International Journal of Research in Medical Sciences
Gupta R et al. Int J Res Med Sci. 2017 Mar;5(3):880-884
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20170629

Original Research Article

Pattern of hand injuries reported in a tertiary care setting of North India

Rishabh Gupta[1]*, Shavi Mahajan[2], Deepika Dewan[3], Rajat Gupta[4]

[1]Consultant Orthopaedician Accidental Hospital Chowki Choura, Directorate of Health Services, Jammu, Jammu and Kashmir, India
[2]Pathologist, Jammu, Jammu and Kashmir, India
[3]Senior Resident, Post Graduate Department of Community Medicine, Government Medical College, Jammu, Jammu and Kashmir, India
[4]Consultant Pathologist, Government Hospital Gandhi Nagar, Jammu, Jammu and Kashmir, India

Received: 08 February 2017
Revised: 10 February 2017
Accepted: 15 February 2017

***Correspondence:**
Dr. Rishabh Gupta,
E-mail: dr.rishabh19@gmail.com

ABSTRACT

Background: Hand injuries are very common in this industrialized world. Significant number of patients report every day to the emergency department with various patterns of hand injuries. It is important to understand these patterns in order to plan proper management and develop safety protocols aimed at preventing these injuries.
Methods: The present cross sectional study was conducted among 150 patients presenting with Open hand injuries, in the OPD and emergency of Post Graduate Department of Orthopaedics, Government Medical College, Jammu over a period of one year from January 2010 to December 2010.
Results: Out of 150 cases 131(87.33%) were males and 19 (12.67%) were females. The commonest age group affected was 21-30 years (34%) followed by 11-20 years (23%). Maximum injuries 90 (60%) occurred in the time interval from 4 pm to midnight. Majority of patients 67 (45%) sustained injury while at work. Occupation-wise 37 (25%) patients were unskilled workers, mainly laborers, 35 (23%) were farmers, while the remainder belonged to various other professions. In this series machine injuries, assault and road traffic accidents accounted for most injuries, representing 61 (41%), 25 (17%) and 16 (11%) patients respectively. Traumatic amputation (30%) was the most common injury. The index (21%) and middle (21%) fingers were involved more commonly. Tendon injuries (31%) were more frequent than compound fractures (23%).
Conclusions: Hand trauma predominantly affects young males who have occupational exposure to different machines. A proper understanding of the pattern of injury will help in better management.

Keywords: Hand injuries, Hand trauma, Pattern

INTRODUCTION

The Hand is identified throughout history as an important component of the human anatomy and unique in structure and function. The hand of the working man is his most valuable asset; without it life becomes a burden. Therefore, it is essential that the hand injuries receive most skillful care, howsoever minor they appear to be. The widening mechanization of industry and agriculture has increased the incidence of injuries of hand. Hand injuries are common, accounting for nearly 10% of hospital emergency department visits.[1-3] The main source of hand injuries include- various types of machine injuries like cutting machines, thresher machines, wringer

machines, printing presses; assault with sharp edged and blunt weapons; Road traffic accidents; sports injuries; broken glass and fall of heavy object on hand. Their clinical presentation ranges from minor complaints of pain to traumatic amputation of the hand.[1,2,4]

The outcome of hand trauma depends not only on the severity of injury but also on the adequacy of timely instituted treatment.[1-3] In the developed countries effective hand injury preventive measures have greatly reduced the incidence as well as severity of these disabling injuries.[5,6] The present study was initiated to analyze the pattern, causes and morbidity caused by hand injuries and thereby to suggest some preventive measures to decrease their incidence.

METHODS

The present cross sectional study was conducted among 150 patients presenting with Open hand injuries, in the OPD and emergency of Post Graduate Department of Orthopaedics, Government Medical College, Jammu over a period of one year from January 2010 to December 2010. Informed consent was taken from all the patients.

Permission was sought from the hospital ethics committee for conducting the study. Closed hand injuries were excluded from this series as they form a significant workload in their own right. For the purpose of this study hand injury was defined as any injury occurring distal to the carpal crease. However, patients having involvement of hand both proximal and distal to the carpal crease by same injury were also included in this study. A detailed history was taken and following points were recorded:

- The patient's name, age, sex, occupation and address.
- Hand involved.
- Exact time of injury.
- Time of arrival at the hospital.
- Mode of injury.
- Whether the patient was intoxicated at the time of injury.
- Whether the patient was overworked or working overtime.
- Whether the light was good or poor.
- Whether he patient was skilled or unskilled worker.
- Nature of first aid received.

The following points were noted in examination

- Hand involved and the exact site of injury; whether dorsum or palm and the zone involved.
- Type of injury
- Extent of injury

Plain X-Rays of hand were done in all patients and other investigations such as those required for evaluation of fitness for general anesthesia were done where indicated.

RESULTS

Out of 150 cases 131(87.33%) were males and 19(12.67%) were females. The age of patients ranged from 2-65 years and the commonest age group affected was 21-30 years (34%) followed by 11-20 years (23%). The mean age was 29 years (Table 1).

Table 1: Age distribution of patients.

Age in Years	No. of patients	Percentage %
1-10	15	10
11-20	34	22.67
21-30	52	34.67
31-40	27	18
41-50	11	7.3
51-60	7	4.67
61-70	4	2.67
Total	150	100

The right hand was injured in 88(59%) patients, the left in 56(37%) and both hands in 6(4%) patients.

Table 2: Distribution of Patients according to Occupation.

Occupation	No. of patients n (%)
Unskilled workers	37 (24.67%)
Farmers	35 (23.33%)
Skilled workers	16 (10.67%)
Government employees	9 (6%)
Businessmen	16 (10.67%)
Students	12 (8%)
Housewives	7 (4.67%)
Others	18 (12%)
Total	150 (100%)

Table 3: Various modes of hand injury (N =150).

Mode of injury	No. of patients n (%)
Machines	
Powered saw Thresher machine Press machine Factory machinery Sugarcane juice machine Automobile machine	61 (40.67%)
Assault	25 (16.67%)
Road Traffic Accidents	16 (10.67%)
Accidental injury	16 (10.67%)
Glass injury	8 (5.3%)
Fall of heavy weights	12 (8%)
Fall	5 (3.3%)
Miscellaneous	
Animal bites Door entrapments	7 (4.67%)

Maximum injuries 90 (60%) occurred in the time interval from 4 pm to midnight followed by 52 (35%) from 8 am to 4 pm while only 8 (5%) occurred from midnight to 8 am. 67 (45%) patients injured their hand during work, 45 (30%) patients when they were off their routine work (this includes cases of violence, road traffic accidents etc.) while as activities at home resulted in 38 (25%) patients of hand injury.

37 (25%) patients were unskilled workers, mainly laborers, 35 (23%) were farmers, 16 (11%) were skilled workers, 9 (6%) were in government job, 16 (11%) were in business, 12 (8%) were students, 7 (4%) housewives, 18 (12%) were either children or unemployed (Table 2). 42 (28%) cases of hand injuries occurred as a result of overwork or working overtime and 30 (20%) cases blamed poor light for injury. 15 (10%) cases gave history of alcohol intake before injury while 21 (14%) blamed poor safety devices of machines as the cause of hand injury. In this series machine injuries, assault and road traffic accidents accounted for most injuries, representing 61 (41%), 25 (17%) and 16 (11%) patients respectively (Table 3).

Traumatic amputation (30%) was the most common injury sustained followed by crush injury (25%), incised wounds (23%) and lacerated wounds (22%). The index (21%) and middle (21%) fingers were involved more commonly followed by ring finger (18%), palm (18%), thumb (11%) and little finger (11%). Tendon injuries (31%) were more frequent than compound fractures (23%) (Table 4).

Table 4: Distribution of hand injuries.

Injury	Tendon injury	Compound fracture	Compound dislocation	Neurovascular injury	Traumatic amputation	Total
Thumb	5	6	1	0	5	17
Index finger	15	1	2	1	16	25
Middle finger	13	4	2	1	12	32
Ring finger	11	5	3	1	13	33
Little finger	10	4	0	1	7	22
Metacarpals	0	20	0	2	2	24
Wrist and Forearm	0	0	0	0	9	9
Total (%age)	54 (31.4)	40 (23.3)	8 (4.6)	6 (3.5)	64 (37.2)	172 (100)

DISCUSSION

Predominant involvement of males was found in this study. A gender difference in hand injury patterns has been reported in the published literature as well. Khan AZ reported a series of occupational hand trauma patients in which all patients were males.[7]

Majority of the patients were young. This was mainly because the patients in these groups were untrained casual laborers and farmers while the injuries in 1-10 years group were mainly a result of children playing with machines. Other published studies have also reported more frequent involvement of relatively younger patients.[5,6,8]

The work place is the site of most injuries where the young adults aged 21-30 years were the main victims. This pattern is similar to the findings of Sorock GS et al who demonstrated that young workers 24 years or younger have the highest risk of occupation hand and finger trauma.[6] The home environment constitutes another major site for injuries especially in children. Creating a safe home environment will therefore go a long way in reducing the prevalence of injuries in children. Machines constituted the leading cause of hand injuries in our study. Among these machines, grinding machines, electrically powered saws, and press machines were most frequently involved. The grinding machines caused a significantly high number of injuries. Adigun et al study had raised alarm on the contribution of the grinding machine to the prevalence of severe injuries not only limited to the hand but also to the external genitalia.[9] There is still need to continue effortlessly in the campaign on injuries prevention from grinding machines. Trybus M et al also reported mechanical equipment as the leading cause of hand injuries.[10] Several other published studies have reported electrically powered metal machinery used in a variety of sectors, as the major source of disabling hand trauma.[11-14]

Our industrial and agricultural systems have recognized limitations that predispose the workers to hand injuries. Lack of occupational safety protocols, lack of vocational training and young age at starting industrial / agricultural life are among the factors that contribute to the causation of serious injuries in our set up. Poor work environmental conditions, poor perception of work conditions and presence of disease or adverse health conditions among the workers have been identified as the general

predisposing factors.[15-18] Sorock GS et al described three major risk factors for occupational hand injuries i.e. deficient use of protective measures, lack of work experience and worker-related factors (drowsiness, inattention etc.).[19] Chow CY et al defined seven significant transient risk factors for acute occupational hand injuries: using malfunctioning equipment/materials, using a different work method, performing an unusual work task, working overtime, feeling ill, being distracted and rushing.[20] Unlu RE et al identified voluntary poking of hand into operating machine and unfamiliarity with the work as the leading causes of crushing type occupational hand injuries.[21]

Amputation of the digits is the single most common injury sustained. Even in combination, it is still the most common injury type sustained by our patients. This may be due to the severity of injuries sustained in machines like grinding machines, thresher machines etc. That hand injuries caused by mechanical equipments resulted in the most severe of injuries was also noted by Trybus M et al in their article on causes and consequences of hand injuries.[10] The index and the middle finger were more frequently involved. Published studies have reported different patterns and distribution of injuries. Some studies have reported laceration type injuries as the most common, followed by crush injuries, fractures and amputations. Stanbury et al analyzed work-related amputations and found that single digit amputations constituted the leading type (71% of the total amputations) while hand amputations were around 1.2%.[11]

CONCLUSION

Hand trauma predominantly affects young males who have occupational exposure to different machines. It is associated with a high rate of traumatic amputation of hand and digits. Most of the cases result from avoidable occupational hazards. Fatigue and overwork, unfamiliarity with machines, poor working conditions, carelessness and violence play a significant role in hand injuries. It is therefore recommended that Occupational safety protocols should be developed and aimed at eliminating recognized workplace hazards. The primary focus of such protocols should be the industrial, agriculture and other machine related work environments. Adequate vocational training and awareness of public can play a major role in prevention of hand injuries.

ACKNOWLEDGEMENTS

The authors are thankful to all the people who have participated in the study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Lese AB. Hand Injury, Soft Tissue [Serial online] 2006 August [Cited 2008 Jan 03]: [4 screens]. Available from: URL: http://www.emedicine.com/emerg/topic225.htm
2. Campbell DA. Hand fractures. Surg Int. 2006;75:437- 40.
3. Saaiq M, Din HU. Occupational hand trauma: Can we do something to reduce the sufferings of our poor workers? Ann Pak Inst Med Sci. 2007;3:204-5.
4. Rosberg HE, Dahlin LB. Epidemiology of hand injuries in a middlesized city in southern Sweden: a retrospective comparison of 1989 and 1997. Scand J Plast Reconstr Surg Hand Surg. 2004;38:347-55.
5. Serinken M, Karcioglu O, Sener S. Occupational Hand Injuries Treated at a Tertiary Care Facility in Western Turkey. Industrial Health. 2008;46:239-46.
6. Sorock GS, Lombardi DA, Hauser RB, Eisen EA, Herrick RF, Mittleman MA. Acute traumatic occupational hand injuries: type, location, and severity. J Occup Environ Med. 2002;44:345-51.
7. Khan AZ, Khan IZ, Khan A, Akhter J, Choudhry AM. Audit of occupational hand trauma presenting in the Accident and emergency departments of two major hospitals. Ann King Edward Med Coll. 1998;4:14-6.
8. Lombardi DA, Sorock GS, Hauser R, Nasca PC, Eisen EA, Herrick RF, Mittleman MA. Temporal factors and the prevalence of transient exposures at the time of an occupational traumatic hand injury. J Occup Environ Med. 2003;45:832-40.
9. Adigun IA, Kuranga SA, Abdulrahman LO. Grinding machine: Friend or foe. WAJM 2002;21:338-340.
10. Trybus M, Lorkowski J, Brongel L, Hladki W. Causes and consequences of hand injuries. Am J Surg.19;192:52-7.
11. Stanbury M, Reilly MJ, Rosenman KD. Work related amputations in Michigan. Am J Ind Med. 2003;44:359-67.
12. Ergor OA, Demiral Y, Piyal YB. A significant outcome of work life: occupational accidents in a developing country, Turkey. J Occup Health. 2003;45:74-80.
13. Jeong BY. Characteristics of occupational accidents in the manufacturing industry of South Korea. Int J Ind Ergon. 1997;30:301-6.
14. Hansen TB, Carstensen O. Hand injuries in agricultural accidents. J Hand Surg.1999;24:190-2.
15. Ghosh AK, Bhattacherjee A, Chau N. Relationships of working conditions and individual characteristics to occupational injuries: a case-control study in coal miners. J Occup Health. 2004;46:470-80.
16. Gauchard G, Chau N, Mur JM, Perrin P: Falls and working individuals: role of extrinsic and intrinsic factors. Ergonomics. 2001;44:1330-9.
17. Bhattacherjee A, Chau N, Sierra CO, Legras B, Benamghar L, Michaely JP et al. Relationships of job and some individual characteristics to

occupational injuries in employed people: a community-based study. J Occup Health. 2003;45:382-91.
18. Chau N, Mur JM, Benamghar L, Siegfried C, Dangelzer JL, Francais M et al. Relationships between certain individual characteristics and occupational injuries for various jobs in the construction industry: a case-control study. Am J Ind Med. 2004;45:84-92.
19. Sorock GS, Lombardi DA, Hauser RB, Eisen EA, Herrick RF, Mittleman MA. A case-crossover study of occupational traumatic hand injury: methods and initial findings. Am J Ind Med. 2001;39:171-9.
20. Chow CY, Lee H, Lau J, Yu IT. Transient risk factors for acute traumatic hand injuries: a case crossover study in Hong Kong. Occup Environ Med. 2007;64:47-52.
21. Unlu RE, Abaci Unlu E, Orbay H, Sensoz O, Ortak T. Crush injuries of the hand. Ulus Travma Derg 2005;11:324-8.

Cite this article as: Gupta R, Mahajan S, Dewan D, Gupta R. Pattern of Hand injuries reported in a tertiary care setting of North India. Int J Res Med Sci 2017;5:880-4.