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RESEARCH ARTICLE

ANALYSIS OF LIMB AMPUTATIONS AT A TERTIARY CARE CENTRE

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Abstract

Objectives: Limb amputation is a substantial yet preventable public health concern and disability. It is associated with substantial psychological, social, and economic consequences for patients and their families. This study was conducted to evaluate the demographic and clinical profile of patients undergone amputations .

Methods: An observational record based study was conducted between October 2022 and September 2023 in the department of General surgery of a tertiary care hospital situated in South India. A semi-structured questionnaire was used to collect the details through the registers maintained in Operation Theater.

Results: A total of 53 study subjects were included in the study. The mean age of the study subjects was 51.23±66 years. Majority of the participants were in the age group of 51-60 years followed by 41-50 years. There was male gender preponderance with almost 3/5th of study subjects being male. The main indication of amputation in the current study was diabetes complication followed by peripheral vascular disease. Above knee and below knee amputations were majorly performed. Surgical site infection was most common reported post-operative complications.

Conclusion: Diabetes complications and peripheral vascular diseases were the most common indications of amputations in our study which can be prevented through appropriate lifestyle modifications and prompt treatment.

Introduction:-

Amputation, originating from the Latin term “amputare” (to excise, to cut out), is defined as the removal of a portion or the entirety of a body part encased by skin.[1] Limb amputation constitutes a significant yet preventable disability and public health issue. It is linked to significant economic, social, and psychological impacts on patients and their families. Limb amputation significantly impairs individuals' mobility. It also renders individuals reliant on others. It also impacts individuals in their social, economic, and psychological dimensions. Approximately 10% of the worldwide population encounters a disability or impairment. [2] The term "disability" possesses various interpretations; the WHO, in its article on the Global Burden of Disease, defines "disability" as a loss of health concerning functional capacities such as mobility, cognition, hearing, and vision. [3] Due to factors such as population growth, the emergence of chronic diseases, aging, and the advancement of the medical field, the number of

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individuals with disabilities is on the rise. This has resulted in a longer lifespan and a greater demand for health and rehabilitation services. [4] Among the numerous causes of disability, amputation ranks as one of the foremost contributors. Furthermore, it is among the most ancient surgical disciplines. The rise of industrialization, particularly through mechanical transportation, has led to an increase in the number of amputees.[5]

Limb amputation is conducted to excise necrotic tissue or to alleviate pain resulting from trauma. The procedure is executed when limb salvage is unfeasible. Lower limb amputation is among the most ancient surgical procedures in the annals of surgery. Amputation has been performed as a surgical procedure since the time of Hippocrates, when it was performed for a variety of reasons, including punitive, ritualistic, and therapeutic intent.[6]. Peripheral vascular disease and diabetes mellitus are the primary risk factors for lower limb amputations. These operations are associated with high rates of postoperative mortality (7-23%) and morbidity (15-40%). Low-income countries are home to approximately 30 million amputees. Each year, the amputee population in India increases by 23,500 individuals, with 20,200 of them being male and 3,300 being female. [7] Above-knee and below-knee amputations are typically performed on patients who have failed to undergo revascularization, have comorbidities or anatomical factors that prevent revascularization, or have experienced extensive tissue loss or infection. [8]

Though predominant indications for amputation vary across study areas, trauma, complications of diabetes mellitus, and peripheral vascular disease are among the most frequently documented indications. Diabetes mellitus complications are widely recognized as the predominant cause of major limb amputation, with prevalence rates varying from 25% to 90% based on the study. This is succeeded by non-diabeticvascular insufficiency and trauma.[9] The most prevalent postoperative complications of amputation are phantom pain, stump hematoma, flexion contracture, infection, and surgical revision, in addition to the risk of mortality.The post-operative 30-day mortality and complications of amputations have a detrimental effect on the quality of life and overall health of amputees, resulting in a decrease in the productivity of the workforce and an increase in the national economic burden.[10]The surgeon, during limb amputation, prioritizes preserving the patient's life or excising a diseased or severely injured limb segment under challenging circumstances. The rehabilitation of amputees is both challenging and rewarding, as lower-extremity amputations significantly affect individuals' psychological and physical well-being, mobility, and social life. [11] To enhance rehabilitative facilities for patients, it is crucial to implement efficient record keeping and conduct thorough analysis of the data. Documentation of various epidemiological parameters concerning amputees in India is seldom encountered in medical literature. [12] At present, advanced technologies are being employed that are driving significant changes in rehabilitative prostheses. Therefore, it is essential to comprehend the current landscape and profiles of amputees in specific regions of India. Hence this study was conducted to determine the demographic profile and clinical profile related to amputations performed among the patients in a tertiary care hospital

Aims and Objectives:-

1. Sex preponderance
2. Most common age group for amputation
3. Most common type of amputation performed
4. Most common cause of amputation

Methods:-

Study design:

This was a prospective observational analytical based study conducted in a General Surgery department of a tertiary care medical college and hospital situated in Karnataka, South India.

Study period:

The study was conducted between the period of October 2022 and September 2023.

Source of data:

The study participants were recruited using the operation theatre register maintained in the department of General Surgery in prospective manner. On every Sunday of each week of the study period, the register was checked and the patients who underwent major limb amputations were included in the study.

Inclusion criteria:
Universal sampling method was employed which means that all eligible participants were included in the study during the entire study period.

Exclusion criteria:
Those patients who underwent wound debridement were excluded from the study.

The demographic details and details about the amputation such as indication, type of indication and post-operative complications were collected using a semi-structured questionnaire. The collected information was entered in MS Excel and interpretation of data was done using SPSS software 24. The data was checked for normality using kolmogorov-smirnov test and it was found that all quantitative data was normally distributed. Descriptive statistics such as frequency, percentages, mean and standard deviation were used to

Results:-

A total of 53 Limb amputations were performed during the study period. Among these study participants majority were males of about 73% (39) as shown in Fig-1. The mean age of the study subjects was 51.23±66 years. Majority were belonging to the age category of 51-60 years (30.1%) followed by 41-50 years(28.3%) as depicted in table 1. Table 2 shows the various indications for which the amputations were performed for the study participants. Most of the amputations (47.2%) were performed because of ulcer caused due to uncontrolled diabetes mellitus. This was followed by peripheral vascular diseases(33.9%), infections(15.1%%) and trauma(3.9%).

Table 3 shows the various types of amputations performed among the study participants in which below knee amputation(50.9%) was most commonly performed followed by above knee amputations(43.4%). Very less proportion i.e only two above and one below elbow amputations were performed during the study period. With regards to post-operative complications, surgical site infection (56.6%) was most common one which was followed by wound dehiscence(13.2%), wound hematoma(1.8%), phantom pain(1.8%) and gangrene of the stump(1.8%). About 24.8 % of the study participants had never reported with any of the major post-operative complications.

Table 1:- Age Distribution of the study subjects.

S.No	Age category	Frequency	Percent
1	<40 years	6	11.3%
2	41-50	15	28.3%
3	51-60	16	30.1%
4	61-70	9	17%
5	>70	7	13.2%

Fig. 1:- Gender distribution of the study subjects.

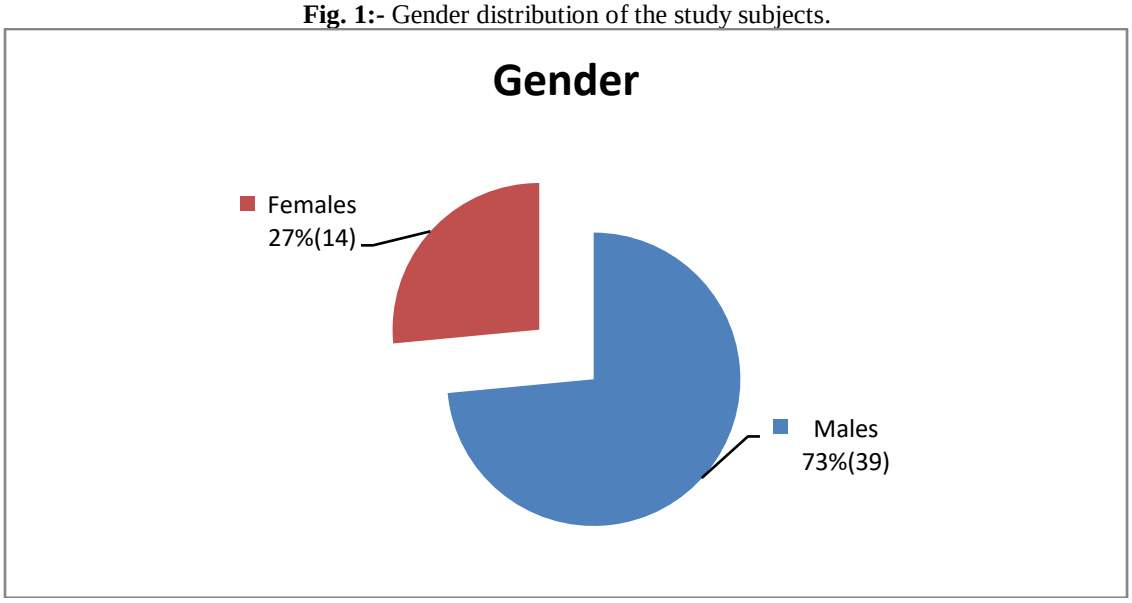

Table 2:- Distributions of various indications for which amputations performed for study subjects(N=53).

S.No	Indications	Frequency	Percent
1	Diabetes	25	47.2%
2	Peripheral Vascular disease	18	33.9%
3	Infections	8	15.1%
4	Trauma	2	3.8%

Table 3:- Type of amputation performed:

S.No	Type of amputation	Frequency	Percent
1	Above Knee	23	50.9%
2	Below Knee	27	43.4%
3	Above elbow	2	3.7%
4	Below elbow	1	1.8%

Fig 2:- Post-operative complications among the study subjects.

S.No	Post-operative complications	Frequency	Percent
1	Surgical site infection	30	56.6%
2	Wound Hematoma	1	1.80%
3	Wound dehiscence	7	13.2%
4	Stump gangrene	3	1.80%
5	Phantom Pain	1	1.80%
6	No Post Op Complications	11	24.8%

Discussion:-

This study was conducted to study the demographic and clinical profile of the patients for which amputation was performed in a tertiary care center through the records maintained in the operation theater. The mean age of the study subjects in the current study was 51.23±66 years. Majority of the study participants were in the age group of 41-50 years(28.3%) and 51-60 years(30.1%). The above findings are comparable to study findings of Tamfu NS et al which showed mean age of 54.28 years (SD ±19.28) years. This observation of 40-60 years being more common age group affected is supported by a study conducted by Bello Bet al. This clearly explains the fact that diabetes complications which are the main cause of amputations are more prevalent among these groups. In the present study, almost three-fourth (73%) of the amputations was performed among male patients. This finding is consistent with similar observational studies conducted by Kow RY et al and Unnikrishnan EP et al. The reason behind this male gender preponderance could be male being more affected by diabetes, trauma and peripheral vascular disease

In the current study, diabetic foot ulcer (47.2%) was the main indication for doing amputation among the study subjects which was followed by peripheral vascular disease(33.9%) and other infections(15.1%). According to Masood et al., the predominant indication in developing countries is complications arising from diabetes mellitus and trauma. [17] The findings are inconsistent with other studies that identified trauma as the predominant reason for major limb amputation. [18,19] Atherosclerosis is the predominant cause of lower limb amputations in developed countries, whereas diabetic foot and trauma are the primary contributors in developing countries.

It was found that lower limb amputations(below knee-50.9%, above knee-43.4%) were done mainly in our study. Dormandy and Thomas (1988) reported that preserving the knee joint enhances the rehabilitation potential of amputees.[20] Despite a global decline in the incidence of above knee limb amputations due to increased efforts to preserve the knee joint, our study indicates that the predominant level of amputation performed remains above-knee, accounting for 53% of cases. Nwadiaro et al. suggest that this may be due to the tendency of most patients to present late with advanced gangrene or sepsis, necessitating a higher level of amputation by the surgeon.[21] This observed high level of above knee amputations performed tells about the severity of the cause which mainly diabetic foot ulcer and peripheral vascular disease. Hence the importance of strict diabetic control and preventive measures of smoking should be ensured to control this incidence of amputations.

In terms of post-operative complications after amputation procedure, surgical site infection (56.6%) was the most common one reported which was followed by wound dehiscence. Consistent with other studies, the most prevalent complication in this research was surgical site infection, occurring in 25.8%, followed by phantom limb sensation at

10.06%, and wound dehiscence observed in 8.2% of amputations . [22,23] Shaw et al. in their investigation on quality of life and complications in lower limb amputees in Tanzania, indicated higher rates of surgical site infections (SSI), with 51% of amputations affected. In contrast, other authors, including Alegbeleye et al., reported lower rates of SSI.[23.24] The observed differences in complication rates can be attributed to the severity of complications resulting in amputation which is decided by the patients adherence towards treatment. In addition, rate of complications being reported, delayed hospital presentation, and the surgeon's experience on amputation procedures also decides the occurrence of post-operative complications. Our study was an observational hospital based study conducted through the data in records, hence the causality of above mentioned inferences cannot be proved and also the results cannot be generalized.Hence the confirmation of these observations should be done with further research using analytical studies.

Conclusion:-

In our study, the predominant reasons for limb amputations were complications associated with diabetes mellitus and vascular insufficiency. It is imperative that patients are informed about the potential complications of diabetes at an early stage of the disease. These patients must be reminded of the necessity of maintaining proper glycemic control and the significance of protective footwear. Patients with vascular insufficiency should be informed about the complications associated with smoking and should be encouraged to cease smoking. It is imperative to provide patients with easy and early access to healthcare in order to identify them before they develop advanced disease. With timely intervention, these patients can lead a normal or nearly normal life.Trauma is the most prevalent cause of amputation in younger individuals, despite its lower ranking on the list in terms of the indication for amputation. Limb loss at an early age is linked to a severe economic crisis for the family. It is imperative to emphasize that prevention is unquestionably superior to cure, as the patient is left reliant on a prosthesis for the remainder of their life. The patients arrive at the hospital late, which makes it challenging to salvage the limb. However, we are frequently compelled to perform a more severe amputation.Regardless of the quality of prosthetic and replacement services, they cannot fully replicate an anatomically normal and functional limb. It is essential to emphasize that prevention is superior to treatment.

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