Pattern and Etiology of Acute Hand Injuries

Hyder Ali,[1*] Roqayyah Munawwer Khursheed,[1] Sabeen Hyder,[1] Mujtuba Pervez[1]

ABSTRACT

Objective — *To determine the pattern and etiology of acute hand injuries presenting in an emergency room.*

Study design — *Cross-sectional study.*

Place & Duration of study — *Emergency Department of Dr. Ruth KM Pfau Civil Hospital Karachi, from August 2019 to July 2020.*

Methodology — *All patients of age 15 years - 60 years with hand injuries were included using non-probability convenient sampling. Data were collected using hand injury chart and analyzed using SPSS software version 26. Results were presented in percentage, mean, and standard deviation. Chi-square test was applied to find out association and a p-value of <0.05 was considered as statistically significant.*

Results — *Out of 386 cases, 342 (89%) were males and 44 (11%) females. The common age group affected was l5 years - 40 years (n= 342 - 88.6%). Occupation-wise, majority (n=276 - 71.5%) of the patients were unskilled workers. Maximum injuries (n=281 - 55.6%) occurred in the time interval from 4 pm to midnight. Majority of patients (n=90 - 55%) sustained injury while at work. The right hand was more commonly injured than the left hand. A total of 438 tendons were injured of which 307 (70%) were flexor tendons. Finger flexors and extensors were involved in 60% and 16.4% respectively.*

Conclusions — *Males employed as unskilled workers were mostly injured. Machine injuries occurred more frequently.*

Key words — *Hand injury, Tendon injuries, Machine injuries, Flexor tendon.*

INTRODUCTION:

The hand is an important part of the human anatomy and has unique structure and function. It has 20 muscles, 27 bones, numerous tendons, and a network of vessels and nerves.[1] The significant hand injuries can result in physical and physiological morbidity. About 10% of all emergency room visits are due to hand injuries and soft tissue insults, of which 82% are related to the former.[2]

Most of the hand injuries occur due to various types of machines like thresher, wringer, printing presses, assault with sharp edged and blunt weapons and objects, road traffic accidents, in sports etc. The clinical presentation ranges from minor complaints of pain to traumatic amputation of the hand or its components.[3,,5] The aim of this study was to determine the pattern and etiology of acute hand injuries presenting in an emergency room. This would be used to plan appropriate strategies to educate masses in general and laborers in particular to how to prevent them.

METHODOLOGY:

This was a cross-sectional study conducted in the Emergency Department of Dr. Ruth KM Pfau Civil Hospital Karachi, from August 2019 to July 2020. Patients with age from 15 years to 60 years were

[1] Department of Plastic & Reconstructive Surgery DUHS, CHK Karachi.

Correspondence:
Dr. Hyder Ali [1*]
Department of Plastic & Reconstructive Surgery
Dow University of Health Sciences &
Dr. Ruth KM Pfau Civil Hospital
Karachi
E-mail: hyder.ali@duhs.edu.pk

included. Patients were enrolled with non-probability convenient sampling technique. Patients who presented with hand Injury involving distal to the carpal crease were included. Patients who received prior treatment at another hospital, and poly trauma patients were excluded.

Approval of study was taken from Institutional Review Board. Informed consent was obtained from the patients or their attendants. The data were collected using the hand injury chart by the on-call plastic surgery resident. The chart included two sections; history and examination. History section contained questions regarding the patient's age, gender, dominant hand, occupation, time of injury, mode and mechanism of injury. In examination section site of injury, type of wound, involvement of tendons and injury to neurovascular bundle were documented.

Statistical analysis was performed using SPSS software version 26. Descriptive statistics were used to analyze the data. Mean and standard deviation were calculated for age. Frequency and percentages were calculated for the variables like age, gender, occupation, mode of injury and mechanism of injury, wound description and tendon and neurovascular injuries. A Chi-square test was used to assess the association between socio-demographics and clinical characteristics of patients. A p-value of <0.05 was considered as statistically significant.

RESULTS:

A total of 386 patients with hand injuries were attended during the study period. There were 342 (89%) males 44 (11%) females. Most of the patients were <45 years of age (n=342 - 88.6%). The mean age of the patients was 24.86±6.41 years. Occupation-wise 276 (71.5%) patients were unskilled workers, 48 (12.4%) were skilled workers, 37 (9.6%) students and 25 (6.5%) housewives. Maximum injuries (n=281 - 55.6%) occurred in the time interval from 04 pm to midnight followed by 79 (35.7%) from 8 am to 4 pm while 26 (8.7%) occurred from midnight to 8 am.

The right hand was injured in 216 (56%) patients. Majority of the injuries occurred in road accident (n=358 - 92.7%), 16 (4.1%) as an assault and 12 (3.1%) were self-inflicted. Most of the injuries were due to different machine (n=186 – 48.2%), followed by glass injuries (n=90 - 23.3%). Other mechanism included knife injuries (n=40 – 10.4%), due to explosives (n=10 – 2.6%), fall of heavy object (n=10 – 2.6%) and hand trapped in door (n=8 – 2.1%). In 42 (10.4%) patients injuries occurred due to roller. Open wound was found in 380 (98.4%) patients. Tidy wound was noted in 200 (51.80%) and potentially contaminated wound in 186 (48.20%) patients. Clean-cut wounds were found in 268 (69.40%) and crush wounds in 118 (30.60%) patients.

A total of 438 tendons were involved in 386 patients in which flexor tendons 307 (70.0%) were more commonly involved. Extensor tendons were injured in 131 (30.0%) patients. Finger flexors were most commonly involved (60%) of which 31% were flexor digitorum superficial (FDS) and 29% flexor digitorum profundus (FDP) tendons. The most commonly injured tendons were FDP of middle finger (n=48 - 10.9%) followed by FDS of ring finger (n=47 - 10.7%). Finger extensors were involved in 72 (16.4%), followed by wrist flexors in 36 (8.2%) and wrist extensors in 29 (6.6%) patients.

Articular surfaces of the joints were involved in 88/242 (36%) fractures. The distal interphalangeal joint was involved in 34% cases, proximal interphalangeal joint in 31.8%, metacarpophalangeal joint in 22.7%, interphalangeal joint of thumb in 9% and, carpometacarpal joint of thumb in 2.3% cases. It was observed that patients aged 45 and below suffered an injury in their dominant hand, had isolated hand injury, and the cause was mostly related to the use of a machine or a tool. They also had evidence of fractures on x-rays. Vascular and nerve injury, if present, was more frequent in female patients. Association between socio-demographics and clinical characteristics of patients is given in table I.

DISCUSSION:

Hands are vital part of our axial skeleton and injuries or trauma to this may lead to physical disability and affect quality of life. During the study period a large number of patients were brought to ER with significant injuries to hand including musculo-skeletal system and neuro-vascular bundles. Most of the injuries occurred in active adult male population.

There was a high proportion (71.5%) of patients who were unskilled workers. They were untrained casual laborers and farmers. Most of the injuries in < 40 year group were mainly the result of decreased concentration, non-supervision, non-experience and lack of training with machines. This finding is consistent with other studies done in different developed and developing parts of the world. [6-9] Mean age is almost similar to other studies where peak age reported was 2nd and 3rd decades of life. [10,11]

Table I: Association Between Socio-demographics and Clinical Characteristics of Patients

Demographics	Vascular injury			Nerve injury			Fracture on X-ray		
	No n (%)	Yes n (%)	p-value	No n (%)	Yes n (%)	p-value	No n (%)	Yes n (%)	p-value
Age									
< 45 years	285 (73.8%)	48 (12.4%)	0.118	279 (72.3%)	58 (15.0%)	0.054	96 (24.8%)	242 (63%)	0.002
> 45 years	48 (12.4%)	5 (1.3%)		49 (12.7%)	0 (0.0%)		48 (12.2%)	0 (0.0%)	
Gender									
Male	316 (82.0%)	0 (0.0%)	0.002	316 (82.0%)	2 (0.5%)	0.002	67 (17.3%)	173 (44.8%)	0.002
Female	19 (5.0%)	48 (12.4%)		10 (2.6%)	58 (15.0%)		2 (0.5%)	144 (37.3%)	
Occupation									
Skilled/Semi-Skilled workers	182 (47.2%)	3 (0.7%)	0.002	179 (46.3%)	13 (3.4%)	0.002	144 (37.3%)	39 (10.1%)	0.002
Uunskilled workers	153 (40.0%)	48 (12.4%)		141 (36.5%)	53 (13.7%)		0 (0.0%)	203 (52.6%)	

Demographics	Affected hand			Event by exposure			Type of injury		
	No n (%)	Yes n (%)	p-value	Affected by machine or tool n (%)	Affected by accident n (%)	p-value	Isolated hand n (%)	Associated injury n (%)	p-value
Age									
< 45 years	115(30.0%)	220 (57.0%)	0.002	211 (55.0%)	125 (32.4%)	0.002	336 (87%)	0 (0.0%)	0.002
> 45 years	48 (12.4)	3 (0.6%)		2 (0.5%)	48 (12.1%)		19 (5.0%)	31 (8.0%)	
Gender									
Male	163 (42.0%)	156 (40.0%)	0.002	144 (37.0%)	175 (45.0%)	0.002	288 (75.0%)	29 (8.0%)	0.166
Female	0 (0.0%)	67 (18.0%)		67 (17.0%)	0 (0.0%)		69 (18.0%)	0 (0.0%)	
Occupation									
Skilled/Semi-Skilled workers	163 (42.0%)	19.2 (5.0%)	0.002	10 (3.0%)	174 (45.0%)	0.002	154 (40.0%)	29 (8.0%)	0.002
Uunskilled workers	0 (0.0%)	201 (53.0%)		202 (52.0%)	0 (0.0%)		203 (53.0%)	0 (0.0%)	

The current study findings showed that majority of the hand injuries occurred in accidents as a result of assault. This is comparable to most of the studies.[9,12,10,13] In another study assault was also found to cause hand fractures.[14] A study conducted in Nigeria reported that hand injuries also occurred in sports and children were involved.[15] This study was limited to the adults population only. Other studies also report that laceration were more frequently found in hand injury followed by cuts, crush injuries, abrasions, amputations, and burns.[6,12]

The results of our study showed that machinery related injuries were seen more frequently. This was also consistent with study conducted in Hong Kong.[6] In the same study it was explained that victims who suffered from laceration had nerve injury. They underwent nerve repair, and suturing. One study explored different mechanism and anatomical location of flexor tendon injury in hands. It was reported that middle and little fingers were injured more frequently followed by thumb. It also emphasized that early mobilization following tendon repair is recommended for good outcome.[5]

There is dearth of local data hence studies with larger sample size are needed to validate the findings of this study. It is also recommended that workplace should be made safe and training must be provided to the workers. Hazardous machinery should be removed or replaced with suitable equipment. Emergency .treatment facility must be made available at workplace with prompt referral to appropriate tertiary care hospital or trauma center.

CONCLUSIONS:

Males were more frequently involved in hand injuries who had occupational exposure to different machines. Grievous injuries resulted involving tendons and neuro-vascular bundles.

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Mujtuba Pervez: Drafting and revising the intellectual content.

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