

Epidemiological Review of Relation between Gender and Traumatic Injuries in Hospitals in Iran

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Abstract

Background: Orthopedic injury including fractures of limbs, hip or spine or the injuries of soft tissue, muscles, ligaments and tendons lesions are the most common traumatic injuries these days, and impose a significant material and spiritual cost to the communities every year. The aim of this study is to evaluate the relation between injuries and the mechanism of injuries and gender.

Methods: In these studies 2480 patients with mean age of 29.9 ± 17.8 referred to Shafa Yahyaean Hospital in Tehran, Iran were participated. Some information of patients has been recorded during April-October in 2013. Information includes demographic characteristics, the exact mechanism of injury, radiographic imaging, CT scan, MRI were recorded. The statistical analysis performed on data with t-test, Mann-Whitney and Chi-Square tests.

Results: From 685 patients with lower extremity fractures, 500 (73%) were male and 185 (27%) female. Also from 332 patients with soft tissue injuries, the males were 281 (84.5%) and 51 (15.5%) female. In this study no significant relation between gender and upper and lower extremity injuries were not seen ($P=0.69$). The most common mechanism of trauma in male patients were fall from standing position 34.8%, direct trauma 24.6%, motorcycle crash 10% and fall from height 7.9%. Also the most common mechanism of trauma in female patients was fall from standing position 54.2%, direct trauma 15.8% and falling from stairs 7.5%. There were no significant relation between sex and trauma mechanism in this study ($P=0.00$).

Conclusions: According to the results the frequency of fractures and soft tissue injuries were higher in male than female. The main mechanisms of injury in both groups were fall from the standing position.

Keywords: epidemiology, fractures, bone, ankle fractures, knee injuries, shoulder

1. Introduction

Orthopedic injuries that was observed in extremities and pelvis or spine fracture or soft tissue, muscles, ligaments and tendons lesions today consider as the most common traumatic injuries (Bradley & Harrison, 2004; Regel et al., 1995) and impose a significant material and spiritual cost to the communities every year (Clapperton, Ashby, & Cassell, 2003; "Ministerial Taskforce on Trauma and Emergency Services and the Department Working Party on Emergency and Trauma Services. Review of Trauma and Emergency Services," 1999).

Although its importance is well recognized but epidemiological studies for the quality and quantity evaluation of these damages are limited in different societies (S. Amin, Achenbach, Atkinson, Khosla, & Melton, 2014; Court-Brown & Caesar, 2006; Menon, Walker, & Court-Brown, 2008; Urquhart et al., 2006). Furthermore, the epidemiology of these injuries is quite different in different societies and cannot be reconciled with each other (Scholes et al., 2014). Even in a particular country these statistics are not the same in urban and rural communities (Amin et al., 2011). Obviously knowing the statistics of these information in any country could result for better management for health and preventive activities (O'Reilly, Gabbe, Braaf, & Cameron, 2015).

In this study we had a close look at patients in an urban trauma center without any intervention and efforts have been made to studying demographic data, mechanism of injury and the type of defect to draw a comprehensive picture of the patients in these centers.

This study has been reviewed the different dimensions of the lesion and compliance aspects and tried to reveal the relation between any fractures with gender, type of trauma and injury for future health and preventive plans.

2. Methods

This is a prospective-case series that performed on 2480 patients with mean age of 29.9 ± 17.8 referred to Shafa Yahyaean Hospital in Tehran, Iran. This hospital is an orthopedic specialty center with more than 50 years' experience of working especially in the field of trauma and it is considered as a Level 1 trauma center.

Some information of patients has been recorded during April-October in 2013. Information includes demographic characteristics, the exact mechanism of injury, radiographic imaging, CT scan, MRI were recorded. This hospital is located in city center and so referring the patients of road trauma is rare here. The patients with isolated spine trauma has been excluded from study but if this trauma was associated with other fractures included into study. Patients had upper and lower extremity injuries as fracture, bone dislocation, joints and soft tissue injuries (rupture of tendon, muscle, vessels and nerves).

Patient's information considered confidential and publication of personal information is prohibited. Also this study did not made any intervention in treatment process.

2.1 Statistical Analysis

Quantitative data has been introduced as Mean \pm SD, and qualitative data as Number (%). To compare the quantitative data we have used Independent t-test or Mann-Whitney. To compare qualitative data Chi-Square or Fisher Exact Test has been used. The entire analysis test has been performed by SPSS (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) And $P < 0.05$ has been considered as significant level.

3. Results

From 685 patients with lower extremity fractures, 500 (73%) were male and 185 (27%) female. Also from 332 patients with soft tissue injuries, the males were 281 (84.5%) and 51 (15.5%) female. In this study no significant relation between gender and upper and lower extremity injuries were not seen ($P=0.69$) (Table 1).

Table 1. Soft tissue injury in upper and lower limb based on sex

	Male	Female	P value
Upper limb	180 (84.1)	34 (15.9)	0.69
Lower limb	102 (85.7)	17 (14.3)	

Data are presented as No. (%)

The most common causes of injury were fall from standing position or falling down with 37.4% and then direct trauma to the body part with 21.5% frequency. The rare trauma is related to bicycle riding. Based on age decades the most common mechanism of trauma in all decades, except the third and fourth decades, were fall from standing position or falling down. In third and fourth decades of patient's life, most common mechanism of trauma was direct trauma.

The most common mechanism of trauma in male patients were fall from standing position 34.8%, direct trauma 24.6%, motorcycle crash 10% and fall from height 7.9%. Also the most common mechanism of trauma in female patients was fall from standing position 54.2%, direct trauma 15.8% and falling from stairs 7.5%. There were no significant relation between sex and trauma mechanism in this study ($P=0.00$).

Shoulder joint or surrounding bone trauma has been recorded in 113 patients, that 89 (78%) of patients were male and 24 (22%) were female. Based on statistical analysis there was a significant differences between gender and shoulder damage ($P=0.00$).

Humeral shaft fracture were seen in 68 patients consist of 53 (77.9) males and 15 (22.05) females. There was a significant sex and humeral shaft fracture in this study ($P=0.00$). Also fractures around the elbow has been recorded for 182 patients that 124 (68.13) of theme were male and the rest 58 (31.87) were female. There were no significant relation between sex and elbow fractures in this study ($P=0.27$).

In the case of forearm fractures, 233 patients consist of 175 (75%) male and 58 (25%) female were recorded in this study that showed no significant relation between this trauma and sex of patients ($P=0.62$). 333 patients consist of 251 (75%) and 82 (25%) females recorded with fractures around the wrist that showed no significant

relation between this trauma and sex of patients ($P=0.189$). Hand bone fractures were seen in 358 patients consist of 306 (85.5%) male and 52 (14.5) female. This result prove a significant relation between sex and hand bone fractures ($P=0.047$) (Table 2).

Table 2. The frequency of injuries in the upper extremities based on sex

	Male	Female	P value
Shoulder	89 (78.8)	24 (21.2)	0.00
Humeros	53 (77.9)	15 (22.05)	0.00
Elbow	124 (68.13)	58 (31.87)	0.27
Forearm	175 (75)	58 (25)	0.62
Wrist	251 (75)	82 (25)	0.189
Hand	306 (85.5)	52 (14.5)	0.047

Data are presented as No. (%)

Also 40 patients consist of 22 (55%) male and 18 (45%) female had been faced with hip fractures that no significant relation between sex and hip fracture were found ($P=0.47$). Femoral fracture were recorded in 142 patients consist of 84 (59%) male and 58 (41%) female that no relation between sex and hip fracture were found ($P=0.385$). As well above information knee fracture with $P=0.005$ and fracture of ankle and foot with $P=0.00$ showed significant relation with sex and leg fractures had no significant relation with sex ($P=0.31$) (Table 3).

Table 3. The frequency of injuries in the lower extremities based on sex

	Male	Female	P value
Hip	22 (55)	18 (45)	0.47
Femur	84 (59.2)	58 (40.8)	0.385
Knee	62 (76.5)	19 (23.5)	0.005
Leg	84 (86.9)	38 (31.1)	0.31
Foot and ankle	248 (82.7)	52 (17.3)	0.00

Data are presented as No. (%)

4. Discussion

There are considerable differences in results of previous epidemiological studies about fracture (Donaldson, Cook, & Thomson, 1990; Donaldson, Reckless, Scholes, Mindell, & Shelton, 2008). One of the reasons for these differences is how to gather information. In some reports all patients admitted to a treatment center has been considered as sample size and in some others as well as this study, patients were hospitalized that naturally patients more severe trauma were considered as study participants (Urquhart et al., 2006). Furthermore, based on the local situation of clinical center, referred patients are quite different (Scholes et al., 2014). Almost all studies reported the incidence of fractures in men more than women and the rate of this incidence in males are about 10-41 in 100000 while in females are 8.1-31 in 100000 (Cannada & Hill, 2014; Donaldson et al., 1990; Donaldson et al., 2008; Fife & Barancik, 1985; Matthiessen & Robinson, 2015; Sakaki et al., 2014; Stockton et al., 2015). In this study the rate of fracture frequency was 76.7% in males and 23.3% in females that is consistent with other studies. The reasons of this high prevalence of fracture in men are higher proportion of men in out of home works, using motor vehicles and wider participation in physical activity (Court-Brown, Bugler, Clement, Duckworth, & McQueen, 2012; Court-Brown & Caesar, 2006; Robinson, Court-Brown, McQueen, & Christie, 1995; Schoofs et al., 2004).

Since the first classics study of Buhr et al. on diffusion curve of gender and age, other studies have emphasized that this curve in men has a bimodal shape means the curve has a peak in age 16-19 and then reach minimum during 50-59 and then show another peak in age 80 and higher while the distribution of this curve in women are unimodal and show a gradual increase in the incidence of fracture in the ages of after menopause (Buhr & Cooke, 1959; Curtis et al., 2009; Johansen et al., 1997; Knowelden, Buhr, & Dunbar, 1964).

In various studies, the most common mechanism of injury was the fall from standing position or falling (Eid et al., 2009; Koo, Tan, & Chong, 2013). As well as this study the most common mechanism was fall from standing or falling, and then direct trauma with 21.5% is in second place and motorcycle crash with 7.9% is in third place. By acquiring mechanism of trauma, health care providers can plan programs for prevention of injuries in different decades of life (Cummins, Koval, Cantu, & Spratt, 2011; Karlsson, Vonschewelov, Karlsson, Coster, & Rosengen, 2013).

In a review by El-Menyar et al., which studied the epidemiology and outcome of different mechanisms and types of traumatic injuries in female, it was shown that in nearly all types and mechanism of injuries, the incidence of injury in male were disproportionately higher than female (El-Menyar et al., 2014). In a study by Deitch et al. it was found that hormonally active human women have a better physiologic response to similar degrees of shock and trauma than do their male counterparts (Deitch et al., 2007).

In conclusion, according to the results the frequency of fractures and soft tissue injuries were higher in male than female. The main mechanisms of injury in both groups were fall from the standing position.

Competing Interests Statement

The authors declare that there is no conflict of interests regarding the publication of this paper.

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