

Observational Study

Epidemiology of isolated hand injuries in the United Arab Emirates

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Abstract

AIM

To provide suggestions for hand injury prevention by study the demography and risk factors of casualties suffering from isolated hand injuries.

METHODS

All trauma patients with isolated hand injuries who were admitted to Al Ain Hospital for more than 24 h during a period of 3 years were studied. Patient demographics, location, mechanism/time of injury, and length of hospital stay were all analyzed.

RESULTS

Two hundred and ten patients were studied. Their mean age was 29.7 years. Males constituted 92%. Sixty-five point one percent of all cases were from the Indian subcontinent. The workplace was the most common location of injury (67.1%), followed by the home (17.1%) and road (6.2%). Machinery caused 36.2% of all injuries, followed by heavy object (20.5%) and fall (11%). Cases injured at home were young ($P < 0.0001$) with an associated higher incidence of females ($P < 0.0001$).

CONCLUSION

Male workers in Al Ain city are at greater risk of sustaining hand injuries, predominantly from machinery. Safety education, personal protection, and the enforcement of safety standards are essential to the prevention and avoidance of hand injury.

Key words: United Arab Emirates; Occupational safety; Hand injury; Injury prevention

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Core tip: Two hundred and ten hospitalized patients with isolated hand injuries were prospectively studied in Al Ain Hospital, United Arab Emirates. Males were in greater danger of sustaining work-related hand injuries especially from machinery. Safety education, personal protection, and enforcement of safety standards are essential for hand injury prevention.

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INTRODUCTION

Hand injuries are common in young men^[1,2]. They constitute 7%-28% of all injuries^[3,4], and account for about one fifth of all emergencies presenting to hospital emergency departments^[5]. Although the outcome of hand injuries is seldom fatal, patients may suffer substantial disability^[6]. Types of injuries vary from soft tissue injuries and lacerations to burns, fractures, and amputations^[7]. The costs of treatment are high as some patients may require hand reconstruction^[7]. Many of these injuries affect the dominant hand^[8] and can cause considerable physical disability and psychological stress^[9,10].

The United Arab Emirates (UAE) is a country experiencing a rapid economic development. The population, reportedly circa 4 million in 2003, consisted of a high proportion of expatriate workers^[11]. Injury remains the second main cause of fatalities at 27.3 per 100000 persons per year^[12]. Data on isolated hand injuries are lacking in this region. There is a need for information on risk factors for hand injuries related to the individual, the environment and the equipment in order to allow the development of efficient injury prevention and safety promotion^[12]. To reduce the effect of associated injuries it was decided to study only patients with isolated hand injuries who had been admitted to Al Ain hospital.

The purpose of the study was to evaluate the risk factors of inpatients with isolated hand injuries so that recommendations for hand injury prevention in the UAE could be advocated.

MATERIALS AND METHODS

Ethical approval

Ethical approval for this study was obtained from Al Ain Health District Ethics Committee (ethical approval No: RECA/02/44). All patients who are admitted to Al Ain Hospital, or their legal guardian, sign a general consent form permitting the use of their anonymous data for audit and research.

Data collection and setting

Data of all patients with isolated hand injuries and who were hospitalized more than 24 h were retrieved from Al Ain Hospital Trauma Registry. During a 36-mo period (March 2003-March 2006), data from the Registry were prospectively collected by a full time Trauma Research Fellow. Al Ain Hospital is a major specialized acute care hospital with a capacity of more than 400 beds^[13]. The hospital cared for approximately 80% of trauma cases in Al Ain during the study period. The hospital is located in Al Ain City which had a population of 460000 during that period. Twenty-two percent of cases were UAE nationals while the remainder came from the expatriate work force^[11]. Nationalities were categorized as Indian subcontinent and others as it had been previously shown that risks of injury for these two groups in Al Ain differed. There is a significantly higher proportion of manual laborers in Al Ain from the Indian subcontinent^[14,15].

Studied variables included gender, age, nationality, mechanism and anatomical location of hand injury, time/date of injury, and length of hospital stay.

Calculations and statistics

We used Kruskal Wallis test to compare continuous and ordinal data and Fisher's exact test to compare categorical data. A *P*-value of less than 0.05 was considered significant. Data were analyzed using Statistical Package for the Social Sciences (IBM-SPSS version 21, Chicago, IL, United States).

RESULTS

Out of 2573 patients in the Trauma Registry, 210 patients sustained isolated hand injuries (8.2%). The majority of patients were male (91.9%, *n* = 193). The average (SD) age of cases was 29.7 (12.6) years. There were two peaks, in children < 5 years old injured mostly at home, and younger adults 20-30 years injured at work (Figure 1). Seventy-two point seven percent of patients (*n* = 152) were in the age group of 20-44; children and youth < 20 years constituted 14.7% (*n* = 31) (Figure 1). In respect of nationality, the majority of patients came from India, Pakistan, Bangladesh and Sri Lanka (65.1%, *n* = 136), then other Arabs (21.1%, *n* = 44), UAE nationals (7.6%, *n* = 16) and other nationalities (6.2%, *n* = 13). Patients from the Indian subcontinent were significantly older than UAE-nationals and others (*P* = 0.002).

Machinery and heavy objects caused more than half

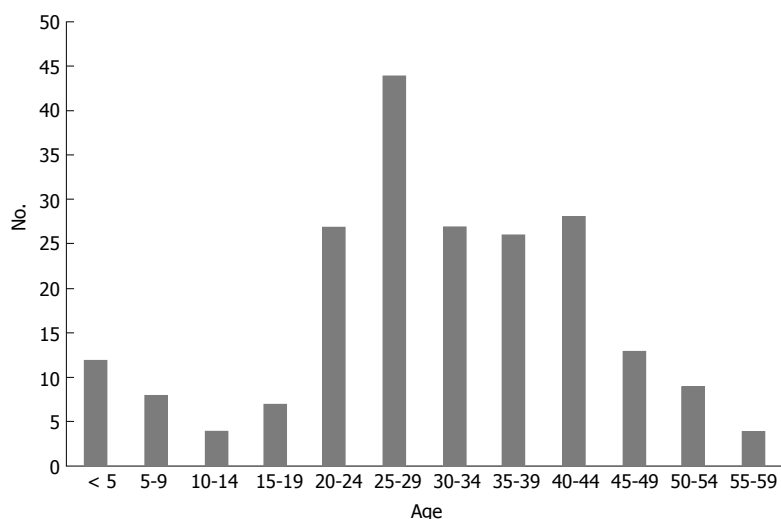


Figure 1 A histogram showing the age distribution of hospitalized patients having isolated hand injuries, Al Ain Hospital, 2003-2006 (n = 210).

Table 1 Isolated hand injury hospitalization by age group and mechanism, Al Ain Hospital, 2003-2006 (n = 210) n (%)

| Variable | Age groups | | | Total |
|--------------|-----------------------|-----------------------|-----------|------------------------|
| | 0-14 | 15-29 | 30-59 | |
| Machinery | 1 (4.2) | 32 (41) | 43 (40.2) | 76 (36.4) |
| Heavy object | 3 (12.5) | 12 (15.4) | 28 (26.2) | 43 (20.6) |
| Fall | 5 (20.8) | 9 (11.5) | 9 (8.4) | 23 (11) |
| Cut | 6 (25) | 9 (11.5) | 5 (4.7) | 20 (9.6) |
| Traffic | 3 (12.5) | 6 (7.7) | 7 (6.5) | 16 (7.6) |
| Burn | 4 (16.7) | 4 (5.1) | 7 (6.5) | 15 (7.2) |
| Crush | 1 (4.2) | 2 (2.6) | 2 (1.9) | 5 (2.4) |
| Animal | 1 (4.2) | 0 | 3 (2.8) | 4 (1.9) |
| Other | 0 | 4 (5.1) | 3 (2.8) | 7 (3.3) |
| Total | 24 (100) ¹ | 78 (100) ¹ | 107 (100) | 209 (100) ¹ |

¹The percentage may not add to 100 due to rounding; age of 1 patient was unknown.

Table 2 Isolated hand injury hospitalization by location and mechanism, Al Ain Hospital, 2003-2006 (n = 210) n (%)

| Variable | Location of injury | | | | Total |
|--------------|------------------------|-----------|-----------------------|----------|------------------------|
| | Work | Road | Home | Other | |
| Machinery | 72 (51.1) | 0 | 2 (5.6) | 2 (10) | 76 (36.2) |
| Heavy object | 39 (27.7) | 0 | 4 (11.1) | 0 | 43 (20.5) |
| Fall | 8 (5.7) | 1 (7.7) | 9 (25) | 5 (25) | 23 (11) |
| Cut | 8 (5.7) | 0 | 10 (27.8) | 2 (10) | 20 (9.5) |
| Burn | 9 (6.4) | 0 | 6 (16.7) | 1 (5) | 16 (7.6) |
| Traffic | 0 | 12 (92.3) | 1 (2.8) | 3 (15) | 16 (7.6) |
| Crush | 3 (2.1) | 0 | 2 (5.6) | 0 | 5 (2.4) |
| Animal | 0 | 0 | 0 | 4 (20) | 4 (1.9) |
| Other | 2 (1.4) | 0 | 2 (5.6) | 3 (15) | 7 (3.3) |
| Total | 141 (100) ¹ | 13 (100) | 36 (100) ¹ | 20 (100) | 210 (100) ¹ |

¹The percentage may not add to 100 due to rounding.

of all injuries (Table 1). Children < 15 years were mainly injured by cuts, followed by falls and burns (Table 1). In the productive age (15-59 years), the most common mechanisms of injury were machinery and heavy object (Table 1). Two injuries were caused by assault (1%),

Table 3 Demography and hospital stay of isolated hand injury by location of injury, Al Ain Hospital, 2003-2006 (n = 210)

| Variable | Work n = 141 | Road n = 13 | Home n = 36 | P-value |
|---------------------|-----------------|----------------|----------------|----------|
| Age | 32 (18-55) | 40 (14-45) | 11.5 (1-57) | < 0.0001 |
| Gender | | | | |
| Males | 98.6% (139) | 100% (13) | 61.1% (22) | < 0.0001 |
| Females | 1.4% (2) | 0 | 38.9% (14) | |
| Nationality | | | | |
| UAE | 1.4% (2) | 7.7% (1) | 27.8% (10) | < 0.0001 |
| Indian Subcontinent | 76.6% (108) | 46.2% (6) | 30.6% (11) | |
| Others | 21.3% (30) | 46.2% (6) | 41.7% (15) | |
| Hospital days | 6 (1-110) | 6 (2-17) | 3.5 (2-22) | 0.008 |

Twenty-six patients injured in other locations were not included; Data are presented as median (range) or number (%) as appropriate; P = Kruskal Wallis test or Fisher's Exact test as appropriate. UAE: United Arab Emirates.

and all other were unintentional.

Work was the most common location for isolated hand injury (67.1%), followed by home (17.1%) and road (6.2%) (Table 2). The most common cause of injury at work was machinery (51.1%) followed by heavy object (27.7%); while at home it was cuts (27.8%) followed by fall (25%) and burn (16.7%) (Table 2). Home cases were significantly younger (P < 0.0001) (Table 3). More males than females were significantly injured at work and road (P < 0.0001) (Table 3). More females than males sustained injury at home (P < 0.0001) (Table 3). Nationals from the Indian subcontinent were more often injured at work (76.6%), while UAE nationals were more often injured at home (27.8%) (Table 3).

During the day there were three peaks: In the morning at around 9 o'clock, at lunch time at around noon, in the evening at around 5 o'clock (Figure 2A). During the week, injuries occurred most often on Saturdays, which was, during the study period, the first working day of the week (Figure 2B). There was a peak of injuries during

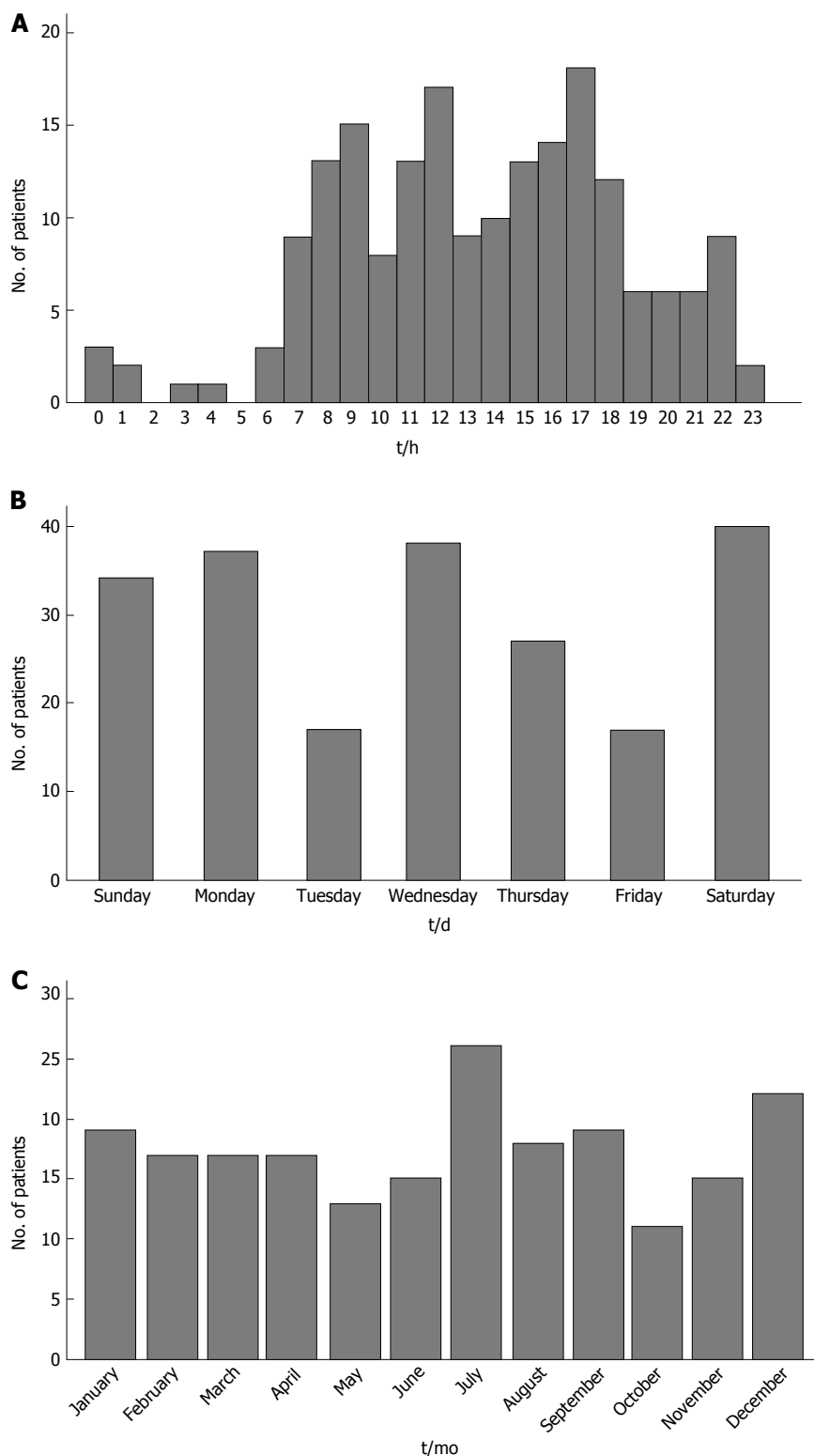


Figure 2 Distribution of hospitalized patients having isolated hand injuries by the hour of the day (A), day of the week (B), and the month of the year (C), Al Ain Hospital, 2003-2006 (n = 210).

summer in July (Figure 2C).

The length of hospital stay ranged from 1 to 110 d (mean 7.9; median 5). Those who were injured at home had a significantly shorter hospital stay ($P < 0.0001$) (Table 3). Forty-eight/two hundred and ten (22.9%) patients sustained an amputation of one finger or more. There were no deaths of studied patients during the

study period.

DISCUSSION

The highest risk group for hand injuries in our setting was young male adults. Males from the Indian subcontinent were commonly injured at work, while UAE nationals

were more commonly injured at home.

The proportion of hand injuries (8.2%) in all injured patients and the proportion of males (91.9%) in those with hand injuries in our study was higher compared with studies in Sweden, Poland and Nigeria^[1,2,8]. As indicated in other studies, it was found that young males sustained injury mainly at work^[16,17]. Immigrant construction workers, mainly from the Indian subcontinent, were found to be at a higher risk of isolated hand injury^[18]. If injured, workers may lose their employment, income, and jeopardize both their socio-economic status and family life. The majority of women in this study sustained injury at home, where they stay most of their time due to cultural factors. This finding exemplifies the importance of home safety in the UAE setting.

The mean age in our study (29.7 years) was similar to that found in other studies^[16,19]. In this study, 14.7% were children and youth < 20 years. The hand is one of the most commonly injured body regions in children^[20], which may be explained by their lack of appreciation of risk. The majority of pediatric injuries in our study were sustained at home, similar to findings in a recent study in the United States^[21].

Machinery caused the most often hand injury in this study, followed by heavy objects, both of which are common causes of hand injury in industrialized countries^[2,16]. These injuries occur as a result of inattention, tiredness, stress, doing an unusual task, being rushed, and the use of poorly maintained or defective machinery^[10,22]. Hand injuries caused by machinery are usually more severe and can lead to permanent loss of hand function or even amputation^[2]. Adopting the use of gloves can decrease the risk of lacerations and punctures, but not crushing, fractures, avulsions, amputations or dislocations^[23]. Other preventive measures, including engineering control and safety training, are necessary to reduce the incidence of more severe injuries^[23].

Violence-related injuries are uncommon in this community compared to other countries. Violence constituted only 1% in this study. In a report from Nigeria, the high level of violence was associated with a high incidence of gunshot injuries to the hand^[8]. Although the percentage of burns in this study was similar to those in other reports, the burn hazards differed^[8]. It has been previously reported that scalds from hot liquids were the major hazard at home, compared with gas and flames at work^[24]. Sport-related hand injuries were not seen in our study compared with a European study that indicated a high prevalence of these injuries^[25]. It is possible that the majority of people in this community do not participate in outdoor sport activities because of hot weather and long working hours.

Animal-related hand injuries were not common in this study (1.9%), and were mainly caused by camels^[26]. Many farm workers in the UAE take care of camels, a large animal with a powerful, incisive bite^[27].

Twenty-two point nine percent of patients in this study sustained finger amputations, similar to findings in other studies^[8,16]. The identification of the object causing amputation was not possible in this study.

Usually these amputations in adults are caused by press machines and powered wood cutters^[28], and, in children, by doors, furniture, and machinery^[29]. These amputations are particularly devastating to the patients and cause distress due to the physical loss and a need for body image adjustment^[30].

Similar to findings in other studies, it was found that the peak time of injury in the morning was around 9 o'clock^[31]. Workers in the UAE tend to work long hours with an associated reduced time for sleep. It has been reported elsewhere that sleep deprivation decreases alertness, adversely affects work performance and constitutes a serious work hazard^[32].

It was also found that injuries were sustained most often on Saturdays, the first day of work in the UAE after the weekend. The first working day of the week usually had the highest incidence of hand injuries^[19]. Similar to findings in other studies, the incidence of injuries was high during summer. It is possible that hot outdoor temperatures in the UAE cause a decrease in the vigilance of outdoor workers^[19].

Hospital stays of patients with hand injuries are usually longer in the UAE than for other injuries because of the greater need for rehabilitation^[2]. It is believed that the longer hospital stays among those injured at work were the result of the social circumstances of UAE expatriate workers. Many of them live alone and without support in crowded accommodation and so prefer to remain as long as possible in the more congenial and supportive environment of the hospital.

It should be emphasized that this study is an epidemiological study and not a clinical outcome study. Injury prevention remains an important duty of trauma surgeons, whose responsibility it is to define risk factors pertaining to injury, to carry out studies on interventional injury prevention and their effects, and to support health promotion through in-depth research on injury prevention^[33-35].

Limitations

This study has certain limitations that require to be highlighted. Patients with minor hand injuries were managed at the Emergency Department. Those who stayed in the hospital for less than 24 h were not included. The Trauma Registry was based in Al Ain hospital, therefore the results of this study may not be generalized for the whole UAE population. This study was for a limited time which was funded by the National University. It is a unique and important source of data for GCC countries. Although these data are a decade old, we think that they still reflect the present situation as isolated hand injury risk factors have not changed in the working environment during this period. Manual laborers still normally do not wear gloves, the electrical saw machines still usually do not have in-built safety, and safety precautions are still not properly followed by labourers. Finally, some important variables were missing like details of occupation, information about injury of dominant hand, absence of functional outcome, occupational experience, length of working

shifts, the causal activity of the person during the injury (smoking or consumption of alcohol), inadequate training, deployment of safety equipment and protective gear, as well as socio-economic variables. There is a need for additional research on causal factors in hand injuries and the importance of transferring these research findings into safety practice in the UAE.

Isolated hand injuries constitute a major proportion of admitted trauma patients in Al Ain city with lengthy hospital stays. Males are at greater risk of sustaining isolated hand injuries especially at work, the majority from machinery. Safety education, personal protection and the enforcement of safety standards could reduce both the need for hospitalization and the incidence of disability in relation to hand injuries.

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COMMENTS

Background

Hand injuries are common in young men. They rarely lead to death, but may cause serious physical disability and psychological stress. Some may require hand reconstruction with associated high cost of treatment. There is a lack of information on personal, environmental and product/equipment risk factors for hand injuries.

Research frontiers

The aim of the study was to investigate demographics and risk factors of hospitalized patients with isolated hand injuries in order to give recommendations for hand injury prevention.

Innovations and breakthroughs

The majority of patients with isolated hand injuries in this study were males. The most common location was work, followed by home and road. Females were injured more at home. Patients injured at home were younger. The most common mechanism was injury from machinery, followed by heavy object and fall. Children < 15 years were mainly injured by cuts, followed by falls and burns.

Applications

Male workers are in higher risk for isolated hand injury, especially from machinery. Safety education, the use of personal protective equipment, and the proper enforcement of safety guidelines are essential.

Terminology

UAE: United Arab Emirates; GCC: Gulf Cooperation Council is a political and economic union consisting of Arab countries - Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates; IBM-SPSS: Statistical Package for the Social Sciences.

Peer-review

The paper describes an epidemiological study concerning isolated hand injuries supported by solid references. This study is definitely worth publishing.

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