

Epidemiological, Demographic Risk Factors and Complications of Traumatic Humeral Fractures among Patients in Baghdad

Saman Mohammad Abdul Razaq *

Department of Orthopaedics, Iraqi Ministry of Health, Baghdad, Iraq

Abstract

Humeral fractures are among the most common fractures in the elderly and in adults. This study aimed to assess the epidemiological; risk factors and complications of traumatic humeral fracture among studied sample. A cross-sectional study was conducted in the outpatient clinics of public hospitals for the period from March to May 2021. The sample size was 178 participants. The sample was randomly selected. As well as demographic information was recorded and compared with the records. Continuous variables were reported by mean \pm standard deviation; chi-square test was used for Univariate analysis and manova, mvreg for multivariate analysis. Out of one hundred and seventy eight of participants' with humeral fracture, the mean age was 49.2 with SD 1.21 years. 55.06% were male cases and 44.94% were female; 48.02% of them had a junior school; 38.98% had a history of smoking and 21.91% of them had a history of alcohol consumption. 45.51% of them had overweight BMI. There is significant association has been found between the smoking history and humeral fracture complication with p. value less than 0.05. Our results indicated that the patients with age over 41 years had greater risk of humeral fracture than other groups (odds ratio OR=1.57; 95% CI 0.971 to 5.919). Unemployed Patients had greater risk of humeral fracture than those who has a job (OR=10.9; 95% CI 5.047 to 13.661). There are signification association has been found between age, occupation, BMI, VD supplements and smoking history with gender at the p-value less than 0.05. We need further research on this field to detect the morbidity and mortality among cases with traumatic humeral fracture complications.

Keywords

Humeral fracture • Epidemiology • Location • Complication • Risk factor

Introduction

Humeral fractures are among the most common fractures in the elderly and in adults. These fractures are more simple fractures (simple fractures) and do not cause problems after treatment. But sometimes when some important points are neglected during treatment, this may lead to some complications and it is became very serious problems. According to the Centers for Disease Control and Prevention (CDC), at least 250,000 people age 65 or older are hospitalized with fractures each year. The reasons vary according to the patient's age. In elderly patients, the cause may be traffic accidents or direct injury as a result of a hard object hitting the forearm area, or as happens in the elderly, the fracture may occur in the two bones or one of them as a result of falling on the hand while it is straight, which leads to the fracture. Sometimes the fracture may be the result of a sharp object or a gunshot wound [1-7]. In young people and children, the vast majority of fractures occur as a result of falls during play or sports activities such as climbing games in the garden or falling from devices that children jump on. In some few cases, the fracture may be the result of a minor injury, due to a defect in the structure of the two bones or one of them in advance, such as the presence of benign tumours that lead to weakness in these bones and thus to the fracture as a result of minor injury. The fracture may occur in both bones or in one of them, and may also occur in the middle region of the two bones, in the middle region of the forearm, the lower region near

the wrist, or the upper region near the elbow [8-11]. In Iraq, there have been few studies about the epidemiology and risk factors of traumatic humeral fractures and there are many inherent difficulties in the study of orthopaedic trauma epidemiology. Most of the studies on humeral fractures pay more attention to the treatment options and compare their effects. We need to define the population in order to obtain a true picture of the epidemiology of these fractures. The epidemiological picture of fractures varies between communities as a result of differences in racial, socioeconomic, cultural, degree of urbanization and other population characteristics. The study of bone and fracture epidemiology is useful in determining the extent to which researchers need to exchange experiences in developing work in this field, in addition to developing plans for training and resource management in fracture medicine. From this point, this study aimed to assess the epidemiological; characteristics and risk factors of studied sample and also to determine the complications of traumatic humeral fracture among studied sample.

Methodology

A cross-sectional study was conducted in the outpatient clinics of public hospitals for the period from March to May 2021 to assess the epidemiological; characteristics and risk factors of studied sample and also to determine the complications of traumatic humeral fracture among studied sample. The sample size was 178 participants. The sample was randomly selected from patients who attended fractures outpatient clinics. As well as demographic information from the patient was recorded and compared with the records. When we find a difference in the data, the case is excluded from the study. Patients who were admitted to the ward were selected, and those under 19 years of age were excluded, as were those who did not lie in the fracture ward. Other fractures were also excluded from the study. Ethical approvals were obtained from the Iraqi Ministry of Health, as well as oral approval from the patient or his family, explaining to them the importance of this study, and using this data for study only and not for other purposes. Demographic information included age by years and it's calculated as mean and SD and classified as 2 groups (19 to 40 years and 41 to 89 years old). Occupation is classified into (unemployed and retired or employed and student). Education is classified as (Illiteracy, primary and junior school or above). Fracture history is categorized as (you have it or not). Alcohol consumption, smoking and Ca+ supplements are

*Address for Correspondence: Saman Mohammad Abdul Razaq, Department of Orthopaedics, Iraqi Ministry of Health, Baghdad, Iraq, E-mail: abeergate@hotmail.com

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categorized as (you have it or not). BMI is classified to 4 categories (less than 18.5, 18.5-24.9, 25.0-29.9 and equal to 30 or above). Fracture location is classified to 3 categories as (proximal, middle and distal). For treatment type is categorized to (non operative and operative). Complication is classified as (humeral shaft fx nonunion, malunion and radial nerve palsy). Humeral injury mechanism is categorized into 6 groups as (traffic accident, trip or fall, fall from heights, crashing injury, sharp trauma and blunt force trauma). Length stay in hospital is classified in to (less than 10 days and more than 10 days). The data was entered into the Excel sheet before using the statistical program for the purpose of checking the data. Statistical analysis software was used to analyse our data. Continuous variables were reported by mean \pm standard deviation. Univariate analysis was reported by Chi square and p. value. Also, we use the manova, mvreg for multivariate analysis. Statistically Significant was set at P value less than 0.05.

Results

Out of one hundred and seventy eight of participants' with humeral fracture, the mean age was 49.2 with SD 1.21 years. The highest frequency 67.98% of whom still in the age groups 41 to 89 years old; 55.06% were male cases and 44.94% were female; 58.99% of whom were unemployed and 48.02% had a junior school. 38.98% had a history of smoking; 21.91% had a history of alcohol consumption and 46.07% of them that take vitamin D supplements. 45.51% of them had over weight BMI. Half of them 52.8% stayed in the hospital for more than 10 days (Table 1).

In Figure 1 show that the middle humeral was the main location of

fracture and followed by proximal and distal. Majority 71.4% of who doesn't need to operative procedure and only 28.6% need to do surgery (Figures 1 and 2).

In Figure 3 show that the highest frequency 26.4% of who were suffering from injury with fall from heights, followed by 19.7% was trips or fall injury and 17.4% were RTA (Figure 3).

There is significant association has been found between smoking history with humeral fracture complication with p. value 0.0073. Also, in same table we shows that there are no significant relationships has been found between age, gender, occupation, alcohol history, Ca+ supplements and length of stay in hospitals with humeral complication at the p-value more than 0.05 (Table 2).

Multivariate analysis showed that age, occupation, smoking history, BMI and VD supplements were independent risk factors for traumatic humeral fracture among both men and women. Our results indicated that the patients with age over 41 years had greater risks of humeral fracture than other groups (odds ratio OR=1.57; 95% CI 0.971 to 5.919). Unemployed Patients had greater risk of humeral fracture than those who has a job (OR=10.9; 95% CI 5.047 to 13.661). Patients with smoking history were more likely to suffered from humeral fracture than those who don't has the history (OR=6.5; 95% CI 5.444 to 11.621). In addition, the patients with overweight and obese BMI had greater risk of humeral fracture than those with normal and underweight BMI (OR=1.31; 95% CI 1.795 to 7.462). Also, those who don't take VD supplements are more likely to get humeral fracture than those who are take it ((OR=5.55; 95% CI 3.996 to 7.462) (Table 3).

Parameters	Frequency (178)	%
Age	Mean \pm SD	49.2 \pm 1.21
Gender	19-40 years	57
	41-89 years	121
Occupation	Male	98
	Female	80
We were	Employed and student	73
	Unemployed and retired	105
Education	Illiteracy	20
	Primary school	72
	Junior school or above	85
Smoking history	Yes	69
	No	108
Alcohol history	Yes	39
	No	139
Vitamin D supplements	Yes	82
	No	96
BMI Kg/m ²	<18.5	22
	18.5-24.9	36
	25.0-29.9	81
	\geq 30	39
Length of stay in hospital	Less than 10 days	84
	More than 10 days	94

Table 1. Characteristics of patients with traumatic humeral fracture.

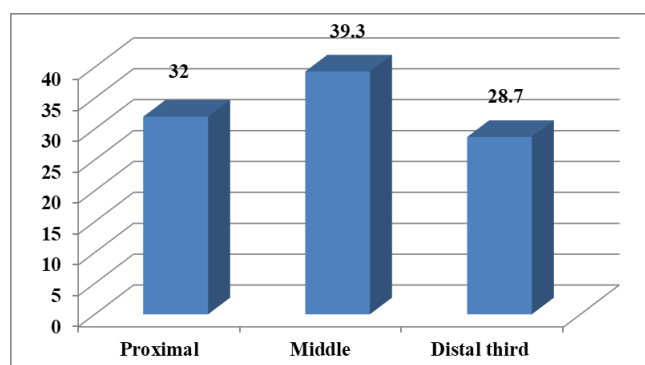


Figure 1. Fracture location among patients with traumatic humeral fracture.

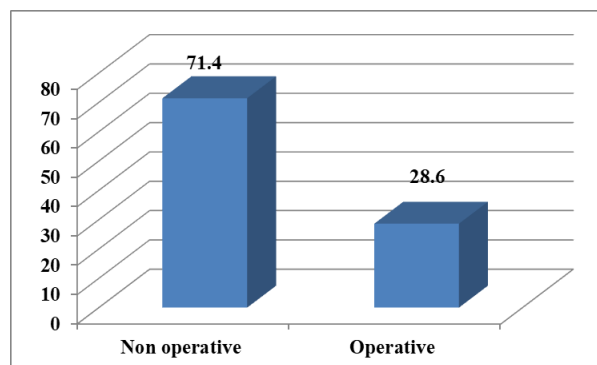


Figure 2. Types of treatment among patients with traumatic humeral fracture.

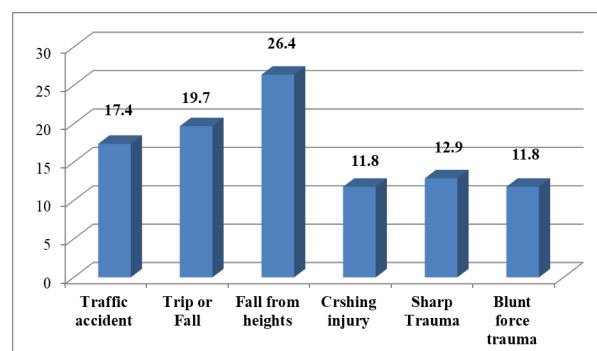


Figure 3. Mechanism injury among patients with traumatic humeral fracture.

Parameters	Mean ± SD	Mean ± SD	Mean ± SD	Total	P. value
	Humeral shaft fx nonunion	Malunion	Radial nerve palsy		
	Frequency %	Frequency %	Frequency %		
Age groups					
19-40	17 30.91	22 32.84	18 32.14	57 32.02	0.974
41-89	38 69.09~	45 67.16	38 67.86	121 67.98	
Gender					
Male	30 54.55	36 53.73	32 57.14	98 55.06	0.927
Female	25 45.45	31 46.27	24 42.86	80 44.94	
Occupation					
Employed and student	24 43.64	27 40.30	22 39.29	73 41.01	0.887
Unemployed and Retired	31 56.36	40 59.70	34 60.71	105 58.99	
Smoking history					
Yes	28 50.91	24 36.36	17 30.36	69 38.98	0.0073
No	27 49.09	42 63.64	39 69.64	108 61.02	
Alcohol history					
Yes	11 20.00	13 19.40	15 26.79	39 21.91	0.565
No	44 80.00	54 80.60	41 73.21	139 78.09	
Vitamin D supplements					
Yes	24 43.64	30 44.78	28 50.00	82 46.07	0.769
No	31 56.36	37 55.22	28 50.00	96 53.93	
Length of stay in hospital					
Less than 10 days	25 45.45	33 49.25	26 46.43	84 47.19	0.908
More than 10 days	30 54.55	34 50.75	30 53.57	94 52.81	

Table 2. Distribution of studied samples with traumatic humeral fracture according to fracture complications.

Risk factors	Exp (β)	95% CI	P-value
Age	1.57	(0.971-5.919)	0.000
Occupation	10.9	(5.047-13.661)	0.000
Education	0.11	(-5.425-0.609)	0.117
Fracture history	0.21	(-5.607-2.293)	0.409
Alcohol history	134.3	(0.390-10.173)	0.069
Smoking history	6.5	(5.444-11.621)	0.009
BMI	1.31	(1.795-2.306)	0.006
Vitamin D supplements	5.55	(3.996-7.462)	0.040

Table 3. Multivariate analysis for risk factors of traumatic humeral fracture among studied samples.

Discussion

This study aimed to assess the epidemiological; characteristics and risk factors of studied sample and also to determine the complications of traumatic humeral fracture among studied sample. With age, the risk of fracture increases significantly. Since the treatment of fractures in the elderly is long-term, recovery can be difficult and can greatly limit movement. In our study we found the mean age were 49.2 with SD 1.2 year; compare with a study done it in Taiwan by Tsai 2009, they found the mean age was 42.9 with SD 20.2 [12]. This difference may be due to life expectancy between the countries. In this study, the majority of traumatic humeral fractures among them occurred in the age 41 to 89 years old and compared with a study in Malawi [13], they reported the majority of humeral fracture occurred in the age 30 to 39 years. This is due to the different causes of exposure and the nature of the hard work that each other does, which is a cause of fracture. In this study, half of them were male and compared with other study in China [14]; the authors reported the majority of humeral fractures occurred among female cases. Because of that the majority of them are exposed to many factors that help increase the rate of fracture among them, such as some of them suffer from osteoporosis and some chronic diseases that help increase the chances of fracture. In Our finding we found 59% of whom were unemployed and compared with another study in China [15], they mentioned the majority were employed. This is due to a difference in the lifestyle, as some of them engage in self-employment or do strenuous exercise that helps to increase the rate of exposure to fracture. The level of education of the participants has an impact in reducing the risk of fracture and its complications, as it helps them to learn about prevention and treatment methods. In this study we found 48% of cases had junior education and compared with a study in US [16], the majority had high education level. The causes of injury are due to the wrong practices that he follows in the performance of exercises. Many studies have indicated that the smoking habits is one of the factors that contribute to human osteoporosis, as the weakness of the bones and their exposure to fracture, which causes strong pain and disability and sometimes leads to death. In our study we found 39% of them were smoker and compared with other studied in Nigeria and in Saudi Arabia [17,18], the majority of them were smoker during exposed to traumatic humeral fracture. This refers to similarity in tradition and habits between countries. Genetic, psychological, social and environmental factors can influence the effect that drinking alcohol has on your body and behaviour. In our study we found that 22% of them had a history of alcohol consumption and compared with another study in US, the authors mentioned the majority of fractures are people who have a history of drinking alcohol. This is due to the different lifestyle and customs between the two countries. A recent study found that taking vitamin D alone does not protect older adults from the risk of bone fracture. In this study we found 46.1% of them had taken the VD supplements and compared with other studied done it in Taiwan and in US about 54 million people have low bone mass or completely suffer from osteoporosis, which can lead to fractures, according to the National Osteoporosis Foundation. It is estimated that after

the age of 50, half of women and a quarter of men are at risk of broken bones due to fragility. The association between obesity and fracture among women is site-dependent, obesity being protective against hip and pelvis fractures but associated with an almost 30% increase in risk for proximal humerus fractures when compared with normal/underweight women [19-21]. In this study we found that the 45.5% of them had overweight BMI and compared with other studied in US, the authors reported that overall, 3794 patients (18.7%) had overweight BMI. Being overweight has been associated with an increase in risk factors for surgery and the possibility of serious complications that sometimes lead to death. Older people who had a fracture and are admitted to hospital, they had a weak physical and psychological structure and are at greater risk of fracture complications and death more than others. The risk of mortality is greater for those of male sex who have co-morbidities and a loss of physical and social independence. In our study we found half of cases had stayed in hospital for more than 10 days and compared with study in Spain, the researchers indicated that the average of hospital stay for fractured patients is one day, with the range one to four days. This depends on the type of injury, location, age and severity of the injury. Some injuries require a longer stay depending on the type of case and the complications accompanying it. A mid-shaft humerus fracture represents about 3% of all broken bones [22-25]. Middle humeral fracture was the main type among familiar fracture location and compared with result in US, the authors reported the distal humeral fracture was the main type of fracture location. It depends on the types of exposure and etiologies. The most common cause of a humeral shaft fracture is a fall, but high-energy injuries as motor vehicle collisions, sports injuries and penetrating trauma as gunshot wounds also can cause this injury. Many humeral shaft fractures, especially in older people, occur as a result of the weakening of the bone from osteoporosis. In this study found the fall from heights were the popular cause of the fracture and compared with other studied in Taiwan, China, they reported the RTA and crushing injury were a major cause of fracture. The vast majority of mid-shaft humerus fractures heal without surgery, which minimizes complications. In this study we found that 28.6% of them had a surgery procedure and compared with another study in Finland, the authors mentioned the total incidence of surgical procedures was 19.6 per 100,000 person years (n=808) in 2009 [26-28]. Open reduction and internal fixation was the most common surgical procedure performed (n=7774, 73.6%), followed by closed reduction and osteosynthesis (n=1515, 14.3%), arthroplasty (n=1198, 11.3%), and external fixation (n=73, 0.7%).

Conclusion

We concluded that the majority of humeral fracture cases occurred among age groups 41-89 years old; half of them were unemployed and few had illiteracy education. Higher frequency of cases had a history of smoking and alcohol consumption. Most of them had history of obese and overweight BMI. Fall from heights were the main etiology of humeral fracture. There are signification association has been found between age, occupation, BMI, VD supplements and smoking history with gender at the p. value less than 0.05.

Recommendation

We recommended eating a healthy diet that includes foods rich in calcium, such as milk, yogurt and cheese, and vitamin D, which helps the body absorb calcium. Doing physical activity with lifting and exercises that improve balance and posture can help strengthen bones and reduce the chance of a fracture. Avoiding the smoking, it can increase the risk of a broken arm by reducing bone mass. It can also hinder fracture healing. In addition to, we need further research on this field to detect the morbidity and mortality according to complications among cases with traumatic humeral fracture.

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