

# Orthopedic Injuries In The Victims Of The Earthquake Of Bam

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## Abstract

**Objective:** To determine the prevalence of the various orthopedic injuries in the earthquake victims of Bam on 26/12/2003 referred to the emergency rooms of the hospitals of the Shaheed Beheshti University of Medical Sciences

**Material and methods:** It was an observational, descriptive case series study and the data collection was via observation and interview. All of the victims of the earthquake of Bam referred directly from the site of earthquake to the emergency rooms of the hospitals of the Shaheed Beheshti University of Medical Sciences and were entered to this study on a census basis. The prevalence of various orthopedic injuries including fractures, dislocations and soft tissue injury were determined by clinical examination, X-ray and CT scan when necessary.

**Results:** The victims' age ranged from 1.5 to 80 years, with a mean of 30.2 years. 76.9% of the victims suffered from one or more sort of orthopedic injuries. 9.6% had solely soft tissue injury and 57.6% had fracture or dislocation without any soft tissue injury. Also 9.6% of the victims suffered from both bone fracture and soft tissue injury. The most common injuries were: pelvic fracture (25%), lower leg fractures (18.2%), and compartment syndrome (12.5%).

**Conclusion:** Since a remarkable percentage of the earthquake victims suffered from a kind of orthopedic injury, particularly pelvic and lower leg fractures and also compartment syndrome, special attention has to be focused on dealing with these injuries in future similar catastrophes.

## INTRODUCTION

The death toll of the devastating earthquake of Bam on 26/12/2003 is estimated at 40,000 and also many people were injured. Since a remarkable number of victims suffered from orthopedic injuries, defining the sort of these injuries can greatly help the health professionals to determine the therapeutic primaries in future such catastrophes and to take effective measures for the treatment of the victims. As a noticeable number of the victims were referred directly from the site of earthquake to the emergency rooms of the hospitals of the Shaheed Beheshti University of Medical Sciences including Imam Hossein Medical Centre, Akhtar Medical Centre and Taleghani Medical Centre, by evaluation of these victims we can get an approximate estimation of the prevalence of various orthopedic injuries in the victims referred to the emergency rooms. For the mentioned reason we performed this study in order to determine the prevalence

of various orthopedic injuries including fractures, dislocations and soft tissue injury in the victims of the earthquake of Bam referred to the emergency rooms of the hospitals of Shaheed Beheshti University of Medical Sciences.

In previous studies regarding the earthquake-related injuries, the orthopedic injuries such as pelvic fracture, compartment syndrome and long bone fractures had a remarkable prevalence (<sup>1,2,3,4,5</sup>). In the earthquake of Marmara in 1999, according to a study conducted in Kartal Hospital, extremities fractures and pelvic and spine injuries were reported to be 16.8% and 16.1% respectively (<sup>1</sup>). In the earthquake of Loma Prieta in 1989, the soft tissue injuries and different fractures were the most common problems amongst the victims (<sup>2</sup>). In the earthquake of Tangshan in China which had the most casualties in the last century,

pelvic fracture and compartment syndromes were the most common orthopedic problems (3). In the earthquake of Kobe-Osaka in 1995 in Japan, vertebral and pelvic fractures were the most common problems (4). Our objective in this study was to determine the prevalence of various orthopedic injuries in the earthquake victims referred to the emergency rooms of the hospitals of Shaheed Beheshti University of Medical Sciences including Imam Hossein Medical Centre, Akhtar Medical Centre and Taleghani Medical Centre.

**MATERIALS AND METHODS**

It was an observational, descriptive case series study and the data collection was via observation and interview. All of the victims of the earthquake of Bam referred directly from the site of earthquake to the emergency rooms of the hospitals of Shaheed Beheshti University of Medical Sciences including Imam Hossein Medical Centre, Akhtar Medical Centre and Taleghani Medical Centre and were entered to this study on a census basis. We evaluated all these 104 referred victims and determined the prevalence of various orthopedic injuries including fractures, dislocations and soft tissue injury by physical examination, X-Ray and CT scan when necessary. Physical examinations were carried out by consultant orthopedic surgeons and senior residents of orthopedic surgery in the hospitals of Shaheed Beheshti University of Medical Sciences. CT scans were reported by consultant radiologists. Helsinki was promised in all stages of the study..

**RESULTS**

52 of the victims were male and also 52 were female. The victims' age ranged from 1.5 to 80 in males and from 2.5 to 65 in females. The mean of the victims' age was 30.2 years. 80 of the victims (76.9%) suffered from a sort of orthopedic injury including fracture, dislocation or soft tissue injury. 70 (67.3%) had fracture or dislocation with or without any soft tissue injury. 60 (57.6%) had fracture or dislocation without soft tissue injury. 10 (9.6%) suffered from both bone and soft tissue injury. Also 10 of the victims (9.6%) had solely soft tissue injury. 24 (23.08%) did not have any fractures, dislocations or soft tissue injury. See the various orthopedic injuries according to the region (upper extremities, lower extremities, pelvic and vertebral column) in the tables 1, 2 and 3.

Also see the prevalence of various orthopedic injuries in order of prevalence in the figure 1.

**Figure 1**

Table 1: The prevalence of orthopedic injuries in upper extremities

	Female	Male	Total
Orthopedic injuries	No. (%)	No. (%)	No. (%)
Fractures of the hand	5 (9.6%)	2 (3.8%)	7 (6.7%)
Distal radial fractures	4 (7.6%)	2 (3.8%)	6 (5.7%)
Both bones fracture of the forearm	2 (3.8%)	-	2 (1.9%)
Fracture of the humerus shaft	4 (7.6%)	1 (1.9%)	5 (4.8%)
Fracture of the humeral neck	1 (1.9%)	1 (1.9%)	2 (1.9%)
Fracture of the clavicle	2 (3.8%)	1 (1.9%)	3 (2.8%)
Anterior sternoclavicular dislocation	-	1 (1.9%)	1 (0.9%)
Acromioclavicular dislocation	-	2 (3.8%)	2 (1.9%)
Compartment syndrome of the hand	-	2 (3.8%)	2 (1.9%)
Compartment syndrome of the forearm	1 (1.9%)	-	1 (0.9%)

**Figure 2**

Table 2: The prevalence of orthopedic injuries in lower extremities

	Female	Male	Total
Orthopedic injuries	No. (%)	No. (%)	No. (%)
Femoral shaft fracture	5 (9.6%)	3 (5.7%)	8 (7.6%)
Intertrochanteric fracture	1 (1.9%)	-	1 (0.9%)
Femoral neck fracture	1 (1.9%)	-	1 (0.9%)
Condylar fracture (medial)	-	1 (1.9%)	1 (0.9%)
Both bones fracture of the lower leg	3 (5.7%)	9 (17.3%)	12 (11.5%)
Isolated tibia fracture	2 (3.8%)	2 (3.8%)	4 (3.8%)
Isolated fibular fracture	3 (5.7%)	-	3 (2.8%)
Malleolar fracture (medial)	-	1 (1.9%)	1 (0.9%)
Calcaneus fracture	1 (1.9%)	-	1 (0.9%)
Metatarsal fracture	-	2 (3.8%)	2 (1.9%)
Lisfranc fracture-dislocation	1 (1.9%)	-	1 (0.9%)
Compartment syndrome of thigh	2 (3.8%)	2 (3.8%)	4 (3.8%)
Compartment syndrome of lower leg	2 (3.8%)	2 (3.8%)	4 (3.8%)
Compartment syndrome of foot	2 (3.8%)	-	2 (1.9%)

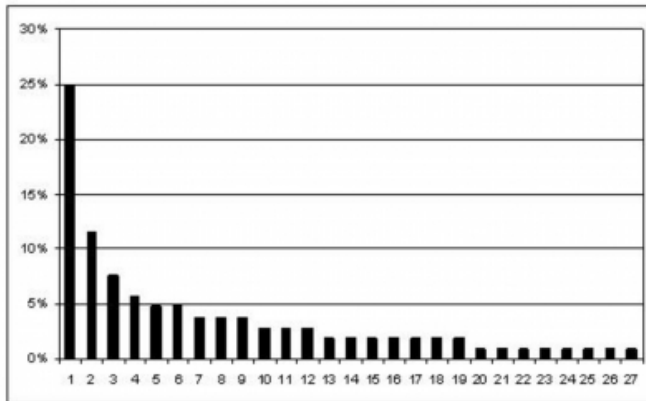
**Figure 3**

Table 3: The prevalence of orthopedic injuries in vertebra and pelvic

Orthopedic injuries	Female No. (%)	Male No. (%)	Total No. (%)
Pelvic fracture	15 (28.8%)	11 (21.2%)	26 (25%)
Vertebral fracture	1 (1.9%)	2 (3.8%)	3 (2.8%)

Figure 4

Figure 1: Earthquake-related orthopedic injuries in order of prevalence



1. Pelvic fracture	25%
2. Both bones fracture of the lower leg	11.5%
3. Femoral shaft fracture	7.6%
4. Distal radial fractures	5.7%
5. Fractures of the metacarpals	4.8%
6. Fractures of the humerus shaft	4.8%
7. Isolated tibia fracture	3.8%
8. Compartment syndrome of thigh	3.8%
9. Compartment syndrome of lower leg	3.8%
10. Fracture of the clavicle	2.8%
11. Isolated fibular fracture	2.8%
12. Vertebral fracture	2.8%
13. Both bones fracture of the forearm	1.9%
14. Fracture of the phalanges	1.9%
15. Fracture of the humeral neck	1.9%
16. Acromioclavicular dislocation	1.9%
17. Compartment syndrome of the forearm	1.9%
18. Metatarsal fractures	1.9%
19. Compartment syndrome of foot	1.9%
20. Anterior sternoclavicular dislocation	0.9%
21. Compartment syndrome of the hand	0.9%
22. Condylar fracture (medial)	0.9%
23. Femoral neck fracture	0.9%
24. Femoral neck fracture	0.9%
25. Calcaneus fracture	0.9%
26. Malleolar fracture (medial)	0.9%
27. Lisfranc fracture-dislocation	0.9%

DISCUSSION

Considering the results of our study, it is elicited that 76.9% of the earthquake victims of Bam referred to the emergency rooms of the hospitals of the Shaheed Beheshti University of Medical Sciences including Imam Hossein Medical Centre, Akhtar Medical Centre and Taleghani Medical Centre suffered from the sort of orthopedic injuries including fractures, dislocations and soft tissue injury in which the most common injuries were: pelvic fracture (25%), lower leg fractures (18.2%), and compartment syndrome (12.5%). Given the results and by comparison with earthquake-related injuries in previous studies, we conclude that pelvic fracture, long bone fracture, particularly lower leg, and also compartment syndromes constitute the most common orthopedic problems in earthquake victims (1,2,3,4,5). Therefore, special attention has to be focused on dealing with these injuries in future similar catastrophes.

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