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Research Article

Common Foot Fracture Patterns: A Descriptive Study on 558 Cases

Sayyed Hadi Sayyed-Hosseinian[1], Mohammad Reza Sarshar[1,*], Mahdieh Parsaeian[1], Mohammad Hossein Ebrahimzadeh[2], Ali Birjandinejad[1]

[1] Orthopedics Surgeon, Orthopedics Research Center, Shahid Kamyab Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
[2] Orthopedics Surgeon, Orthopedics Research Center, Ghaem Hospital, Mashhad University of Medical Sciences, Mashhad, Iran

[*]Corresponding author: Mohammad Reza Sarshar; Orthopedics Research Center, Shahid Kamyab Hospital, Mashhad University of Medical Sciences, Mashhad, Iran. Tel: +98-51-38413494, Email: mohammad.sarshar64@gmail.com

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Abstract

Background: Foot fractures are relatively common among trauma patients, and further research is needed to identify prevalent fracture patterns. This study aimed to explore common foot fracture patterns.
Methods: This cross-sectional study included patients admitted to a trauma center between 2018 and 2020. All patients with acute foot injuries were identified using the hospital information system (HIS). Data such as age, sex, trauma mechanism, mobile injuries, hospitalization status, and whether the injury was open or closed were extracted from patient records. Radiographies were reviewed to evaluate the location of fractures or dislocations and their anatomical classification.
Results: A total of 558 patients with an average age of 35.70 ± 16.55 years were studied, of whom 489 (67%) were men. The most common mechanism of trauma was motor vehicle accidents (240/558, 43.1%). The forefoot was the most frequently affected area (48.7%). Among the different bones, the calcaneus had the highest fracture incidence (233/558, 41.8%). There were 63 patients with dislocations, with Lisfranc dislocation being the most common (32/558, 50.8%). Calcaneus fractures were significantly more common in men than in women (P = 0.008), while fractures of the second (P = 0.010) and fifth (P = 0.011) metatarsals were significantly more common in women.
Conclusion: Calcaneus fractures were most common, especially in men, while women had more metatarsal fractures. Motor vehicle accidents were the primary cause of trauma. The mechanism of injury plays a crucial role.

Keywords: Fractures; Trauma; Foot; Dislocation Fracture

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Background

Foot fractures are among the most frequently encountered injuries in traumatic incidents. Due to their potential impact on mobility and overall quality of life, a comprehensive evaluation and a treatment plan are essential to ensure effective patient care (1, 2). The intricate structure of the foot, which comprises 26 bones and 33 joints, makes it particularly vulnerable to various types of injuries, including those resulting from motor vehicle accidents, falls, and sports-related incidents (3, 4). Consequently, the foot is susceptible to a range of fracture patterns triggered by different mechanisms of trauma. Understanding the prevalence and patterns of these fractures is crucial for improving healthcare diagnostics, treatments, and preventive strategies (5).

Foot fractures can occur in various forms and patterns, influenced by factors such as age, gender, and the underlying mechanism of injury. Their prevalence and patterns can vary significantly (6, 7). Research findings indicate that individuals in their twenties, particularly men, are at a higher risk of suffering traumatic foot injuries, often due to high-energy impacts from motor vehicle accidents and sports activities (8, 9). On the other hand, elderly individuals, especially women, may experience foot fractures due to low-energy traumas, such as falls, exacerbated by conditions like osteoporosis and other health factors (10-12).

Motor vehicle accidents are the leading cause of traumatic foot fractures globally, with injury patterns often reflecting the high-energy nature of the trauma (13). Such accidents frequently result in complex fracture patterns involving multiple bones and joints of the foot, leading to increased mortality rates and extended recovery periods (14). Identifying specific patterns associated with these accidents is essential for developing targeted prevention and treatment strategies.

Sports-related injuries also significantly contribute to the incidence of foot fractures, particularly among younger, more active populations (15, 16). High-impact sports, such as football, basketball, and running, can cause acute fractures due to sudden stress or overuse injuries from repetitive strain (17, 18). Understanding common fracture patterns in sports can help design better protective equipment and training protocols to minimize the risk of injury (19).

Gender differences in foot fracture patterns also warrant attention, as they can influence the approach to diagnosis and treatment (20, 21).

Studies have shown that certain fractures, such as those involving the second and fifth metatarsals, are more prevalent in women, potentially due to differences in bone density, hormonal influences, and activity levels (22-24). Understanding these differences can help tailor preventive and therapeutic measures to the specific needs of male and female patients.

Evaluating foot fracture patterns in a trauma center with a high volume of patients provides valuable data that can inform clinical practice and public health strategies. By analyzing the demographic distribution, mechanisms of injury, and anatomical locations of foot fractures, healthcare providers can develop more effective

diagnostic protocols, treatment plans, and preventive measures. Multiple bone fractures can occur during an accident, and if we are not aware of these patterns, we may easily neglect or miss the injuries. This study aims to contribute to the existing body of knowledge on foot fractures, offering insights that can enhance patient care and reduce the burden of these injuries in the community.

Methods

Study Design: This cross-sectional study was conducted in 2020 on patients admitted to Shahid Kamyab Hospital, Mashhad City, Iran, between 2018 and 2020, with acute foot injuries (from the distal area of the ankle to the end of the digits). The inclusion criteria included all patients who sustained trauma resulting in dislocation or fracture in this region and were admitted to Shahid Kamyab Hospital. Exclusion criteria included patients with soft tissue injuries of the foot without fractures or dislocations, those without complete and standard radiographs of the foot area, and patients lacking a complete history regarding demographic characteristics and the mechanism of injury.

Data Collection: Relevant information, including age, sex, mechanism of trauma, accompanying injuries, duration of hospitalization, and whether the injury was open or closed, was extracted from the patient's files. Radiographs and, where available, computed tomography (CT) scans and other imaging modalities were reviewed using the hospital's picture archiving and communication system. The location of fractures or dislocations and their anatomical classification were analyzed. Based on the findings, specific patterns of dislocation fractures were identified if present.

Statistical Analysis: Data analysis was performed using SPSS statistical software (version 26, IBM Corporation, Armonk, NY, USA). The correlation of qualitative variables was assessed with the chi-square test, while comparisons between groups were made using an independent t-test. The correlation of quantitative variables was determined by calculating the correlation coefficient. Since the study was conducted as a survey, there was no need to calculate the sample size. Results were considered statistically significant at $P < 0.05$ in all tests.

Ethical Approval: This research was approved by the Organizational Ethics Committee of Mashhad University of Medical Sciences (ID: IR.MUMS.MEDICAL.REC.1399.803).

Results

A total of 558 patients were admitted to a trauma center with foot fractures during the study period and were examined. The average age of the patients was 35.70 ± 16.55 years (ranging from 2 to 98 years), and the average length of hospital stay was 8.04 ± 8.96 days (ranging from 1 to 61 days). Among the patients, 489 (87.6%) were men, and 69 (12.4%) were women. Forty-four patients (7.9%) were admitted to the intensive care unit (ICU), with an average stay of 6.89 ± 9.82 days.

Motor vehicle accidents were the most common mechanism of injury, accounting for 240 cases (43.1%). The forefoot was the most frequently injured area, with a prevalence of 48.7%. The calcaneus was the most commonly fractured among the various bones, with 233 cases (41.8%) (Figure 1 and Table 1).

Table 1. Fractured bones in patients

Bone		n (%)
Talus	Total	38 (6.8)
	Body	10 (26.3)
	Neck type 1	1 (2.6)
	Neck type 2	7 (18.4)
	Neck type 3	2 (3.5)
	Neck type 4	1 (2.6)
	Head	2 (3.5)
	Processes	5 (2.1)
	Body and neck	1 (2.6)
	Body, neck, and head	5 (13.2)
	Body and head	4 (10.5)
Calcaneus	Total	233 (41.8)
	Type 1	17 (7.3)
	Type 2A	47 (20.2)
	Type 2B	32 (13.7)
	Type 2C	9 (3.9)
	Type 3AB	22 (9.4)
	Type 3AC	12 (5.2)
	Type 3BC	3 (1.3)
	Type 4	24 (10.3)
	Tuberosity	42 (18.0)
	Body	11 (4.7)
	Sustentaculum	6 (2.6)
	Multi part	4 (1.7)
	Body and anterior process	3 (1.3)
Navicular	Total	23 (4.1)
	Type 1	8 (34.8)
	Type 2	9 (39.1)
	Type 3	6 (26.1)
Cuboid	Total	34 (6.1)
Medial cuneiform	Total	22 (3.9)
Intermediate cuneiform	Total	22 (3.9)
Lateral cuneiform	Total	15 (2.7)
Metatarsus 1	Total	56 (10.0)
	Base	20 (35.7)
	Shaft	21 (37.5)
	Neck	6 (10.7)
	Head	4 (7.1)
	Head and neck	2 (3.6)
	Shaft and base	1 (1.8)
	Multi part	1 (1.8)
Metatarsus 2	Total	97 (17.4)
	Base	35 (36.1)
	Shaft	36 (37.1)
	Neck	17 (17.5)
	Head	6 (6.2)
	Head and neck	2 (2.1)
	Multi part	1 (1.0)
Metatarsus 3	Total	95 (17.0)
	Base	29 (30.5)
	Shaft	32 (33.7)
	Neck	23 (24.2)
	Head	8 (8.4)
	Head and neck	1 (1.1)
	Multi part	1 (1.1
	Shaft and base	1 (1.1)
Metatarsus 4	Total	75 (13.4)
	Base	21 (28.0)
	Shaft	27 (36.0)
	Neck	18 (24.0)
	Head	6 (8.0)
	Multi part	3 (4.0)
Metatarsus 5	Total	84 (15.1)
	Base	27 (32.1)
	Shaft	34 (40.5)
	Neck	12 (14.3)
	Head	8 (9.5)
	Shaft and base	2 (2.4)
	Multi part	1 (1.2)
Digit 1	Total	69 (12.4)
	Proximal phalanx	34 (49.3)
	Distal phalanx	32 (46.4)
	Proximal and distal	3 (4.3)
Digit 2	Total	20 (3.6)
	Proximal phalanx	12 (60.0)
	Middle phalanx	1 (5.0)
	Distal phalanx	4 (20.0)
	Proximal and middle phalanx	1 (5.0)
	Middle and distal phalanx	1 (5.0)
	Proximal and distal phalanx	1 (5.0)
Digit 3	Total	16 (2.9)
	Proximal phalanx	11 (68.8)
	Middle phalanx	1 (6.3)
	Distal phalanx	4 (25.0)
Digit 4	Total	21 (3.8)
	Proximal phalanx	16 (76.2)
	Middle phalanx	1 (4.8)
	Distal phalanx	3 (14.3)
	Proximal and distal phalanx	1 (1.8)
Digit 5	Total	32 (5.7)
	Proximal phalanx	21 (65.6)
	Middle phalanx	2 (6.2)
	Distal phalanx	7 (21.8)
	Proximal and distal phalanx	2 (6.2)

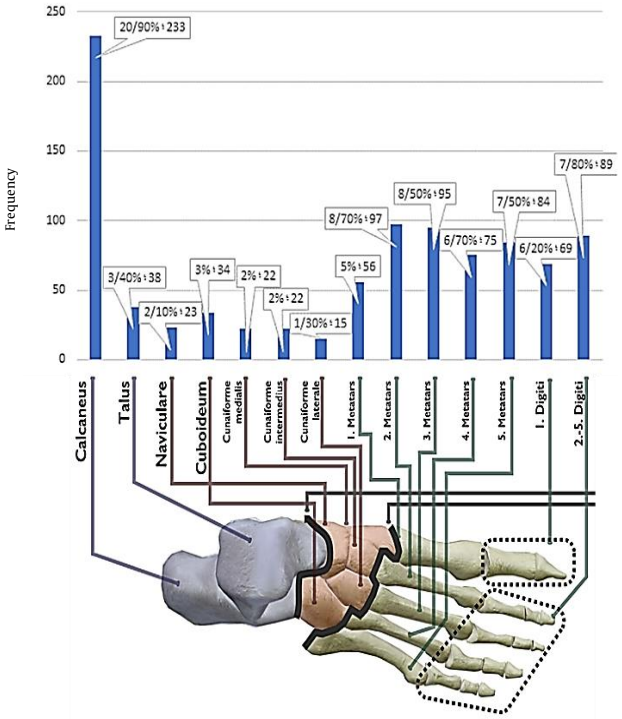

Figure 1. The frequency of fractures in each foot bone

In total, 63 patients experienced dislocations, the most frequent of which was Lisfranc dislocation, which occurred in 33 cases (61.4%) (Tables 2 and 3).

Table 2. Treatment performed for various bone fractures

Bone	Treatment	n (%)
Talus	Close	12 (32.4)
	Open	25 (68.6)
Calcaneus	Close	133 (76.4)
	Open	40 (23.0)
	Amputation	1 (0.5)
Navicular	Close	15 (68.1)
	Open	7 (31.8)
Cuboid	Close	19 (57.5)
	Open	14 (42.5)
Medial cuneiform	Close	8 (38.0)
	Open	12 (57.1)
Intermediate cuneiform	Close	11 (52.4)
	Open	10 (47.6)
Lateral cuneiform	Close	7 (53.8)
	Open	6 (46.2)
Metatarsus 1	Close	22 (40.0)
	Open	29 (52.7)
	Amputation	4 (7.2)
Metatarsus 2	Close	52 (53.6)
	Open	43 (44.3)
	Amputation	2 (2.1)
Metatarsus 3	Close	62 (65.3)
	Open	31 (32.6)
	Amputation	2 (2.1)
Metatarsus 4	Close	47 (62.7)
	Open	26 (34.7)
	Amputation	2 (2.6)
Metatarsus 5	Close	51 (60.7)
	Open	31 (36.9)
	Amputation	2 (2.3)
Digit 1	Close	33 (47.8)
	Open	32 (46.3)
	Amputation	4 (5.7)
Digit 2	Close	8 (40.0)
	Open	9 (45.0)
	Amputation	3 (15.0)
Digit 3	Close	7 (44.7)
	Open	7 (44.7)
	Amputation	2 (12.5)
Digit 4	Close	11 (52.4)
	Open	7 (33.3)
	Amputation	3 (14.3)
Digit 5	Close	12 (37.5)
	Open	17 (53.1)
	Amputation	3 (9.4)

Table 3. Dislocations diagnosed in the patients

Dislocation	n (%)
Subtalar	4 (6.3)
Talonavicular	10 (15.9)
Naviculocuneiform	3 (4.8)
Lisfranc	33 (61.4)
Metatarsophalangeal	8 (12.7)
Interphalangeal	5 (7.9)
Total	63 (100)

Calcaneus fractures were significantly more common in men than in women (P = 0.008), while fractures of the second metatarsal (P = 0.010) and fifth metatarsal (P = 0.011) were significantly more common in women (Table 4).

Table 4. Comparison of fracture frequency of leg bones in two sexes

Dislocation	Women	Men	P-value
	n (%)		
Talus	4 (5.8)	32 (6.5)	> 0.999
Calcaneus	15 (21.7)	186 (38.0)	0.008
Navicular	1 (1.4)	21 (4.3)	0.503
Cuboid	3 (4.3)	30 (6.1)	0.786
Medial cuneiform	3 (4.3)	19 (3.9)	0.745
Intermediate cuneiform	4 (5.8)	18 (3.7)	0.336
Lateral cuneiform	3 (4.3)	11 (2.2)	0.398
Metatarsus 1	3 (4.3)	53 (10.8)	0.131
Metatarsus 2	20 (29.0)	76 (15.5)	0.010
Metatarsus 3	17 (24.6)	77 (15.7)	0.048
Metatarsus 4	9 (13.0)	66 (13.5)	> 0.999
Metatarsus 5	18 (26.1)	66 (13.5)	0.011
Digit 1	5 (7.2)	64 (13.1)	0.239
Digit 2	1 (1.4)	19 (3.9)	0.493
Digit 3	0 (0)	16 (3.3)	0.241
Digit 4	3 (4.3)	18 (3.7)	0.735
Digit 5	6 (8.7)	26 (5.3)	0.266

The incidence of fractures involving the talus, cuboid, cuneiforms, and the 1st, 2nd, 3rd, and 5th metatarsals was higher in motor vehicle accidents than falls and other mechanisms. However, most calcaneus fractures were observed following falls (P < 0.05) (Table 5).

Table 5. Comparison of fracture frequency of foot bones between different injuries

Bone	Fall	Crashing	Others	P-value
	n (%)			
Talus	5 (3.8)	26 (10.8)	5 (2.7)	0.001
Calcaneus	88 (66.7)	52 (21.7)	61 (32.8)	< 0.001
Navicular	2 (1.5)	14 (5.8)	6 (3.2)	0.102
Cuboid	5 (3.8)	24 (10.0)	4 (2.2)	0.001
Medial cuneiform	0 (0)	19 (7.9)	3 (1.6)	< 0.001
Intermediate cuneiform	2 (1.5)	18 (7.5)	2 (1.1)	0.001
Lateral cuneiform	1 (0.8)	12 (5.0)	1 (0.5)	0.005
Metatarsus 1	2 (1.5)	37 (15.4)	17 (9.1)	< 0.001
Metatarsus 2	15 (11.4)	64 (26.7)	17 (9.1)	< 0.001
Metatarsus 3	12 (9.1)	59 (24.6)	23 (12.4)	< 0.001
Metatarsus 4	14 (10.6)	42 (17.5)	19 (10.2)	0.050
Metatarsus 5	19 (14.4)	50 (20.8)	15 (8.1)	0.001
Digit 1	4 (3.0)	24 (10.0)	41 (22.0)	< 0.001
Digit 2	2 (1.5)	7 (2.9)	11 (5.9)	0.088
Digit 3	0 (0)	7 (2.9)	9 (4.8)	0.039
Digit 4	1 (0.8)	12 (5.0)	8 (4.3)	0.108
Digit 5	1 (0.8)	18 (7.5)	13 (7.0)	0.019

Additionally, 66.7% of lateral cuneiform fractures were associated with simultaneous cuboid fractures and 66.7% were associated with simultaneous medial cuneiform fractures. In 53.6% of 1st metatarsal fractures, there was a concurrent fracture of the 2nd metatarsal. Furthermore, 64.9% of 2nd metatarsal fractures had simultaneous 3rd metatarsal fractures.

Similarly, 66.3% of 3rd metatarsal fractures had concurrent fractures of the 2nd metatarsal, and 54.7% had concurrent fractures of the 4th metatarsal.

Finally, 69.3% of 4th metatarsal fractures were associated with concurrent 3rd metatarsal fractures (Table 6).

Discussion

We tried to assess common foot fractures in an epidemiological manner. Our data comprised various age categories, including a two-year-old child and a 98-year-old elder.

Table 6. Simultaneity of fracture of different bones

	Talus (%)	Calcaneus fractures [n (%)]	Navicular fractures [n (%)]	Cuboid fractures [n (%)]	Cuneiform medial fractures [n (%)]	Cuneiform middle fractures [n (%)]	Cuneiform lateral fractures [n (%)]	Metatarsal 1st fractures [n (%)]	Metatarsal 2nd fractures [n (%)]	Metatarsal 3rd fractures [n (%)]	Metatarsal 4th fractures [n (%)]	Metatarsal 5th fractures [n (%)]	Digit 1 fractures [n (%)]	Digit 2 fractures [n (%)]	Digit 3 fractures [n (%)]	Digit 4 fractures [n (%)]	Digit 5 fractures [n (%)]
Talus	-	11 (28.9)	6 (15.8)	4 (10.5)	1 (2.6)	1 (2.6)	2 (5.3)	1 (2.6)	0 (0)	0 (0)	0 (0)	1 (2.6)	0 (0)	0 (0)	0 (0)	0 (0)	0
Calcaneus	11 (4.7)	-	10 (4.3)	9 (3.9)	0 (0)	2 (0.9)	2 (0.9)	2 (0.9)	6 (2.6)	5 (2.1)	4 (1.7)	4 (1.7)	2 (0.9)	0 (0)	0 (0)	1 (0.4)	1 (0.4)
Navicular	6 (21.6)	10 (43.5)	-	9 (39.1)	4 (17.4)	5 (21.7)	3 (13.0)	2 (8.7)	3 (13.0)	2 (8.7)	4 (17.4)	6 (26.1)	1 (4.3)	0 (0)	0 (0)	1 (4.3)	1 (4.3)
Cuboid	4 (11.8)	9 (26.5)	9 (26.5)	-	8 (23.5)	10 (29.4)	10 (29.4)	5 (14.7)	7 (20.6)	6 (17.6)	11 (32.4)	7 (20.6)	1 (2.9)	0 (0)	0 (0)	1 (2.9)	2 (5.9)
Cuneiform medial	1 (4.5)	0 (0)	4 (18.2)	8 (36.4)	-	11 (50.0)	10 (45.5)	8 (36.4)	10 (45.5)	7 (31.8)	4 (18.2)	4 (18.2)	2 (9.1)	0 (0)	0 (0)	3 (13.6)	2 (9.1)
Cuneiform middle	1 (4.5)	2 (9.1)	5 (22.7)	10 (45.5)	11 (50.0)	-	12 (54.5)	6 (27.3)	10 (45.5)	6 (27.3)	6 (27.3)	4 (18.2)	1 (4.5)	0 (0)	0 (0)	3 (13.6)	2 (9.1)
Cuneiform lateral	2 (13.3)	2 (13.3)	3 (20.0)	10 (66.7)	10 (66.7)	12 (80.0)	-	6 (40.0)	7 (46.7)	4 (26.7)	6 (40.0)	5 (33.3)	1 (6.7)	0 (0)	0 (0)	2 (13.3)	2 (13.3)
Metatarsal 1st	1 (1.8)	2 (3.6)	2 (3.6)	5 (8.9)	8 (14.3)	6 (10.7)	6 (10.7)	-	30 (53.6)	25 (44.6)	16 (28.6)	11 (19.6)	6 (10.7)	3 (5.4)	1 (1.8)	2 (3.6)	1 (1.8)
Metatarsal 2nd	0 (0)	6 (6.2)	3 (3.1)	7 (7.2)	10 (10.3)	10 (10.3)	7 (7.2)	30 (30.9)	-	63 (64.9)	39 (40.2)	21 (21.6)	4 (4.1)	1 (1.0)	1 (1.0)	4 (4.1)	2 (2.1)
Metatarsal 3rd	0 (0)	5 (5.3)	2 (2.1)	6 (6.3)	7 (7.4)	6 (6.3)	4 (4.2)	25 (26.3)	63 (66.3)	-	52 (54.7)	26 (27.4)	4 (4.2)	1 (1.1)	2 (2.1)	3 (3.2)	1 (1.1)
Metatarsal 4th	0 (0)	4 (5.3)	4 (5.3)	11 (14.7)	4 (5.3)	6 (8.0)	6 (8.0)	16 (21.3)	39 (52.0)	52 (69.3)	-	36 (48.0)	2 (2.7)	1 (1.3)	2 (2.7)	2 (2.7)	3 (4.0)
Metatarsal 5th	1 (1.2)	4 (4.8)	6 (7.1)	7 (8.3)	4 (4.8)	4 (4.8)	5 (6.0)	11 (13.1)	21 (25.0)	26 (31.0)	36 (42.9)	-	2 (2.4)	1 (1.2)	1 (1.2)	2 (2.4)	5 (6.0)
Digit 1	0 (0)	2 (2.9)	1 (1.4)	1 (1.4)	2 (2.9)	1 (1.4)	1 (1.4)	6 (8.7)	4 (5.8)	4 (5.8)	2 (2.9)	2 (2.9)	-	6 (8.7)	4 (5.8)	4 (5.8)	4 (5.8)
Digit 2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (15.0)	1 (5.0)	1 (5.0)	1 (5.0)	1 (5.0)	6 (30.0)	-	6 (30.0)	3 (15.0)	3 (15.0)
Digit 3	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (6.3)	1 (6.3)	2 (12.5)	2 (12.5)	1 (6.3)	4 (25.0)	6 (37.5)	-	4 (25.0)	3 (18.8)
Digit 4	0 (0)	1 (4.8)	1 (4.8)	1 (4.8)	3 (14.3)	3 (14.3)	2 (9.5)	2 (9.5)	4 (19.0)	3 (14.3)	2 (9.5)	2 (9.5)	4 (19.0)	3 (14.3)	4 (19.0)	-	12 (57.1)
Digit 5	0 (0)	1 (3.1)	1 (3.1)	2 (6.3)	2 (6.3)	2 (6.3)	2 (6.3)	1 (3.1)	2 (6.3)	1 (3.1)	3 (9.4)	5 (15.6)	4 (12.5)	3 (9.4)	3 (9.4)	12 (37.5)	-

However, the mean age was within young ages, which was 35.70 years old. Similarly, previous studies proposed mean ages of 34 years old (25), 30.81 years old (26), and 36.1 years old (2). In line with the findings of several other studies in the literature, the incidence of fracture was higher in men, and they comprise 89.6 percent of all fractures. This was 82% in the Dhillon et al. study (26) and 91.2% in Tadros et al. (25). However, the reported percentage in the Rasmussen et al. study (2) was 54.3%.

Regarding fracture mechanism, road accidents stand at the top of the list of causes with around 43%, followed by fall from height with 23%. However, the most common cause of fracture was a fall from height (44%) in the Tadros et al. study (25), and the second most common was road traffic accidents (21%). In contrast to our findings, Vosoughi et al. (27) also reported that fall with 81% was the most common cause of injury, and in the second-place states, motor vehicle accidents with 16.6%.

Unfortunately, it is reported that the mortality and morbidity of road accidents are higher in Iran compared to many other countries, and this is a matter of fact that our results differed from other similar studies (28).

The most common part of the fracture was the forefoot, which accounted for around half of the fractures, followed by calcaneal fractures. Moreover, the most common dislocation was Lisfranc dislocation, which comprised more than 50% of the cases. According to Tadros et al., the most common fracture site was calcaneus (42.4%). This result was not in line with our findings due to the difference in the most common mechanism in our study and Tadros et al. study (25). Fracture of calcaneus commonly occurs due to high-energy traumas, which is bold in fall from height, and contrary to our findings, fall from height was the most common cause of fracture in the Tadros et al. study (25) as well as Huang et al. study (29). However, the result of Rasmussen et al. study (2) was in line with our findings and showed that the most common fractures were in the forefoot. Still, in Rasmussen et al. study, low-energy traumas comprised 98.7% of fracture causes, and the results are justified in this regard (2).

When we compared the frequency of fracture sites between different fracture mechanisms, the frequency of talus, cuboid, cuneiform, and metatarsus fractures was significantly higher in motor vehicle accidents, and the frequency of calcaneal fractures was significantly higher in falls from height. Similarly, Mitchell et al. (30), Court-Brown and Caesar (31), and Rasmussen et al. (2) proposed that talar fractures were associated with motorcycle accidents and calcaneal fractures with traffic accidents.

We also found that calcaneal fracture was significantly higher in men, while fractures in the second and five metatarsal bones were notably higher in women. In line with our findings, Vosoughi et al. proposed that men were 4.86 times more susceptible to calcaneal fracture (27). Moreover, Rasmussen et al. (2) showed that calcaneal fracture was higher in men compared to women. Sarpong et al. (32) and West et al. (33) also proposed that metatarsal fractures were more common in women. This is justified due to the hormonal differences and higher malnutrition rate in women than men (6).

The strength of our study was the large sample size from one of the largest trauma centers in the northeast of Iran. However, the type of study restricted our findings, as it was retrospective, and we could not provide patients with follow-up. Moreover, some documents were incomplete and excluded from our investigation.

Conclusion

We found that most of the fractures in our studied trauma center occurred in men at young ages. The most common etiology for fractures in this setting was traffic accidents. Forefoot was stated at the top frequently occurred fractures. Talus, cuboid, cuneiform, and metatarsal fractures occurred significantly higher in motor vehicle accidents, and the calcaneal fracture was notably found in falls from height. Finally, men suffered mostly from calcaneal fractures, while forefoot fractures were the most common type of fractures in women. We advise researchers to assess the epidemiology of fractures in other trauma centers, as it may differ from our findings.

Conflict of Interest

The authors declare no conflict of interest in this study.

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