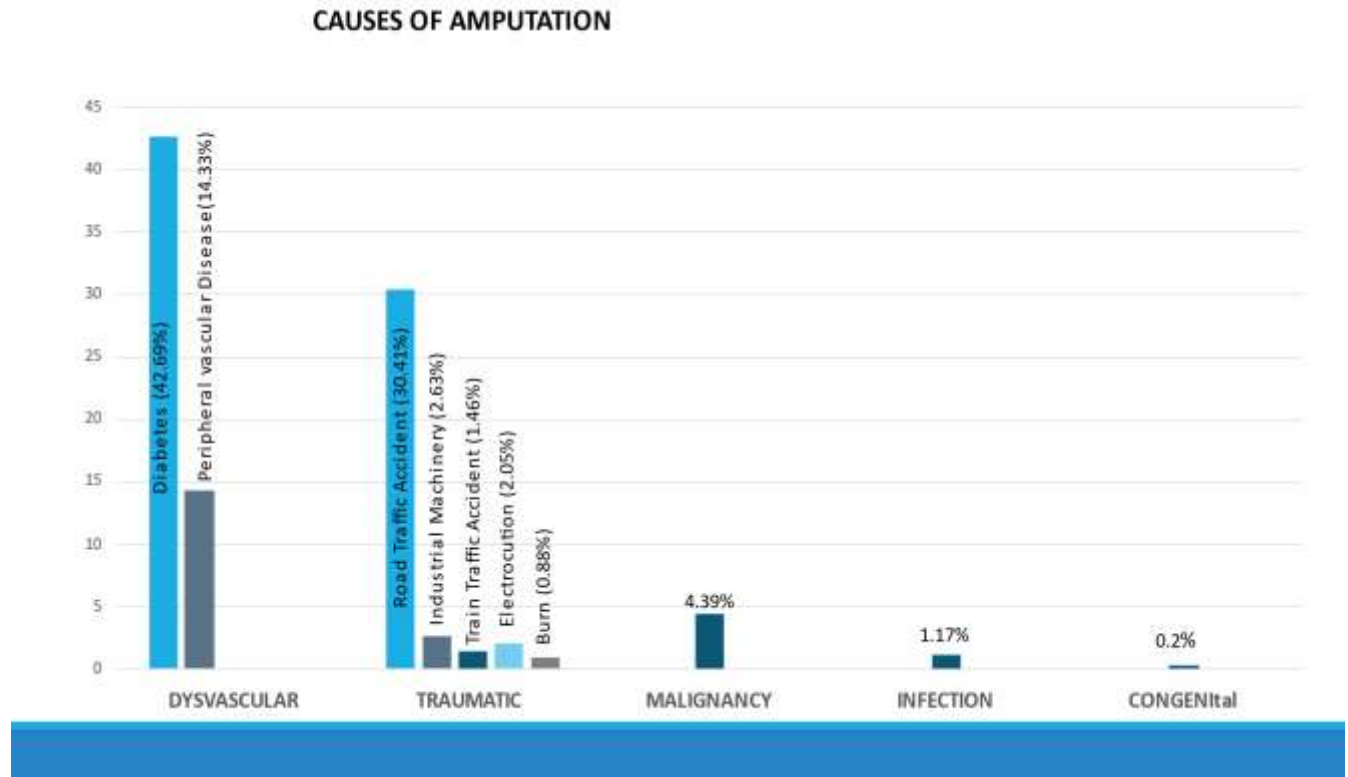
More than 85% (440/500) of amputations were of lower limb. The ratio of upper limb to lower limb amputation was 1.0:7.3. Among both male and female subjects, amputations were similar in number in both right and left side except in one scenario where in females right upper limb amputations was twice as that of left.

Among the 60 upper limb amputations most common was trans radial amputation accounting to more than 50% which is followed by trans humeral amputation accounting for 30%. Amputations like forequarter, shoulder disarticulation, elbow disarticulation, wrist disarticulation, transcarpal, transmetacarpal, transphalangeal constitute rest 20%.

Among the 440 lower limb amputations 290 were transtibial amputation which was more common constituting 66% followed by 122 cases of trans femoral amputation constituting 27%. The rest 7% include hip disarticulation, knee disarticulation, foot amputation and syme's amputation.

Among the 500 cases about 1% was bilateral amputations and trauma was the major cause for bilateral amputation.

**Figure 3:-** Causes of amputation among patients attended at government institute of rehabilitation in the period of January 2022 to December 2022 (500 in number).



In this study dysvascular disease was the major cause of amputation which was responsible for 285 cases of amputation constituting more than 50%. Dysvascular diseases include peripheral vascular disease, peripheral artery disease and diabetes. About three fourth of this cases belongs to diabetes which was the leading cause of non-traumatic lower extremity amputation . The prevalence and severity of dysvascularity increases significantly with age and the duration of diabetes.

Next leading cause for amputation was traumatic injury constituting 37%. Traumatic amputation includes road traffic accidents, train traffic accidents, machinery, power tools and appliances , firearms , electrocution, and burns. Road traffic accidents which was responsible for 152 cases out of 187 cases of traumatic amputation was the major cause.

Third most common cause was due to Malignancy (4.38%). Malignancies include Squamous cell carcinoma, Osteosarcoma, Giant cell carcinoma, Ewing sarcoma and Myxofibrosarcoma.

Three amputee patients underwent lower limb amputation due to acute limb ischemia following COVID-19. Other causes were infection- 6 cases(1.17%), congenital- only 1 case (0.2%).

### Discussion:-

This Cross-sectional study done among amputee patients reported for prosthesis fitting and disability certificate at Government Institute of Rehabilitation Medicine, KK Nagar from January 2022 to December 2022 revealed that middle aged and males had higher preponderance for amputation.

This finding was similar to a study done in US in which mean age of amputees was 55 years and about 70% were males. While in another study done in South India in 2011, males had higher amputation rate but the mean age of the amputees was 30 years. In the above study, the major cause for amputation was trauma while the major cause of

amputation in our study was dysvascular diseases. The finding of our study is similar to the study done in US in which the vascular causes were the major cause of amputation.

Many factors may have contributed to the observed increase in the incidence of amputation due to vascular diseases. Increased prevalence of diabetes, smoking, hypertension, and hypercholesterolemia—important risk factors for peripheral vascular disease and amputations which have been documented in recent studies may explain these findings. Changes in clinical management and healthcare delivery may also be contributing to the increasing rates of dysvascular amputations.

Our study also showed that Lower limb amputation was more common which is similar to the findings in the South Indian study (UL: LL=24:76%) and in the US study (UL:LL=35:65%). This is in support of the finding which says that the leading cause of amputation is diabetes which leads to diabetic foot syndrome.

Our findings reveal striking similarities by aetiology in rate of limb loss. In 1996, the rate of diabetic foot syndrome amputations was almost 8 times greater than that of trauma-related amputations which was the second-leading cause of limb loss. Amputations due to malignancy occurred at significantly lower rates. Recent studies indicate a trend toward more aggressive use of limb sparing procedures for management of osteosarcomas suggesting that change in medical practice may largely account for the observed decline in the incidence of limb loss due to malignancies(11,12)

In contrast to declining rates of trauma-related and cancer-related amputations, we found evidence of a significant increase in the incidence of amputations due to diabetic foot syndrome.

Overall, the risk of amputations increased with age. This was true for all aetiologies and for both sexes. Males with an average age of 50 generally at higher risk for limb loss than women.

The finding of a higher male-to-female ratio in diabetic and trauma-related amputation rates is consistent with results reported in several other studies.

Malignancy as a cause for amputation have been found as the third most common cause in this study. The south Indian studies in 2011 also confirms the same. Another study supporting the similar findings is the US trends in 2013.

The risk of trauma related amputations may also be attributed to several causes. The aggressiveness of both reconstructive (limb salvage surgery and reimplantation of severed digits), improved occupational safety standard, increased awareness and enforcement of overall safety regulations can lead to decrease in the rate of amputation due to trauma.

We conclude from our study that diabetes and trauma were the leading causes of amputation which are highly preventable. Amputation due to diabetes can be prevented by early diagnosis, strict hyperglycaemic control, proper foot care with appropriate footwear. To prevent amputations due to trauma ensuring safety measures at the workplaces and implementing road safety measures can be helpful.

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