Trauma Monthly 2025; 30(5): 1582-1590

10.30491/tm.2025.512354.1815

Trauma Monthly

Research Article

Current Trends and Associated Factors of Traumatic Amputations in Shiraz

Mojtaba Norouzi[1], Neda Malek Mohammadi[2], Hossein Moameri[3], Mahnaz Yadollahi*[4]

[1] Department of Epidemiology and Biostatistics, School of Health, Shahrekord University of Medical Sciences, Shahrekord, Iran.
[2] Department of Biostatistics and Epidemiology, School of Public Health, Kerman University of Medical Sciences, Kerman, Iran.
[3] Department of Epidemiology, School of Public Health, Shahroud University of Medical Sciences, Shahroud, Iran.
[4] Trauma Research Center, Shahid Rajaee (Emtiaz) Trauma Hospital, Shiraz University of Medical Sciences, Shiraz, Iran.

***Corresponding Author:** Mahnaz Yadollahi, Trauma Research Center, Shahid Rajaee (Emtiaz) Trauma Hospital, Shiraz University of Medical Sciences, Shiraz, Iran. Tel: 987136364001; E-mail: mahnazyadollahi@gmail.com, Orcid: 0000-0002-6434-0931.

Received 2024-12-05; **Accepted** 2025-08-25; **Online Published** 2025-10-29

Abstract

Introduction: Amputations from trauma can lead to disability and pose a challenge for health care services. This study hopes to shed light on the trend, the changes, outcomes, and factors associated with trauma leading to amputations in Shiraz, Iran.

Method: A cross-sectional study was conducted to assess patients who experience amputations due to trauma in Shiraz from 2017 to 2023. The sampling method consisted of patients hospitalized at Shahid Rajaee Hospital in Shiraz. We included participants who were hospitalized for traumatic amputations. Outpatients, follow-up cases, and non-trauma-related amputations were excluded from the analysis. Data collection included variables such as admission year, gender, age, and level of amputation.

Result: 435 patients were included, and 92.2% were males. The average age of patients was 36.1 years, and the majority of patients (88.8%) underwent minor amputations. Amputation was most common among motorcycle riders (47.5%), while traffic accidents and lower limb injuries significantly contributed to major amputations, accounting for 21.9% and 51.3% of cases, respectively. The average hospital stay was 5 days. The majority of patients stayed over two days. Upper limb injuries and amputations had a significant association ($p < 0.001$), as well as contact with a blunt object and amputation ($p = 0.002$). The presence of many injuries was associated with shorter stays in a hospital ($p = 0.045$). We found a statistically significant increase in amputations by gender ($p <0.001$) and type ($p=0.006$) during the study period. The overall trend peaked in 2022.

Conclusion: The pattern of limb loss rates among participants, mostly men, was worrisome. Motorbike drivers are clearly at greater danger, and road accidents play a big part in severe amputations. The association between arm injuries and amputations shows the need for focused ways to stop this.

Keywords: Amputations, Trend, Traumatic, Iran.

Introduction

Losing a limb brings about disability, greatly restricts movement and bodily ability, and has created a big health cost issue around the world in recent years.[1] Amputations can be pretty risky, needing quick doctor help to stop heavy bleeding and possible sickness; also, they might result in ongoing problems like long-lasting pain and mental harm.[2] The financial strain of losing a limb is important, raising not just the costs for the first care but also the ongoing bills tied to recovery and artificial limbs.[3, 4] Furthermore, missing work becomes a serious problem because many people face formidable obstacles when trying to get back on job.[4] In addition to that, loss of limb can bring emotional effects such as sadness or worry which impact not only the person but also affect their family members or friends' network.[5, 6] A comprehensive understanding of traumatic amputation statistics and their underlying causes is essential for developing targeted prevention strategies and informing evidence-based public health policies to reduce their incidence and their impact.[7, 8]

The leading causes of amputation vary from region to region; peripheral vascular disease and diabetes are the predominant factors in developed countries.[9] This trend can be attributed to the increasing prevalence of these conditions and the substantial burden they impose on patients.[10], [11] In contrast, trauma remains the primary cause of amputation in developing countries.[4] Global data indicate a significant rise in the prevalence of traumatic amputations, increasing from 370.25 million cases in 1990 to 552.45 million in 2019, reflecting an increase of 49.2%.[3] The primary causes of trauma were falls (36.2%), road traffic injuries (15.7%), other transportation-related injuries (11.2%), and mechanical forces (10.4%).[12] Traumatic amputation is a disabling surgical intervention employed as a last option when a limb sustains severe injury, frostbite, burns, or electrical damage, resulting in irreversible loss of blood supply that cannot be effectively repaired or treated. This procedure is often necessitated when serious complications pose a life-threatening risk, despite the high costs and functional limitations compared to prosthetic alternatives [2]. Notably, with economic development and increased vehicle density, the incidence of traumatic amputations resulting from road traffic accidents in developing countries is on the rise [13]. Traumatic amputation typically necessitates long periods of rehabilitation, significantly affecting the patients' quality of life and imposing a considerable burden on healthcare systems [11, 12, 14]. Consequently, preventive efforts aiming at reducing its incidence are of paramount importance. However, the scarcity of epidemiological studies on traumatic amputation indicates that it remains a largely understudied problem. Although there are published studies about epidemiological trends of traumatic amputations[3, 13]. They have not focused on developing countries such as Iran [1]. Information about traumatic amputation can detect preventable causes and improve the safety of occupational and other high-risk environments. Therefore, this study aimed to provide updated information on the trends, consequences, and associated factors of traumatic amputation in Shiraz, Iran.

Methods

Design of the Study

We designed a cross-sectional study in Shahid Rajaee Hospital of Shiraz to reach our aims. Then, information was collected based on the electronic registry system between January 2017 and December 2023. All individuals from the registry system who met the eligibility criteria were included in this study. The registry serves as a representative source for trauma in Shiraz, as it is the primary referral center for all trauma cases in the area.[15]

Eligibility criteria

We recruited individuals who were hospitalized at Shahid Rajaee Hospital for traumatic amputations. Patients who came just for a short visit of less than 24 hours, those sent back for more care, and folks whose limb loss happened due to other reasons were excluded from the study.

Data Collection

This study collected data on several key variables, including the year of admission, gender, age, amputation level, presence of polytrauma, patient role, side of amputation, disability status, patient status, duration of hospital stay in days, and the season of admission.

We classified amputations into two primary categories: major and minor. Significant cuts were seen as those that included removing part of the pelvis, taking off the hip, cutting the knee, above-knee cut, above-elbow cut, below-elbow cut, and below-knee cuts decided by expert agreement. However, minor cuts included ankle cut, mid-foot cut, toe removal, hand cut, mid-hand, and wrist cut.

We also classified disability into three main categories as follows: Low disability was defined as those involving toe amputation, trans-metatarsal (midfoot) amputation, ankle disarticulation, and trans-metacarpal amputation. Moderate disability included transtibial (below the knee) amputation, trans-carpal (hand) amputation, wrist disarticulation, and transradial (below the elbow) amputation. Severe disability included knee disarticulation, transfemoral (above-knee) amputation, elbow disarticulation or higher, hip disarticulation or higher, hemipelvectomy, shoulder disarticulation, and forequarter amputations.

Sample size:

We calculated the sample size to ensure sufficient participant recruitment and enhance the reliability of the study findings. The sample size was determined using a formula with parameters set at $p = 0.14$ (based on the global prevalence of traumatic amputation in North Africa and the Middle East)[3], $d = 0.05$, and a 95% confidence interval, resulting in a required sample size of 185 participants. However, the study ultimately enrolled 435 individuals.

Statistical analysis:

Univariate analysis was conducted using the Chi-square test. Variables with a p-value of less than 0.2, taking clinical significance into account, were included in the multivariate analysis. Then, multivariate analysis was performed with logistic regression models. The logistic regression results, which include odds ratios (OR), P-values, and 95% confidence intervals (CI), were reported by Stata version 14.2. JoinPoint Regression Program (version 5.2.0) was used to determine the trend. A P-value lower than 0.05 was considered statistically significant. Also, Kaplan-Meier survival curves were made to show the survival rates of patients with minor and major amputations during their hospital stay.

Results

Of 435 individuals, 401 (92.2%) were male and 34 (7.8%) were female. Moreover, the mean age of the patients was 36.1 ± 15.4 years. Many people had minor removals, which made up 88.8% of the cases. Bike riders were at a higher risk of removal (47. 5%). Car crashes and leg injuries were major causes of many amputations, with car crashes accounting for 21.9% and leg injuries accounting for 51.3% of them (Table 1).

Table 1: Description of the factors related to amputation in Shiraz, Fars Province, Iran*

Variable	Total (n= 435)	Amputation		Chi² P Value
		Minor (n=387) (88.9)	**Major** (n= 48) (11.1)	
Gender				
Female	34 (7.8)	29 (85.3)	5 (14.7)	0.477
Male	401(92.2)	358 (89.3)	43 (10.7)	
Age, y				
≤35	247 (56.8)	220 (89.1)	27 (10.9)	0.092
36-55	136 (31.3)	125 (91.9)	11 (8.1)	
≥ 56	52 (11.9)	42 (80.8)	10 (19.2)	
Level of amputation				
Upper limb	354 (81.4)	349 (98.6)	5 (1.4)	< 0.001
Lower limb	81 (18.6)	38 (46.9)	43 (53.1)	
Cause of trauma				
Traffic accident	137 (31.5)	107 (78.1)	30 (21.9)	
Contact with a blunt object	83 (19.1)	91 (97.6)	2 (2.4)	< 0.001
Contact with a penetrative object	179 (41.1)	172 (96.1)	7 (3.9)	
Other	36 (8.3)	27 (75)	9 (25)	
Polytrauma				
Yes	66 (15.2)	56 (84.8)	10 (15.2)	0.246
No	369 (84.8)	331 (89.7)	38 (10.3)	
Patient status				
Survived	428 (98.4)	3854 (89.9)	43 (10.1)	< 0.001
Not survived	7 (1.6)	2 (28.6)	5 (71.4)	
Role of patient (n=137)				
Driver	18 (13.1)	14 (77.8)	4 (22.2)	0.537
Passenger	34 (24.8)	24 (70.6)	10 (29.4)	
Pedestrian	20 (14.6)	15 (75)	5 (25)	
Rider	65 (47.5)	54 (83.1)	11 (16.9)	
Side of amputation				
Right	221 (50.8)	199 (90.1)	22 (9.9)	< 0.001
Left	211 (48.5)	188 (89.1)	23 (10.9)	
Both	3 (.7)	0 (0.0)	3 (100.0)	

The typical hospital stay for individuals having an amputation was 5 days with a standard difference of 2.7 days. Many patients (73. 1%) stayed in the hospital for over two days. Many amputations led to small amounts of disability (77. 7%), and a big part of these patients (71%) remained in the hospital for over two days. Things like leg injuries, car crashes, and major amputations really changed how long people stayed in the hospital (Table 2).

Table 2: Description of the factors related to the length of hospital stay of amputation patients in Shiraz, Fars Province, Iran*

Variable	Total (n= 435)	Length of hospital stay (days)		Chi² P Value
		≤ 2 (n= 117) (26.9%)	>2 (n= 318) (73.1%)	
Gender				
Female	34 (7.8)	5 (14.7)	29 (85.3)	**0.095**
Male	401(92.2)	112 (27.9)	289 (72.1)	
Age, y				
≤35	247 (56.8)	60 (24.3)	187 (75.7)	
36-55	136 (31.3)	43 (31.6)	93 (68.4)	**0.302**
≥ 56	52 (11.9)	14 (26.9)	38 (73.1)	
Disability				
Low	338 (77.7)	98 (29.0)	240 (71.0)	
Moderate	70 (16.1)	16 (22.9)	54 (77.1)	**0.093**
Severe	27 (6.2)	3 (11.1)	24 (88.9)	
Level of amputation				
Upper limb	354 (81.4)	109 (30.8)	245 (69.2)	< **0.001**
Lower limb	81 (18.6)	8 (9.9)	73 (90.1)	
Cause of trauma				
Traffic accident	137 (31.5)	25 (18.3)	112 (81.7)	
Contact with a blunt object	83 (19.1)	26 (31.3)	57 (68.7)	**0.003**
Contact with a penetrative object	179 (41.1)	61 (34.1)	118 (65.9)	
Other	36 (8.3)	5 (13.9)	31 (86.1)	
Polytrauma				
Yes	66 (15.2)	30 (45.4)	36 (54.6)	< **0.001**
No	369 (84.8)	87 (23.6)	282 (76.4)	
Patient status				
Survived	428 (98.4)	113 (26.4)	315 (73.6)	**0.069**
Not survived	7 (1.6)	4 (57.1)	3 (42.9)	
Role of patient (n=137)				
Driver	18 (13.1)	5 (27.8)	13 (72.2)	
Passenger	34 (24.8)	2 (5.9)	32 (94.1)	**0.125**
Pedestrian	20 (14.6)	3 (15)	17 (85)	
Rider	65 (47.5)	15 (23.1)	50 (76.9)	
Side of amputation				
Right	221 (50.8)	165 (25.3)	56 (74.7)	
Left	211 (48.5)	61 (28.9)	150 (71.1)	**0.404**
Both	3 (.7)	0 (0.0)	3 (100.0)	
Amputation				
Minor	387 (88.9)	112 (28.9)	275 (71.1)	**0.006**
Major	48 (11.1)	5 (10.4)	43 (89.6)	

A significant association between upper limb injuries and amputation was revealed by multivariate analysis (OR = 8.4, p < 0.001, 95% CI: 2.8-29.1). Additionally, contact with a blunt object was significantly linked to amputation (OR = 25.5, p = 0.002, 95% CI: 3.2-30.8). Furthermore, polytrauma was associated with the duration of hospital stay, though it seemed to reduce the likelihood of more extended stays (OR = 0.3, p = 0.045, 95% CI: 0.1-0.9) (Table 3).

The joint point study showed an apparent rise in the count of amputations by gender from 2017 to 2023, with an average yearly change of 31. 3 ($p < 0.001$). Also, there was a significant rise in the count of amputations based on their type during this time, with an average yearly change of 26. 3 ($p = 0.006$) (Figure 1 and Table 4).

Although amputations were more usual in the summer, the study said that the spread of amputations in different seasons was mainly similar (Figure 2).

The big trend of amputations increased over the study time, reaching its peak in 2022. Also, every injury from trauma saw a growing trend during this time, with the most significant highs seen in wounds from sharp objects and car crashes (Figure 3).

People with major amputations had a longer time in the hospital than those with minor amputations. In fact, half of the people with minor amputations were in the hospital for around two days, while half of those with major amputations were there for about 17 days (Figure 4).

Table 3: Adjusted Odds Ratio (OR) of the factors associated with amputation and length of hospital stay in Shiraz, Fars Province, Iran

Variable	Amputation		Length of hospital stay (days)	
	OR (95% CI)	P Value	OR (95% CI)	**P Value**
Level of amputation				
Lower limb	Reference	Reference	-	-
Upper limb	8.4 (2.8-29.1)	< 0.001	-	-
Cause of trauma				
Other	Reference	Reference	-	-
Traffic accident	3.4 (0.8-14.4)	0.093	-	-
Contact with a blunt object	25.5 (3.2-30.8)	0.002	-	-
Contact with a penetrative object	2.6 (0.5-12.2)	0.211	-	-
Patient status			Reference	**Reference**
Not survived	-	-		
Survived	-	-	23.3 (2.2-24.3)	**0.008**
Polytrauma				
No	-	-	Reference	**Reference**
Yes	-	-	0.32 (0.1-0.9)	**0.045**

Table 4: Joint point analysis of the number of amputations based on the type of amputation and gender in Shiraz from 2017 to 2023

Annual Percent Change (APC)					
		Years	**APC**	**95% CI***	**P-value**
Gender	**Segment 1**	2017-2023	31.3	13.9-51.2	< 0.001
Amputation	**Segment 1**	2017-2023	26.3	8.2-47.4	0.006
Average Annual Percent Change (AAPC)					
		Years	**AAPC**	**95% CI**	**P-Value**
Gender	**Full range**	2017-2023	31.3	13.9-51.2	< 0.001
Amputation	**Full range**	2017-2023	26.3	8.2-47.4	0.006

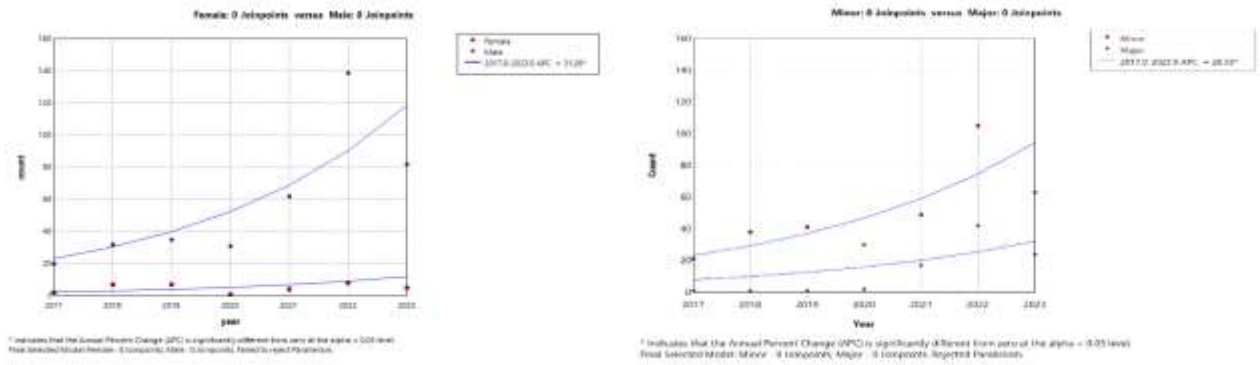

Figure 1. The trend in the number of amputations based on the type of amputation and gender in Shiraz from 2017 to 2023

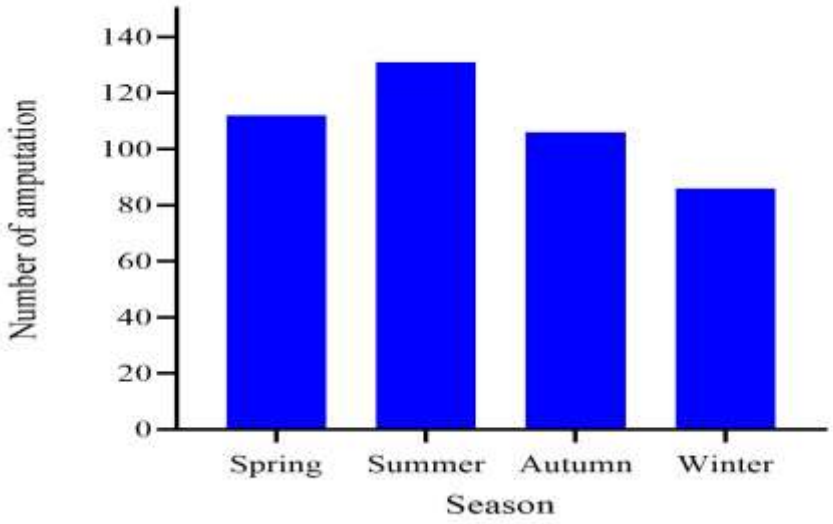

Figure 2.Distribution of amputations across different seasons in Shiraz from 2017 to 2023

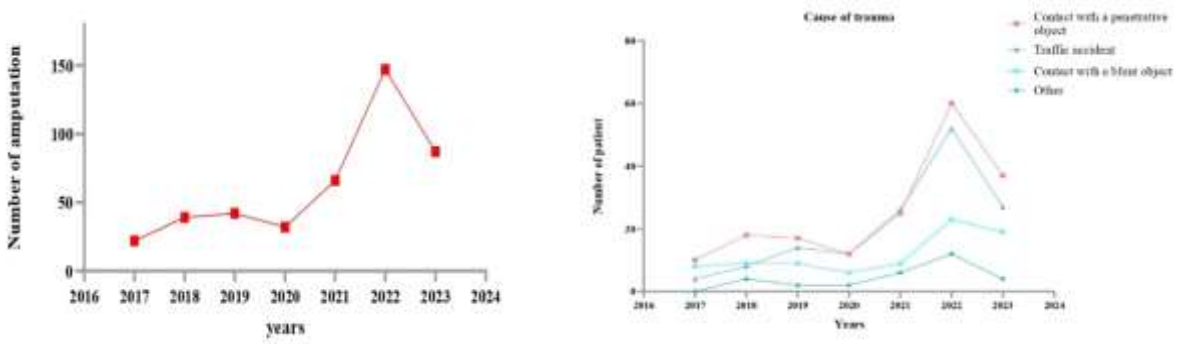

Figure 3. Trend of amputations and causes of trauma in Shiraz from 2017 to 2023

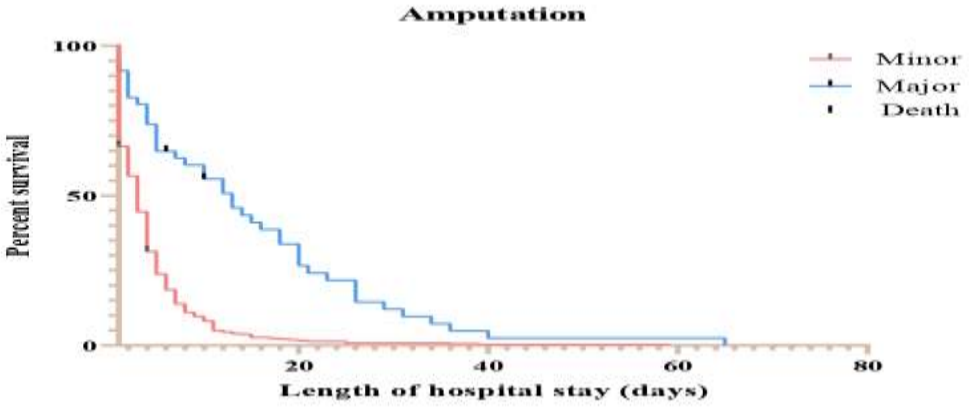

Figure 3. The percentage of the length of hospital stay in patients with amputations in Shiraz from 2017 to 2023

Discussion

The results of the present study showed that traffic accidents and lower limb injuries were the leading causes of amputation. For patients who had undergone amputation, the average hospital stay was 5 days, and such factors as lower limb injuries, traffic accidents, and amputation significantly affected the length of hospital stay. Patients with major amputations were hospitalized longer than those with minor amputations. The results also showed that amputations were more common in men than in women and had an increasing trend during the study period. The main factors associated with amputations were upper limb injuries, contact with a blunt object, and polytrauma, which also affected the length of hospital stay.

Our results showed that the average hospital stay for patients who had undergone amputation was 5 days. Factors such as lower limb injury, motor vehicle accidents, and amputation significantly affected the length of hospital stay. Patients with major amputations were hospitalized for longer. Polytrauma also affected the length of hospital stay. This finding is consistent with other studies conducted in the US, Brazil, KwaZulu-Natal, UK, and Bern.[4, 16-19] The length of hospital stay for amputees is an important factor in their recovery. Individuals with big amputations stay in the hospital longer because of more harm, since the healing time for these folks is longer. People in car crashes are also at a bigger risk because those cars lack safety gear, so their riders face more danger, which is why these people get hurt more, affecting how long they stay in the hospital. Therefore, there is a need to implement more training programs on protective equipment, such as helmets for motorcyclists on various platforms.

The result of this study demonstrates that traffic accidents and lower limb injuries were the leading causes of major amputation. Our findings are consistent with other studies conducted in Kenya and Los Angeles.[20, 21] A global study also showed that one of the important factors in amputations was road accidents.[12] However, this finding is inconsistent with a study conducted in Pakistan that showed that agricultural tools were the leading cause of major amputation.[22] Careless driving is a significant issue, especially in developing countries, leading to major traumatic injuries, often requiring amputation. Patients whose lower limbs, including the leg and foot, are injured are more likely to require amputation because this area is more susceptible to injury. Lower limb injuries can occur for various reasons, including traffic accidents, sports, falls, or work-related accidents.[20, 23] Therefore, there is a need to increase road and vehicle safety. Safety rules in workplaces need to be strictly followed.

The results also showed that amputations were more common in men than in women and had an increasing trend during the study period. This result is in line with other studies conducted in the US (2017), Brazil, Kenya, the United States (2021), Los Angeles, and the US (2012).[4, 18, 21, 24, 25] A global study of traumatic amputation in 204 countries also showed that the trend of accidental amputations had been increasing between 1990 and 2019. However, the age-related trend has been going down.3 From 1990 to 2019, another world study showed that big jumps in leg amputation rates were seen

in Syria, Yemen, and Afghanistan, linking with times of fighting and chaos. On the other hand, places like Iraq, Palestine, Sudan, Lebanon, Iran, and Kuwait showed clear drops. The study pointed out a tricky mix of social-political issues, natural events, pain, and long-lasting sicknesses like diabetes in forming trends all over the area.[26] A larger share of men in amputations might be from their more dangerous actions. Men are more likely to engage in high-speed activities such as motorcycling and high-speed driving, and men are also more likely to work in high-risk jobs. These activities can put men at greater risk for serious injuries and subsequent amputation.[20]

This study has two limitations. First, it is primarily retrospective. Since these studies rely on existing records, data quality and availability can be a major concern. Incomplete, inaccurate, or missing information can significantly bias the results. Second, this is a database study, which is inherently at risk of confounding variables.

Conclusion

The results of our study showed that road traffic accidents and lower limb injuries were the leading causes of amputation. Additionally, factors such as lower limb injury, traffic accidents, and amputation affected the length of hospital stay. Therefore, identifying the patterns of these injuries is essential for their prevention. Our results can contribute to strategies used to reduce the impact and complications of traumatic amputation.

Acknowledgments

The authors would like to thank Shiraz University of Medical Sciences, Shiraz, Iran and also Center for Development of Clinical Research of Nemazee Hospital and Dr. Nasrin Shokrpour for editorial assistance.

Conflict of Interest Disclosures

The authors declare that there is no conflict of interest.

Funding Sources

No funding was received to assist with the preparation of this manuscript.

Authors' Contributions

All authors contributed to the study conception and design. M.Y oversaw data collection and ensured adherence to ethical guidelines. M.N. and S.N. conducted the statistical analyses. N.M. and H.M. drafted the initial manuscript, and all authors participated in reviewing and editing the final version to ensure accuracy, clarity, and coherence. M.Y supervised the overall project, guiding the research process. All authors read and approved the final manuscript.

Ethical Statement

The present study has the code of ethics IR.SUMS.REC. No. 1402.245 of Shiraz University of Medical Sciences

Declaration of Generative AI and AI-assisted technologies

The authors declare that no generative AI or AI-assisted technologies were used in the preparation of this manuscript.

References

1. Hughes W, Goodall R, Salciccioli JD, Marshall DC, Davies AH, Shalhoub J. Editor's Choice–Trends in lower extremity amputation incidence in European Union 15+ countries 1990–2017. *Eur J Vasc Endovasc Surg*. 2020;60(4):602-12.

2. Clasper J, Ramasamy A. Traumatic amputations. *Br J Pain*. 2013;7(2):67-73.

3. Yuan B, Hu D, Gu S, Xiao S, Song F. The global burden of traumatic amputation in 204 countries and territories. *Front Public Health*. 2023;11:1258853.

4. Ceratti MM, Sorbello CCJ, Sunye IR, Portela FS, da Silva MFA, Teivelis MP, et al. Traumatic Amputations-A Nationwide Epidemiological Analysis of a developing country over 16 years. *medRxiv*. 2024:2024.09. 05.24313153.

5. Rahim AA, Tam A, Holmes M, Mittapalli D. The effect of amputation level on patient mental and psychological health, prospective observational cohort study. *Ann Med Surg (Lond)*. 2022;84:104864.

6. Şimsek N, Öztürk GK, Nahya ZN. The Mental Health of Individuals With Post-Traumatic Lower Limb Amputation: A Qualitative Study. *J Patient Exp*. 2020;7(6):1665-70.

7. Rankin IA, Nguyen T-T, McMenemy L, Clasper JC, Masouros SD. The injury mechanism of traumatic amputation. *Front Bioeng Biotechnol*. 2021;9:665248.

8. Roşca AC, Baciu CC, Burtăverde V, Mateizer A. Psychological consequences in patients with amputation of a limb. An interpretative-phenomenological analysis. *Front Psychol*. 2021;12:537493.

9. Behrendt C-A, Sigvant B, Szeberin Z, Beiles B, Eldrup N, Thomson IA, et al. International variations in amputation practice: a VASCUNET report. *Eur J Vasc Endovasc Surg*. 2018;56(3):391-9.

10. Biz C, Ruggieri P. Minimally invasive surgery: osteotomies for diabetic foot disease. *Foot Ankle Clin*. 2020;25(3):441-60.

11. Lypez-Lypez L, Losa-Iglesias ME, Gymez-Salgado J, Becerro-de-Bengoa-Vallejo R, Romero-Morales C, Lypez-Lypez D, et al. The implications of diabetic foot health-related with quality of life: a retrospective case control investigation. *J Tissue Viability*. 2022;31(4):790-3.

12. McDonald CL, Westcott-McCoy S, Weaver MR, Haagsma J, Kartin D. Global prevalence of traumatic non-fatal limb amputation. *Prosthet Orthot Int*. 2021;45(2):105-14.

13. Dhillon MS, Saini UC, Rana A, Aggarwal S, Srivastava A, Hooda A. The burden of post-traumatic amputations in a developing country–An epidemiological study from a level I trauma centre. *Injury*. 2022;53(4):1416-21.

14. Devinuwara K, Dworak-Kula A, O'Connor RJ. Rehabilitation and prosthetics post-amputation. *Orthop Trauma*. 2018;32(4):234-40.

15. Norouzi M, Ghaem H, Yadollahi M. A Review of Hospitalization and Clinical Pattern of Occupational Injuries and Related Factors. *Trauma Mon*. 2018;23(1).

16. Chrysou K, Halat G, Hoksch B, Schmid RA, Kocher GJ. Lessons from a large trauma center: impact of blunt chest trauma in polytrauma patients—still a relevant problem? *Scand J Trauma Resusc Emerg Med*. 2017;25:1-6.

17. Gumede N, Hardcastle T. Traumatic limb amputations in polytrauma ICU admissions. *S Afr J Surg*. 2024;62(4):338-41.

18. Low EE, Inkellis E, Morshed S. Complications and revision amputation following trauma-related lower limb loss. *Injury*. 2017;48(2):364-70.

19. Naqvi G, Johansson G, Yip G, Rehm A, Carrothers A, Stuhr K. Mechanisms, patterns and outcomes of paediatric polytrauma in a UK major trauma centre. *Ann R Coll Surg Engl*. 2017;99(1):39-45.

20. Abdi AA. Prevalence and Aetiology of Various Levels of Traumatic Limb Amputations Following Traumatic Injuries at Kenyatta National Hospital: University of Nairobi; 2023.

21. Kobayashi L, Inaba K, Barmparas G, Criscuoli M, Lustenberger T, Talving P, et al. Traumatic limb amputations at a level I trauma center. *Eur J Trauma Emerg Surg*. 2011;37:67-72.

22. Jabeen N, Malik S. Prevalence and pattern of traumatic limb amputations in female population of Bhimber District, Azad Jammu and Kashmir, Pakistan. *Pak J Med Sci*. 2015;31(1):54.

23. Ndukwu C, Muoneme C. Prevalence and pattern of major extremity amputation in a tertiary Hospital in Nnewi, South East Nigeria. *Tropical Journal of Medical Research*. 2015;18(2):104-.

24. Cai M, Xie Y, Bowe B, Gibson AK, Zayed MA, Li T, et al. Temporal trends in incidence rates of lower extremity amputation and associated risk factors among patients using Veterans Health Administration services from 2008 to 2018. *JAMA Netw Open*. 2021;4(1):e2033953-e.

25. Krueger CA, Wenke JC, Ficke JR. Ten years at war: comprehensive analysis of amputation trends. *J Trauma Acute Care Surg*. 2012;73(6):S438-S44.

26. Al-Ajlouni YA, Abouzid M, Tanashat M, Basheer AA, Al Ta'ani O, Bilgin-Badur N, et al. Temporal trends in lower extremity amputation in Middle East and North Africa (MENA) region: analysis of the GBD dataset 1990–2019. *Int J Equity Health*. 2024;23(1):178.