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Research Article

Trends and Causes of Major Lower Limb Amputation in Bahrain: A Comparative Study

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Abstract

Background: Major lower limb amputation (MLLA) Inflicts significant psychological and socioeconomic Pressure for the patients and families. worldwide, diabetes mellitus (DM) and peripheral vascular disease are the leading causes for lower limb amputations [1]. Similar to developed countries, Bahrain exhibits a high prevalence of diabetes mellitus [2].

Objective: To compare the causes and characteristics of Major lower limb amputation in Bahrain between the periods of 2015–2016 and 2018–2023, highlighting any epidemiological shifts.

Methods: A comparative analysis was conducted using data published in 2017 a prospective study done from period May 2015 to 30 April 2016 and vascular registry records from Salmaniya Medical Complex for the years 2018 through 2023. Patient demographics, indications for amputation, and surgical details were analyzed.

Results: In 2017 dataset, 84.4% of MLLAs were Associated with DM and its complications. From 2018 to 2023, this figure increased to 94.1%. Trauma-related amputations accounted for only 2.4% of cases in the recent dataset compared to 4.4% in the 2017 dataset, Cases with unspecified causes mainly due to missing data remained low in both datasets. Across all years, most amputations were reported in males over the age of 60.

Conclusion: Major lower limb amputations due to DM has increased significantly, from 2017 to 2023 supporting the need for urgent and Extensive diabetes management strategies in Bahrain.

Keywords: Major Lower Limb Amputation (MLLA); Bahrain

Introduction

Amputation is a surgical procedure often needed or used for irreversible ischemia can't be controlled by intervention radiology, infection can't be controlled by antibiotics or dressing, or crash injury. indication for major lower limb amputation remains largely unchanged in diabetic and vascular patients [3].

Major lower limb amputations are defined as amputations performed proximal to the ankle joint [3] and are often the final therapeutic measure in patients with severe and life-threatening lower limb pathology and conditions. worldwide, the incidence of MLLA varies significantly, from 3.8 per 100,000 in Japan to over 23.6 per 100,000 in the United States [4].

In Bahrain, a prospective study conducted in May 2015 to April 2016 and published in 2017 at the Salmaniya Medical Complex reported that 84.4% of amputations were due to DM-related complications [2] With the rising number of people diagnosed by diabetes, and given that lower limb amputations are a common and serious complication of diabetes, which significantly impacting patients' quality of life due to prolonged course of treatment, pain, disability and societal pressure and increasing healthcare burdens, it is important to reevaluate current trends and data to better guide health planning and resource allocation.

Methods

This study uses a retrospective comparative design

- **2015-2016 data:** Extracted from a prospective study conducted between May 2015 and April 2016, published in the Bahrain Medical Bulletin
- **2018-2023 data:** Extracted from a ISEHA database system from Salmaniya Medical Complex, including annual records from 2018 to 2023 for all patients underwent major lower limb amputation procedures either above or below knees.

Variables analyzed include patient age, gender, nationality, level and side of amputation, and primary cause. Descriptive statistics were used to calculate frequencies and distributions. Data analysis was performed using Python (pandas library).

Results

Patient demographics

- 2015-2016: Median age 66 years; 64.4% male; 91.1% Bahrainis
- 2018–2023: Majority over 60 years; predominantly male; Bahrainis formed the majority

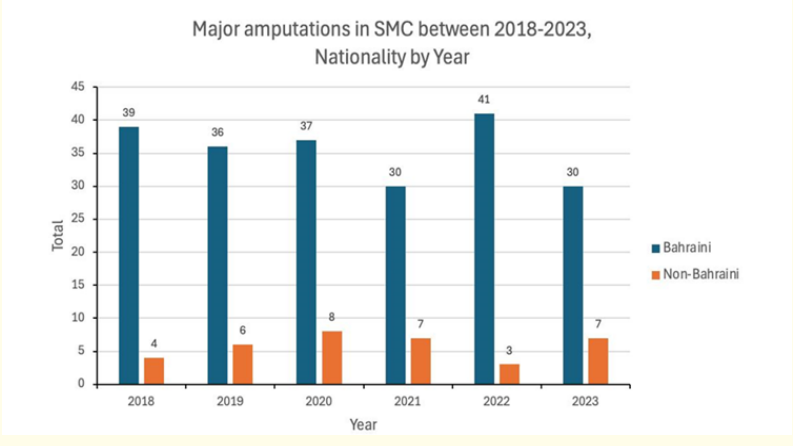

Figure 1: Major Amputations by Nationality at Salmaniya Medical Complex (2018–2023).

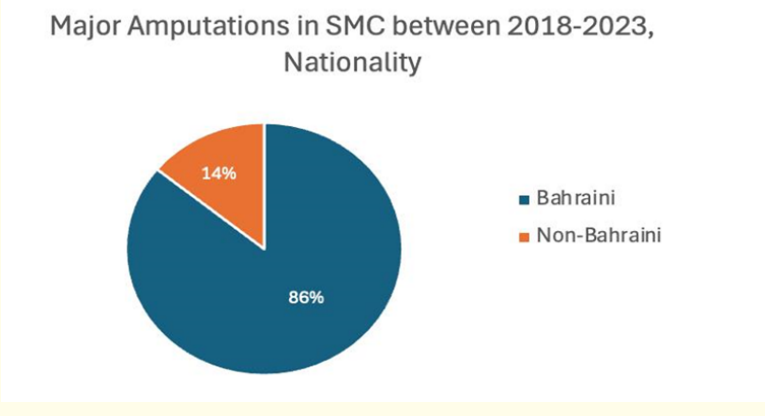

Figure 2: Major Amputations by Nationality at Salmaniya Medical Complex (2018–2023).

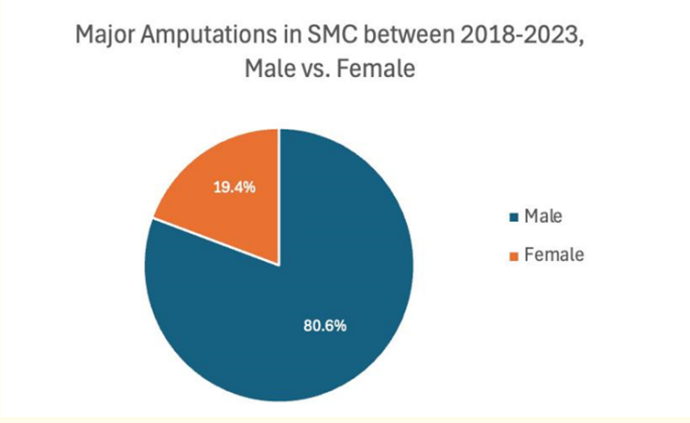

Figure 3: Major Amputations by Gender at Salmaniya Medical Complex (2018–2023).

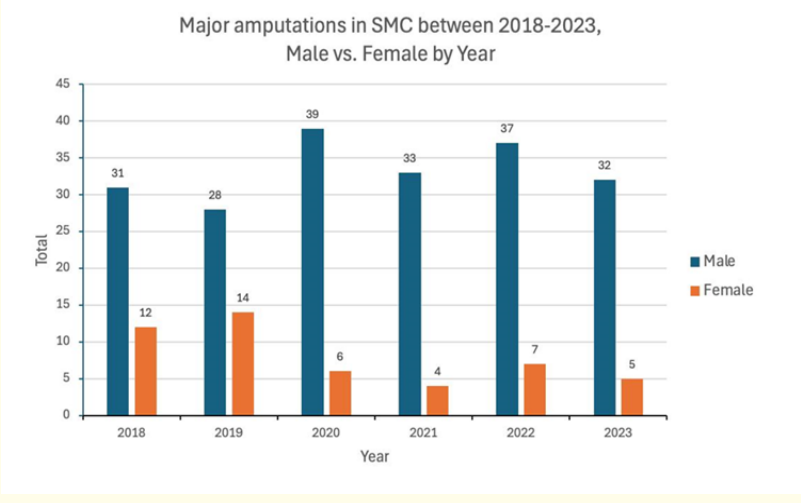

Figure 4: Major Amputations by Gender at Salmaniya Medical Complex (2018–2023).

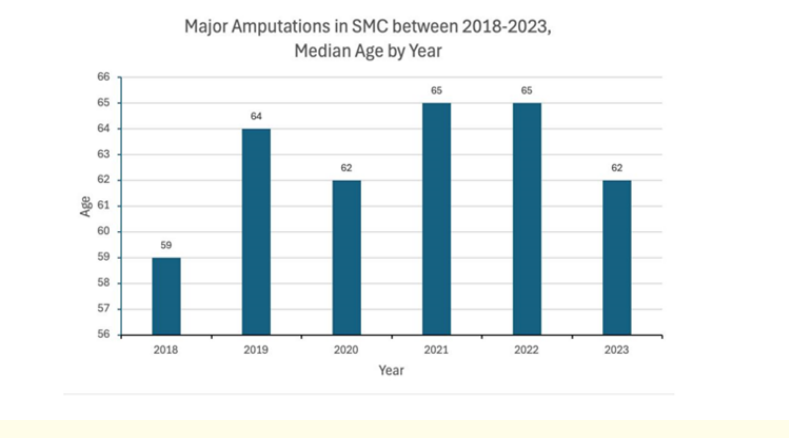

Figure 5: Median Age of Patients Undergoing Major Amputations at Salmaniya Medical Complex between 2018 and 2023.

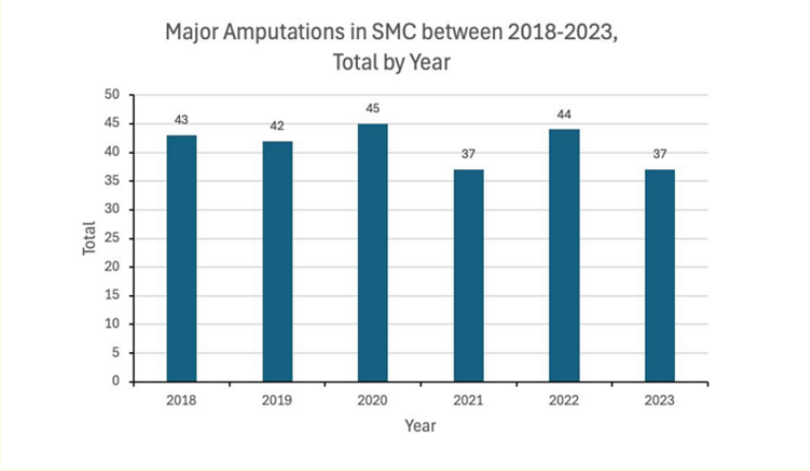

Figure 6: Annual Total of Major Amputations at Salmaniya Medical Complex (2018–2023).

Indications for Amputation between the two cohorts

In comparison Between 2015-2016 cohort and recent cohort of 2023, there was a significant increase in diabetic-related amputations, rising from 84.4% to 94.1%, indicating a growing impact of diabetes as a primary cause of all amputations in Bahrain. In contrast, trauma-related cases decreased from 4.4% to 2.4%. Cases with unspecified or other causes also declined dramatically, from 11.2% to 3.5%.

Overall Cause Distribution (2018–2023)

Among 254 cases reviewed from 2018–2023, 239 were related to diabetes and its complications. Trauma-related cases numbered just 6, while another 9 cases were unspecified or missing data.

Comparison between the Causes of Amputation between 2015-2016 and 2023

In 2015-2016, 84.4% of amputations were due to diabetes-related complications; this percentage increase to 92.1% in 2023. Trauma-related amputations decreased from 4.4% to 2.6%. Cases related to acute ischemia and other causes also declined. The majority of patients in both cohorts were over 60 years old and predominantly male.

Table 1: Comparison of Indications for Major Amputations Between 2015–2016 and 2018–2023.

Indications for Amputation		
Cause	**2015-2016 (%)**	**2018–2023 (%)**
Diabetic-related	84.4%	94.1%
Trauma	4.4%	2.4%
Unspecified/Other	11.2%	3.5%

Overall Cause Distribution (2018–2023)		
Cause	**Count (N)**	**Percentage (%)**
Diabetic-related	239	94.1%
Traumatic	6	2.4%
Unspecified	6	2.4%
No data	3	1.2%

Table 2: Overall Distribution of Causes for Major Amputations Between 2018 and 2023.

Amputation Level and Laterality

Above-knee amputations remained more common in both studies. Laterality data from the recent years showed a predominance of unilateral amputations, with a slight preference toward left-sided involvement. Bilateral amputations were rare throughout the dataset.

Comparison between the Causes of Amputation between 2015-2016 and 2023		
Year	**2015-2016**	**2023**
Number of patients (Number of amputations)	45 (47)	38 (38)
Cause	(N) (%)	(N) (%)
Diabetic-related causes	(38) 84.4%	(35) ≈ 92.1%
Trauma	(2) 4.4%	(1) ≈2.6%
Acute ischemia/Other	(7) 11.2%	(2) ≈ 5.3% (no data)

Table 3: Comparison between the Causes of Amputation between 2015-2016 and 2023.

Discussion

This extended comparative study highlights a concerning upward trend in diabetes-related amputations in Bahrain. The 94.1% rate from 2018 to 2023 Exceeds that of 2015-2016 and is significantly higher than figures reported in developed country such as the UK [5] and Spain [6] where organized and regular diabetic foot care awareness programs have reduced amputation rates. The socioeconomic and educational profiles of affected individuals may contribute to these outcomes. In 2015-2016, 66.7% of patients had no university education, a factor echoed in global literature linking health literacy and poor diabetic outcomes [7].

Improvements in trauma care and vascular interventions may explain the modest decline in non-diabetic amputations. However, the continuous increase in diabetic cases suggests insufficient control of diabetes at the community level, possibly due to lifestyle, late presentation, or suboptimal outpatient management. International studies emphasize that diabetic patients face up to a 30-fold higher lifetime risk of amputation [8]. Moreover, survival post-amputation remains low, with 5-year mortality rates often exceeding 50% [9].

Conclusion

Diabetes mellitus remains the dominant cause of major lower limb amputation worldwide. In Bahrain, diabetes with its prevalence as an etiological factor increasing from 84.4% in 2015-2016 to 94.1% during the period 2018–2023. Trauma and other vascular causes have decreased in relative frequency. These trends raise the urgency of establishing a clear national diabetes control program and diabetic foot multidisciplinary team involve: 1- Endocrinologists: Manage overall diabetes control and metabolic factors; 2- Vascular surgeons: Assess and treat peripheral arterial disease; 3- Podiatrists: Provide specialized foot care and biomechanical assessments; 4- Orthopedic surgeons: Address structural foot deformities; 5- Plastic surgeons: Perform complex wound closures and tissue reconstruction, 6- Infectious disease specialists: Manage complex wound infections, 7- Nutritionists: Optimize nutrition for wound healing and glycemic control; 8- Physical therapists: Assist with mobility and offloading strategies; 9- Wound care specialists: Provide advanced wound care techniques; 10- Psychologists: Address psychological aspects of chronic wound management; 11- Nurses: Coordinate care, provide wound care, and educate patients improving patient education, and expanding preventive care.

Conflict of Interest

The authors have no conflict of interest to declare.

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