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## Incidence and causes of lower-limb amputations in a tertiary care center: Evaluation of the medical records in a period of 2 years

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### Abstract

**Aims:** The aim of the study is to outline the incidence, patterns and causes of lower limb amputations among patients attending a tertiary care center in Mangalore, India.

**Methods:** This is a retrospective study which was done at tertiary care center in Mangalore, India., from June 2016 to May 2018. Data was collected from the medical records online system of the hospital. Search will be made using search words like limb amputation, gangrene, diabetes mellitus, PVD, wound infection, wound dehiscence and wound debridement. The following parameters of all the patients who had lower limb amputation (LLA) during this period were recorded: Age, sex, indication for amputation, level of amputation and complications.

Incidence rates were calculated using the number of discharges for diabetes and non-diabetes related lower extremity amputations as the numerator and estimates of the resident population with and without diabetes as the denominator.

**Results:** Over a period of 24 months, 243 LLAs were performed. Age of the patients ranged from 20 to 70 years with an average age of 53.5 years. 81.89% of the amputees were males. Diabetic foot complications were the most common indication for LLA in our series. Followed by peripheral arterial occlusive disease and also there were a few cases of trauma and rarely tumors. Toe disarticulation was the most common type, followed by transtibial amputation and transfemoral. Infection was the most common complication that involved 64 amputation stumps, followed by wound dehiscence which occurred in 11.

**Discussion:** In limb amputations, the indications are many and the pattern varies from place to place [15, 16]. The general trend usually is PVD being the leading cause in the developed countries because of increasing life expectancy and sedentary life style. Males are always at risk of trauma, especially in the developing countries where male population work outside and thus exposed to the accidental hazards, moreover, males are more prone to risk factors for PVD like cigarette smoking and tobacco chewing. An early minor amputation can prevent a later major amputation [25]. Thus, minor amputations may reflect improved quality of care with earlier intervention; consequently preventing the progression from minor to major amputation.

**Keywords:** Lower limb amputation, diabetes, Pvd, Trauma

### Introduction

Amputation” derived from the Latin word “amputare “(to excise, to cut out) has been defined as the “removal of part or all of a body part enclosed by skin [1]”. The most common indications for amputation vary from study to study. Trauma, complications of diabetes mellitus and peripheral vascular disease are some of the most common indications that are recorded [2]. Complications of diabetes mellitus is widely accepted as the most common cause for major limb amputation with figures ranging from 25% to 90% depending on the study [3]. This is followed by non diabetic vascular insufficiency and trauma [4, 5]. The surgeon, when removing a limb, is primarily concerned with saving the life of a patient or getting rid of a diseased or badly injured part of a limb under adverse conditions.

Lower limb amputation (LLA) can be major or minor. Major LLA is the one, which is performed at the level of the ankle or above [6]. The most common indication for LLA varies in different parts of the globe, however, trauma and peripheral vascular disease (PVD) including diabetic foot constitutes the major burden [7, 8].

According to Ebskov *et al.* the reported male:female ratios from the UK, USA and Scandinavia are 2:1 and this has not altered over the last 20 years [10].

According to Masood *et al.* the most common indication in developing countries is complications of diabetes mellitus and trauma [11]. These findings are not in agreement with other studies which reported trauma as the most common indication for major limb amputation

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[12, 13], In developed countries, atherosclerosis is the most common indication for lower limb amputations while in developing countries diabetic foot and trauma are the leading causes.

Dormandy and Thomas in 1988 reported that saving the knee joint increases the amputee's rehabilitation potential [14]. Although globally there is a fall in the number of AK amputations as there are more and more efforts to save the knee joint.

The usual complication rates range between 20-40% as reported by a study conducted by Chalya *et al* in Tanzania and by Esoh *et al* in Nigeria [9]. The most common complication was superficial surgical site infection.

**Aims and objectives**

The aim of the study is to outline the incidence, patterns and causes of lower limb amputations among patients attending a tertiary care center in Mangalore, India.

**Inclusion criteria**

1. Inclusion criteria was all patients who underwent lower limb amputation, more than 20 years of age

**Exclusion criteria**

1. Exclusion criteria was patients those who were less than 20 years of age and those patients who underwent amputation from another centre and came to our hospital for follow up or management of complications.

**Materials and methods**

This is a retrospective study which was done at tertiary care center in Mangalore, India, from June 2016 to May 2018. Data was collected from the medical records online system of the hospital. Search will be made using search words like limb amputation, gangrene, diabetes mellitus, PVD, wound infection, wound dehiscence and wound debridement. The following parameters of all the patients who had lower limb amputation (LLA) during this period were recorded: Age, sex, indication for amputation, level of amputation and complications. In case there was a conversion to a higher level, the amputation level was recorded as the new revised level. Other post op complications if present was studied and recorded. Data was collected and analyzed using SPSS version 18 computer software and other appropriate statistical tests.

**Results**

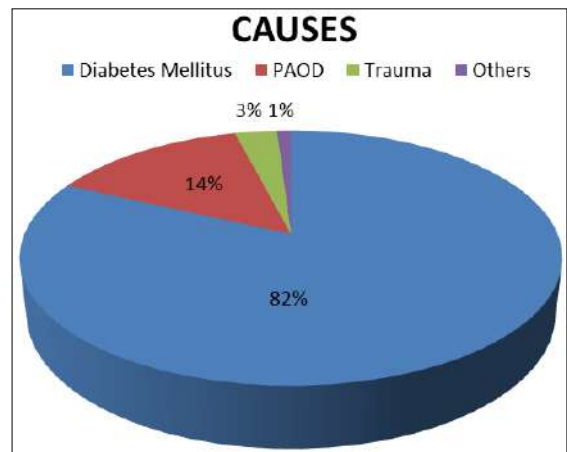
Over a period of 24 months, 243 LLAs were performed. Age of the patients ranged from 20 to 70 years with an average age of 53.5 years. 81.89% of the amputees were males. (Table 1)

Diabetic foot complications were the most common indication for LLA in our series. Followed by peripheral arterial occlusive disease and also there were a few cases of trauma and rarely tumors. (Figure 1)

Toe disarticulation was the most common type, followed by transtibial amputation and transfemoral. Infection was the most common complication that involved 64 amputation stumps, followed by wound dehiscence which occurred in 11. All the infected stumps required debridements with suturing and only 6% required a revision amputation at a more proximal level. There was one mortality noted during the study period. (Table 2)

**Table 1:** Gender distribution

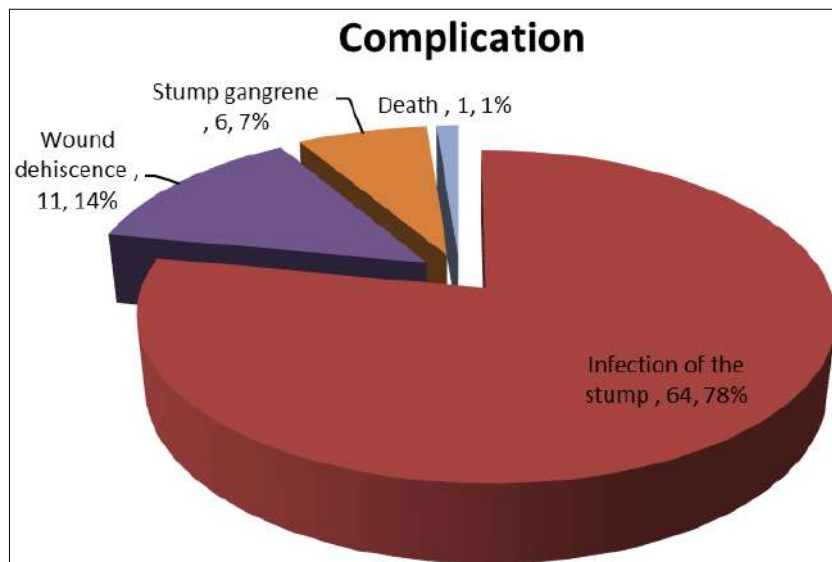
Gender	Frequency	Percentage
Male	199	81.89%
Female	44	18.11%
Total	243	100%



**Fig 1:** Causes of lower limb amputations

**Table 2:** Rates of Complications

Complication	Number of patients (%)
Infection of the stump	64 (26.33%)
Wound dehiscence	11 (4.52)%
Stump gangrene	6 (2.4%)
Death	1 (0.4%)



## Discussion

In limb amputations, the indications are many and the pattern varies from place to place [15, 16]. The general trend usually is PVD being the leading cause in the developed countries because of increasing life expectancy and sedentary life style [17]. Pooja and Sangeeta in their epidemiological report from January 2008 to January 2010 from Kolkata, India found 70.3% of the amputations were traumatic [15]. Paudel *et al.* in retrospective review from 1997 to 2004 found RTA leading cause accounting for 74.29% of LLA in adult population in a tertiary care hospital of Nepal [18]. In our series, only 82% limbs were amputated for diabetic foot complications and 14% limbs for vascular etiology, 3% due to trauma and 1% due to other causes like tumors.

Mean age of the population is 53.5 years which was not similar to the findings in other studies, which showed the mean age to be around 30 to 50 years of age [19, 20]. This difference is probably because in those studies, trauma was the second most common indication for amputation and the younger age group was affected more. As the age of onset of diabetes reduces and the age of survival increases, more time exists for complications of diabetes including LLA to develop [21, 22].

According to Ebskov *et al* the reported male: female ratios from the UK, USA and Scandinavia are 2:1 and this has not altered over the last 20 years [10]. findings from our study also show an obvious male predominance.

Males are always at risk of trauma, especially in the developing countries where male population work outside and thus exposed to the accidental hazards, moreover, males are more prone to risk factors for PVD like cigarette smoking and tobacco chewing in countries of South East Asia than the females, who mostly take care of households and are indoors. A similar study from Karachi, Pakistan had 86.6% patients as males and 86% male patients in a study from Kolkata, India [15, 23]. In a study from northern Netherland only 61% patients were males [24].

An early minor amputation can prevent a later major amputation [25]. Thus, minor amputations may reflect improved quality of care with earlier intervention; consequently preventing the progression from minor to major amputation. Dormandy and Thomas in 1988 reported that saving the knee joint increases the amputee's rehabilitation potential [14]. Although globally there is a fall in the number of AK amputations as there are more and more efforts to save the knee joint, our study showed that the most common level of amputation done is Toe disarticulation (63%). According to Nwadiaro *et al* this could be because, most of the patients present late with advanced gangrene or in sepsis where the surgeon would be forced to go for a higher level of amputation [26]. Removal of the non-functional or dying or infected limb from the body may improve the quality of life of the patient and help in early ambulation [27]. However, patients with co-morbidities, especially diabetes increases the risk of mortality in the peri-operative period [8, 10]. Mortality in the postoperative period in our series was 0.4%. One patient of PVD with a previous history of cerebrovascular accident died of cardiac arrest in the post-operative period.

Wound infection is the most common complication in the post-operative period [8]. The complication rate in our study (26.33%) was higher than that of the studies conducted by Chalya *et al* in Tanzania and by Essoh *et al* in Nigeria [8, 28]. The most common complication was superficial surgical site infection. This high rate of post-operative complications is probably because of the severity of the sepsis that the patient had prior to amputation.

## Conclusion

Complications of diabetes mellitus and vascular insufficiency

were the most common indications for limb amputations in our region. Patient education regarding lifestyle modification, proper control of diabetes, and foot care will play a pivotal role in prevention of such morbidity in diabetic patients.

No matter how good the prosthesis and replacement services available are, it will never be good enough to replace an anatomically normal and functional limb. So it cannot be stressed enough that prevention is better than cure.

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