



## A STUDY OF PATTERN OF HAND INJURIES IN RURAL INDIA -JAMMU

## Orthopedics

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## ABSTRACT

A study of "PATTERN OF OPEN HAND INJURIES" in 150 cases is presented. Various causes, morbidity, disability and preventive measures have been discussed with review of relevant literature. The incidence of open hand injuries was common in the age group between 21-30 years (34%) and the patients ranged from 2 years to 65 years in age. Male (97%) were affected more commonly than females (13%). Right hand being involved more frequently (59%) than left hand (37%) and both hands (4%). Hand injuries were more common in the evening (60%) than morning (35%). (45%) cases injured their hands at work; (30%) off the work and (25%) at home.

Machine being the most common cause of injury (41%), followed by violence (17%), road traffic accidents (11%), accidental injuries (11%), glass injuries (5%), fall of weights (8%) and miscellaneous causes (7%). Farmers and unskilled labourers were more commonly affected (48%). Fatigue and overwork, poor light, unfamiliarity with machine, poor safety devices, carelessness and violence played a significant role in the cause of hand injury. Average disability caused by hand injury was 5.5% and average time off the work was 38 days. The findings are in consistence with those of other workers (Absoud 1984; Smith 1985; Johns 1981; Leung 1980; Mathur 1988).

## KEYWORDS

Hand fractures, Hand injuries, Occupational injuries, Toka injury, Sustainable

## INTRODUCTION

The hand is identified throughout history as an Important component of the Human anatomy, unique in structure and function. Hand injuries account for one-third of all accidents at work; Domestic hand injuries make up 1/3 of total hand injuries. The present study was initiated to analyse the incidence, causes, morbidity and disability caused by hand injuries in Jammu province.

## MATERIAL AND METHODS:

150 cases of open hand injuries attended orthopedic department of Government Medical College, Jammu, during January to December for a period of one year.

For our purpose hand injuries 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 the same injury were also included in this study. The pattern of hand injuries sustained by each patient was Recorded as under :-

## A) HISTORY:

Following points were recorded during history taking:

Patients name, age, sex, occupation, address, hand involved, exact time of injury, type of machine or weapon, mode of injury, weather intoxicated or not at the time of injury, weather overworked or working overtime, condition of light, weather skilled or unskilled worker.

## B) EXAMINATION:

The following points were noted in the examination:

- 1. Hand involved:** Weather right or left hand, exact site of injury, weather palm or dorsum and which zone was involved.
- 2. Type of injury:** Weather incised wound, lacerated wound, crush injury, and level of amputation was noted
- 3. Extent of injury:** Was recorded by noting involvement of skin, muscles, tendons, nerves, vessels, bones and amount of foreign material present.
- 4. Investigation:**
  - I. Included routine hemogram and urine examination.
  - II. X-ray of the injured hand, AP and lateral view.
  - III. Specific tests

Including serum chemistry, X-ray chest (PA view), E.C.G.
- 5. Primary treatment:** Depending upon the extent of injury; under local or general anesthesia, Thorough wound irrigation and debridement was done and converting the wound from compound to simple by restoring the skin cover except in grossly contaminated

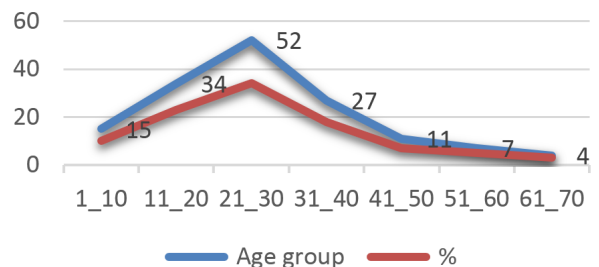
wounds or where the wound was more than 12 hours old.

Tendon injuries were treated by primary repair in 70% cases. Nerve injuries by primary epineural repair. Fractures and dislocations were treated conservatively except in 6% cases who required internal fixation. 50% cases needed POP splint. Analgesics and antibiotics were prescribed. All cases were followed up at 3 weeks interval up to 12 weeks. During this period severely injured patients were subjected to regular physiotherapy and at 12 weeks range of finger movements and pinch and grasp power of hand was noted and any residual disability was recorded.

**OBSERVATIONS:** In 150 cases of open hand injuries, the incidence in different age groups was as shown in table below:

Table 1

Age in years	No. of patients	Percentage
1-10	15	10
11-20	34	23
21-30	52	34
31-40	27	18
41-50	11	7
51-60	7	5
61-70	4	3
Total	150	100



**Graph Showing :** Age ranged from 2 to 65 years; Commonest age group affected was 21 to 30 years (34%); 11 to 12 years (23%). Average age was 29 years. Sex in incidence: hand injuries were more common in males than females. Out of 150 cases, 131 (87%) were males and 19 (13%) were females.

## Hand involved:

Out of 150 patients, 88 (59%) had right hand involvement and 56

(37%) patients had left hand involvement and 6 (4%) patients had involvement of both hands.

**Time of injury:**

Maximum injuries 90 (60%) occurred from 4 p.m. to midnight; followed by 52 (35%) from 8 a.m. to 4 p.m. Only 8 (5%) injuries occurred from midnight to 8:00 a.m.

**Place of injury:**

67 (45%) cases injured their hand at work; 45 (30%) cases off the work, which included violence, road traffic accident etc. While as activities at home resulted in 38 (25%) cases of hand injuries.

**Personal and environmental factors:**

**Table 2.**

Personal and environmental factors	No of cases	Percentage
Alcohol intake	15	10
Medicine intake	15	10
Over work and working over time	42	28
Poor light	30	20
Defect in machine	21	14
Others	27	18
Total	150	100

This shows 42 (28%) cases occurred as a result of overwork and working overtime. And 30 (20%) cases blamed poor light for the injury; 15 (10%) cases gave positive history of alcohol intake immediately before injury especially in cases of violence. 21 (14%) cases blame poor safety devices of machines for injury. 15 (10%) cases were taking some kind of medicine. Other human factors were responsible in 27 (18%) of cases for hand injuries.

**Occupation of patient:**

35 (23%) cases were farmers who received injuries while working at Farm. 37 (25%) cases were unskilled laborers; 16 (11%) cases where skilled workers like mechanics, operators, drivers; 9 (6%) percent cases were in government jobs; 16 (11%) were either shopkeepers, businessmen, contractors. 12 (8%) cases were students; 7 (4%) were housewives; 18 (12%) were children or unemployed.

**Social class of patients:**

Incidence of hand injuries was high 60 (40%) in lower socioeconomic class, 45 (30%) cases Occurred in upper lower class and 25 (17%) person cases in lower middle class and 20 (13%) cases in upper middle class.

**Seasonal incidence:**

37% cases occurred during spring, 27% cases during winter and 21% cases during autumn and 15% cases during summer.

**Mode of injury:**

In our series 41% of hand injuries were machine injuries; 17% cases were as a result of assault; 11% cases as a result of road traffic accidents; 11% cases were accidental injuries caused by sharp objects like knife, axe, etc; 5% due to broken glass; 5% as a result of fall; 4% occurred due to miscellaneous causes such as bite by animals and 3 cases where by door injuries.

**Type of injury:**

In this series 30% cases had traumatic amputation due to machine injuries, 25% cases had crush injury due to machine, Road traffic accident and fall of heavy objects; 23% had incised wounds due to Sharp weapons and 22% lacerated wounds due to machines, R.T.A, fall etc.

**Site of injury:**

In 35% cases zone II; 25.5% zone III; 25% cases zone I; 10% cases Zone IV and 4.5% cases zone V was involved. More than one zone was involved frequently in the same hand by the same injury. In our series index finger (21%); middle (21%); ring (18%); palm (18%) were almost equally involved and thumb (11%) and little finger (11%) were involved less frequently as compared to other fingers.

**Type of injury related to severity:**

In our series 81 (54%) cases were minor, 69 (46%) were major hand injuries. After a follow-up of up to 12 weeks it was observed that in our

series patients were off the work for 5789 days averaging 38 days per patient. The residual disability was about 5.5% on an average. Disability was calculated on the basis of manual for orthopaedic surgery for evaluating permanent physical impairment by ALIMCO, India.

**DISCUSSION:**

150 cases of open hand injuries presented for treatment at orthopaedic department, GMC, Jammu from January to December for one complete year. These cases ranged in age from 2 years to 65 years, most common age group was between 21 to 30 years and mean age was 29 years. This incidence is similar to other authors.



**Figure: Hand Injury X ray**



**Figure : Showing multiple Toka injuries (assault) involving both hands Zone III , IV and V (Dorsum)**



**Figure : Showing Injury due to Kutti Machine in a child involving right hand (Dorsum)**



**Figure: Showing severe thresher injury right hand involving all zones.**

Name of Researcher	Year	Age group
E.M. Absoud & S.W. Harrop	1984	16-25
D.P.Clark et al	1985	20-29
N. Mathur & K.K.R Sharma	1984	26-35
Present Series		21-30

Present series consists of 87% males and 13% female patients which is almost similar to that of Absoud (1984); Clark (1985) etc.

#### Hand Involved:

In our series hand involvement was right hand (59%), left hand (37%); Bilateral 4%.

Clark et al (1985) reported right-hand involvement in 60% and left hand in 40% cases.

#### Time of injury:

D.P Clark (1985) –“8 a.m. to 4 p.m. 46%; 4 p.m. to midnight 44% and midnight to 8 a.m. 10%” and smith et al (1985)–“70% occur more frequently in late afternoon and evening than in the morning (20%) or overnight (9%).”

This is comparable to our study, 35% between 8 a.m. to 4 p.m., 60% 4 p.m. to midnight and 5% midnight to 8:00 a.m. Higher involvement during late afternoon and evening is because of tiredness and overwork especially in farmers during harvesting season with no rest and poor light. Also working conditions in some industries are not good and laborers have to work overtime and also violence rate is high in the evening usually because of consumption of alcohol.

#### Place of injury:

A.M John's (1981) reported 42% incidence at work, 36% at public places and 22% at home. We confirm his work with 45% incidence at work, 30% off work, 20% incidence at home.

#### Personal and environmental factors:

In our series 10% cases gave history of alcohol intake immediately before injury; 10% gave positive history of tablet intake prescribed by a doctor before injury but could not name the drug.

D.P Clark et al (1985) reported 15% cases gave positive history of alcohol intake; 7% history of tablet intake prescribed by their doctor before injury. In our series 28% gave history of overwork and working overtime. These included mostly farmers and unskilled laborers especially during harvesting season. Which might have contributed to higher incidence of hand injuries. 20% gave history of poor light which might have contributed towards the injury. 14% cases blamed machine for the injury which included poor safety device, repair of machine, sudden starting of machine by someone else. 18% cases did not specify a reason.

#### Occupation of patients:

In their study of hand injuries at work E.M. Absoud and S.N. Harrop (1984) reported 37.3% incidence in skilled workers, 58% in semi-skilled and unskilled workers. Our study which include hand injuries off work and at work showed 23% incidence in farmers, 25% in unskilled workers mainly labourers, 11 percent in skilled workers, 6% cases were in government job.

#### Social Class Of Patients:

In our series we also studied socio-economic status of the patients as per Kuppuswamy's socio-economic status scale and found that most of our patients came from lower class (40%) followed by upper lower (30%), lower middle (17%), upper middle class (13%) and none from the upper class.

#### Seasonal incidence:

Donald C. Campbell et al (1980), In his series of mechanical corn picker injuries found highest incidence during cold wet weather and in dark during busy corn picking season. In our series, we also found high incidence during spring (37%) from March to May which is the harvesting season and farmers work day and night on thrasher and kutti machines. Injuries occur as a result of fatigue, fast work and inattention. 27% cases occur during winter due to cold environment and construction work during this season. Only 21% occur during autumn and 17% during summer, which is hottest and people go to work early and return early and take proper rest.

#### Mode of injury:

E.M. Absoud (1984) reported 48% incidence of machine injuries; 18% injuries by tools and 20% injuries by heavy objects occurring at work place.

We found 41% injuries by machines when hand was entrapped in machines; 30% in farmers working on thrasher and kutti machines or bandsaw injuries and other industrial workers working on roller machines. 11% injuries resulted when a stationary machine was started suddenly by someone while a mechanic or operator was at machine.

John's (1981) reported 36% incidence of hand injuries due to assault, RTA, and sports.

We found in our series 33% incidence due to (17%) violence, (11%) R.T.A, (5%) broken glass. In our series accidental injuries (11%) resulted due to sharp weapons and blasts, while (8%) resulted due to fall of heavy objects i.e. log of wood. Injuries as a result of fall amounted to 3% and miscellaneous injuries in 4% cases.

In our series, 30% injuries were traumatic amputations mainly due to thrasher and Kutti machines, electric saw and roller type of machines. Lacerated wounds amounted to 22% injuries mainly due to fall of heavy objects, animal bite, doors, etc. 25% injuries were crush injuries mainly due to machine, RTA (road traffic accidents), fall of weight. 23% injuries were incised wounds mainly due to assault with sharp weapons such as toka, kokri, sword, and accident injury by knife, axe, etc.

In our series of hand injuries site of injury was 25% in zone I; 35% zone II; 25.5% in zone III; 10% in zone IV and 4.5% in zone V.

#### Hand and digit wise distribution:

We confirm the digit wise incidence given by N. Mathur and K.K.R Sharma (1988)

**Table :**

Site	N.Mathur (Cases) %	Present Study (Cases) %
Thumb	13	11
Index Finger	26	21
Middle Finger	28	21
Ring Finger	17	18
Little Finger	10	11
Palm of Hand	6	18

However, slight difference is because of inclusion of all types of hand injuries in our series while N. Mathur has studied industrial hand injuries only.

In our series higher number of tendon injuries (54) as compared to higher number of compound fractures (71) and traumatic amputations with Mathur is because our series included 23% cases with sharp weapons mostly associated with tendon injuries while as Mathur has studied industrial hand injuries only.

N. Mathur and KKR Sharma (1988) found in their series incidence of minor injuries 56% and major 49%. We confirm these results with 54% minor and 46% major injuries in our series.

In our series average time off the work was 38 days while Mathur reported 35 days average. In our series we found 5.5% residual disability on an average while as P.C. Leung and T.K.Y. NG (1980) in their series reported a residual disability of 5 to 10 percent. In our series 8% cases who were permanently disabled could not return to their original occupation.

#### CONCLUSION:

In the study of pattern of hand injuries in 150 patients we draw the following conclusions:

1. Unskilled workers are more prone to hand injuries because they are untrained and unfamiliar with the machine on which they are working.
2. The farmers use machines only seasonally and as a consequence, they are not fully familiar with their functioning and also the dangers fraught with their use.
3. They often remove safety devices to facilitate operation.
4. During harvesting season and peak factory hours they are

- overworked and tired and often work overtime which affects their concentration.
5. Poor light at the place of work played a considerable role in hand injuries.
  6. Alcohol and medicines contribute to a significant proportion of hand injuries.
  7. Violence was an important factor for hand injuries; old rivalry and alcohol intake being the main cause of violence.
  8. As a result of hand injury there is considerable loss of working time resulting in great loss to the individual and to the nation as a whole.
  9. The resultant disability and loss of earning capacity makes the patient dejected and depressed and affects his family badly.

#### **PRECAUTIONS :**

Lastly to decrease the incidence of hand injuries. We suggest the following preventive measures:

1. Proper training of workers before allowing them to work on machines.
2. Use of safety devices while the machine is operating.
3. Implementation of work rules in the factory and farm.
4. Change of old unsafe machines by new mechanized ones.
5. Provision of proper light at the place of work
6. Educating the people about the hazards of alcohol and self-medication intake during the operation of machines or otherwise.
7. Lastly implementation of programs for the rehabilitation of disabled persons and their families.

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