

## Original Article

## Analysis of Hand Fractures in Kuwait

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**ABSTRACT**

**Objectives:** To analyze hand fractures in Kuwait and to detect any findings that characterize our population

**Design:** A retrospective study

**Setting:** Al-Razi Hospital, Kuwait

**Subjects:** All patients with hand fractures seen in the hand unit in 2005 were included in this study.

**Main Outcome Measures:** Incidence of hand fractures, site and location of fracture

**Results:** The annual incidence of hand fractures was 93.5 per 100,000 individuals. The age group 25-34 years had 35.6% of fractures and represented the biggest group in carpal, metacarpal and phalangeal fractures. The male to

female ratio was 5:1 and the right to left hand ratio was 1.2 : 1. Non-Kuwaiti nationals had 61% of fractures and 66.7% out of them sustained their fractures at work. The little finger is the most frequently injured finger and the terminal phalanx is the most frequently injured bone. In children the majority of fractures occur at home and crush injury was the mechanism in 79.9% of children four years old and younger.

**Conclusion:** Our results show that a high percentage of fractures occur in non-Kuwaiti nationals at work and there is a high male to female ratio. This is partly explained by the composition of the population in Kuwait.

KEY WORDS: hand fractures, Kuwaiti nationals, terminal phalanx

**INTRODUCTION**

Hand fractures are among the most common fractures of the skeletal system as they represent 17-25% of all fractures<sup>[1-3]</sup> and 18-46% of all hand and wrist injuries<sup>[4-6]</sup>. In Kuwait we have no data on the number of hand fractures or their distribution in the hand and in the population. We, therefore, made this study to shed some light on this subject and to try to identify the groups at risk for these fractures and to compare the findings in our population to those in other countries.

**SUBJECTS AND METHODS**

A special register was made to include all patients with hand fractures referred to the hand unit in Al-Razi hospital in Kuwait during the period from first of January to 31<sup>st</sup> of December 2005. All the required information was registered on a one-page form completed by the hand surgeon on the first visit to the clinic. This hand surgery unit is the only hand unit in Kuwait and all patient with hand fractures are referred to us except some who are seen by orthopedic surgeons in general and private hospitals. The information collected included age and sex of the patient, hand dominance, anatomical site of the fracture, location of the fracture occurrence and the nationality of the patient.

**RESULTS**

During the study period a total of 2796 patients with hand fractures were seen in our hand unit. This gives an annual incidence of 93.5 per 100,000 as the total population of Kuwait at the end of the year 2005 was 2,991,189. The right hand is injured in 53.3% of cases, the left hand in 46% and both hands are injured in 0.7%, with 98.1% of the patients being right-handed.

The average age for all patients was 28.1 years. The average age for men was 29.2 years and that for women was 22.8 years. The age group distribution of hand fractures is shown in Table 1. Patients in the age group 25-34 years had the largest proportion of hand fractures (35.6%) compared to the other groups. This same group also had the largest proportion of carpal, metacarpal and phalangeal fractures with only multiple fractures more common in the age group 45-54 years.

The gender distribution shows that men get the greatest proportion of hand fractures with 83.4% compared to women with only 16.6%. This gives a male to female ratio of 5:1. This gender distribution is true for all fractures and is especially true for the carpal and metacarpal fractures (Table 2).

The distribution of hand fractures by nationality (Table 3) shows that non-Kuwaiti nationals, who

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**Table 1:** The distribution of hand fractures by age group and anatomical location

Age group in years	Carpal bone fractures (% of total number of carpal fractures)	Metacarpal bone fractures (% of total number of metacarpal fractures)	Phalanges fractures (% of total number of phalangeal fractures)	Multiple fractures (% of total number of multiple fractures)	Total (% of total number of hand fractures)
0-4	0 (0)	15 (2.6)	99 (5.1)	0 (0)	114 (4.1)
5-14	2 (0.8)	76 (13.4)	299 (15.5)	0 (0)	377 (13.5)
15-24	81 (31.6)	144 (25.4)	224 (11.6)	12 (27.3)	461 (16.5)
25-34	117 (45)	199 (35)	670 (34.9)	9 (20.4)	995 (35.6)
35-44	41 (15.8)	91 (16)	386 (20.1)	8 (18.2)	526 (18.8)
45-54	10 (3.8)	21 (3.7)	200 (10.4)	15 (34.1)	246 (8.8)
55-64	9 (3.5)	21 (3.7)	27 (1.4)	0 (0)	57 (2.0)
65 +	0 (0)	1 (0.2)	19 (1.0)	0 (0)	20 (0.7)
Total (% of total number of hand fractures)	260 (9.3)	568 (20.3)	1924 (68.8)	44 (1.6)	2796

**Table 2:** The distribution of hand fractures by gender and anatomical location

Gender	Carpal Fractures (% of total number of carpal fractures)	Metacarpal fractures (% of total number of metacarpal fractures)	Phalangeal fractures (% of total number of phalangeal fractures)	Multiple fractures (% of total number of multiple fractures)	Total
Male	248 (95.4)	513 (90.3)	1535 (79.8)	35 (79.5)	2331
Female	12 (4.6)	55 (9.7)	389 (20.2)	9 (20.5)	465
Total	260	568	1924	44	2796

**Table 3:** The distribution of hand fractures by age group and nationality

Age group (in years)	Kuwaiti nationals (% within same age group)	Non-Kuwaiti nationals	Total
0-4	73 (64)	41 (36)	114
5-14	277 (73.5)	100 (26.5)	377
15-24	304 (66)	157 (34)	461
25-34	206 (20.7)	789 (79.3)	995
35-44	107 (20.4)	419 (79.6)	526
45-54	70 (28.5)	176 (71.5)	246
55-64	29 (51)	28 (49)	57
65 +	20 (100)	0(0)	20
Total	1086 (39)	1710 (61)	2796

represent 66% of the total population in Kuwait, are affected 61% of the time. They are the majority in the age groups (25-34) and (35-44) years. The Kuwaiti nationals represent 39% of cases and are the majority in the other age groups. The distribution of fractures by location of occurrence (Table 4) shows that 43% of patients sustain their fractures at work and 32.9% at home. Kuwaiti nationals sustain their fractures at home in 51.7% of the time and at work in 5.6% of the time. In contrast, non-kuwaiti nationals sustain their fractures at work in 66.7% of the time and at home in 21.1% of the cases.

The distribution of fractures by anatomical location in the hand (Table 5 and 6) shows that the little finger is the most frequently injured finger in the hand with 27.3% and the terminal phalanx to be the most frequently injured bone with 34.8%. Among the metacarpal bones the fifth metacarpal

**Table 5:** Anatomical location of hand fractures

Bone fractured	Number of patients	Percentage
Scaphoid	204	7.3
Other carpal bones	56	2.0
First metacarpal bone	59	2.1
Second metacarpal bone	77	2.8
Third metacarpal bone	40	1.4
Fourth metacarpal bone	75	2.7
Fifth metacarpal bone	317	11.3
Proximal phalanx	614	22.0
Middle phalanx	336	12.0
Terminal phalanx	974	34.8
Multiple fractures	44	1.6

bone is most affected (55.8%) and among carpal bones the scaphoid bone is most affected (78.5%). The mechanisms of injury are shown in Table 7.

In children 14 years and younger (Table 8 and 9) the little finger is most frequently injured (36.5%) and the proximal phalanx is the most frequently injured bone (36.9%) with the terminal phalanx second (34.0%). Carpal bone fractures are rare representing only 0.4% of cases. In children 65.1% of their hand fractures occur at home with 13.8% at sport and recreation and 5% occur at school. Girls predominate in four years old children and younger (62.3% girls, 37.7% boys) while boys predominate in older age group (66.5% boys, 34.5% girls). Crush injury is the mechanism in 79.9% of cases in children four years old and younger with a home door causing the injury in 43.9% of cases.

**Table 4:** The distribution of hand fractures by nationality and location of fracture occurrence

Nationality	Location of fracture occurrence					Total
	Home	Work	Sport & Recreation	School	Others	
Kuwaiti (%)	560 (51.7)	61 (5.6)	345 (31.7)	25 (2.3)	95 (8.7)	1086 (100)
Non-Kuwaiti (%)	361 (21.1)	1140 (66.7)	140 (8.2)	18 (1.1)	51 (2.9)	1710 (100)
Total	921	1201	485	43	146	2796

**Table 6:** Location of fractures in the hand

Site of fracture	Number of patients	Percentage
Carpal bone	260	9.3
Thumb	366	13.1
Index finger	358	12.8
Middle finger	421	15.1
Ring finger	453	16.2
Little finger	764	27.3
Multiple fingers	174	6.2

**Table 8:** Distribution of hand fractures in fingers in children (< 14 years)

Finger injured	Number of patients	Percentage
Thumb	120	24.6
Index	54	11.0
Middle	68	13.9
Ring	68	13.9
Little	179	36.6

## DISCUSSION

The composition of the population in Kuwait has some characteristics which are reflected in some of our results. One of these characteristics is that the majority of the manual work power in Kuwait is provided by non-Kuwaiti nationals and they represent two thirds of the general population. They represent 61% of cases with hand fractures and 66.7% of these injuries occur at work with only 21.1% occurring at home and 4.1% occur at sports and recreation. In Kuwaiti nationals, on the other hand, only 5.6% of injuries occur at work with the majority of the fractures occurring at home and during sports and recreation. In some previous reports the rate of work accidents was 9-20% [2,7,8]. The anatomical distribution of hand fractures is also affected by the nature of the man-power in Kuwait. Phalangeal fractures are 68.8% of all fractures which is higher than the 46% reported by Hove<sup>[1]</sup> and the 59% reported by Van Onsellen<sup>[3]</sup>. Terminal phalangeal fractures represent 34.8% of all fractures and 59.8% of these occur at work. This is probably a reflection of lack of proper training and lack of proper safety measures in the work place. The carpal bone fractures represent 9.3% of hand fractures similar to previous studies<sup>[1,3]</sup>. The scaphoid fractures are 78.5% of carpal fractures, which is within the wide range of 51-87% reported in previous studies<sup>[1,9,10]</sup>.

**Table 7:** The distribution of hand fractures by mechanism of injury

Mechanism of injury	Number of patients	Percentage
Fall	1101	39.4
Machinery / Crush	1198	42.8
Quarrel	301	10.8
Car accident	74	2.6
Injury by car/home door	122	4.4

**Table 9:** Distribution of hand fractures by anatomical location in children (< 14 years)

Bone Fractured	Number of patients	Percentage
Scaphoid bone	2	0.4
First metacarpal	10	2
Second metacarpal	24	4.9
Third metacarpal	18	3.7
Fourth metacarpal	8	1.6
Fifth metacarpal	31	6.3
Proximal phalanx	181	36.9
Middle phalanx	50	10.2
	167	34

The distribution of hand fractures by age groups shows that 70.9% of cases are in the age group 15-44 years which is similar to the results of Packer and Shaheen<sup>[2]</sup> (70% of their cases in the age group 10-40 years) and Van Onsellen<sup>[3]</sup> (67% of their cases in the age group 10-39 years). The male to female ratio of 5:1 is high compared to other studies which report a range of 1.8 : 1 to 3.7 : 1<sup>[2,3,7,11,12]</sup>. This also partly reflects the great number of fractures that occur at work and in sports and recreational activity and this is dominated by men in our society. The right to left hand ratio is similar to that reported by Van Onsellen of 1:1<sup>[3]</sup> but different from that reported by Packer and Shaheen of 2:1<sup>[2]</sup>.

When we consider children in the age group 0-14 years we find our results for the most frequently injured finger and most frequently injured bone to be similar to other reports<sup>[13,14]</sup> but at much lower rates. In the Vadivelu *et al* <sup>[14]</sup> study the little finger was injured in 52% of cases and phalangeal fractures represented 59.5% of the hand fractures. The crush injury is the most common mechanism in young children similar to previous reports and the same is true for the gender distribution. The reversal in the sex incidence of these injuries above the age of four years is not something peculiar to Kuwait. In the

Rajesh *et al* study<sup>[13]</sup> girls predominate in children four years old and younger with 66%, whereas boys predominate in older children with 68%. In the Vadivelu *et al* study<sup>[14]</sup> a similar pattern was noted. They explained this as a result of the cultural changes with girls becoming more involved in sports at younger age, while older boys are more involved in contact sports. Another explanation could be that young girls are presumed, falsely, to be less active and are given more freedom to play unwatched and therefore are more liable to get injured.

The annual incidence of hand fractures calculated in our study of 93.5 per 100,000 individuals is to be taken with caution because although we receive the great majority of hand fractures in Kuwait some patients are seen in other hospitals and not referred to us. We could not find any clear report of the incidence of hand fractures in the literature but they are rather reported as part of the incidence of hand injuries. This incidence has a wide range of 147/100,000 to 705/100,000<sup>[5,6]</sup>.

## CONCLUSION

The distribution of hand fractures in Kuwait is different from that in other countries in some aspects. These include the high percentage of fractures at work, the high percentage of terminal phalanx fractures and the high male to female ratio. This is in part a reflection of the composition of the population in Kuwait.

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