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Orthopaedics

# TO ASSESS MAGNITUDE AND PROFILE OF TRAUMATIC AGRICULTURAL INJURY CASES ATTENDING A TERTIARY CARE INSTITUTION SITUATED IN A RURAL AREA

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**ABSTRACT** **Introduction:** Agricultural injuries are major cause of morbidity and mortality. The usual causes of agricultural injuries are fodder cutter, thresher, tractor and other agriculture related machine & hand tools. Increased use of farm machinery along with other agricultural inputs has enhanced the production and productivity of Indian farms. Simultaneously it has also increased occupational health hazard on the farms. The present study was conducted to assess magnitude and profile of traumatic agriculture injury cases in a tertiary care institution situated in a rural area. **Methods:**All patients of acute trauma including agricultural injury admitted to a tertiary care hospital from 1 January 2018 to 31 December 2018 were included in the study. A total of 303 cases of agriculture injuries were studied. Information was collected through pre- tested questionnaire proforma and collected data was entered into an electronic database. The data was analyzed statistically in SPSS version 20.0 software. Injuries more than 12 hour and non traumatic agriculture injuries were excluded. **Results:**During one year period a total 2591 number acute trauma cases came to accident and emergency department out of which 303 (11.69 %) cases were of agriculture injury. Maximum (n= 98, 32.34 %) agriculture injury cases were in the age group of 30-45 years &there were 246 males (81.18 %) and 57 (18.81) female patients. Maximum patient came in the month of April (12.87%) and May (9.90%). Maximum (n=198, 65.35%) were injured in the time period 12pm- 8pm. Maximum (n=71, 23.43%) agricultural injuries were tractor related followed by fodder cutter (n=66,21.78%). Upper limb injury was most common (n=176, 57.14%) followed by lower limb injury (n=93, 30.19%). **Conclusion:**Farm mechanization along with increased application of other new agriculture machines &inputs, has increased the productivity of Indian farms but it has also tremendously increased agriculture injuries. There are multiple risk factors involved in it. Prevention of these injuries can be done by engineering safe machines, education of farm workers and enforcement of law for certain dangerous machines.

**KEYWORDS :** Agriculture injury (AI) , Rural area, fodder cutter, thresher injury.

## 1. INTRODUCTION :

An estimated 1.3 billion workers are engaged in agricultural production worldwide. This represents half of the total world labour force. Almost 60 % of them are in developing countries with more than 40% of the world's agricultural population concentrated in China and more than 20% in India. In some countries children account for as much as 30 % of the agriculture workforce. Agriculture is one of the most hazardous occupation worldwide. In several countries the fatal accident rate in agriculture is double the average for all other industries. The intensive use of machinery has raised the risks. Machinery such as tractors & harvesters have the highest frequency and fatality rates of injury. Further these data on the incidence of occupational accidents & diseases are imprecise and notoriously underestimated, due to inadequate and heterogeneous recording & notifications systems.[1]

India represent 10% of the total world work force in agriculture which is spread over 640,000 villages.[2] Agricultural injuries are major cause of morbidity and mortality. The usual causes of agricultural injuries are fodder cutter, thresher, tractor and other agriculture related machine & hand tools. The majority of trauma is carried out by fodder cutter because of its daily usage for animal fodder cutting. [3]

Located in Northern India, Haryana has a geographical area of 44,212 square kilometres and a total cropped area of 60,15,000 hectare. It has a population of about 25.35 million in 2011. It is the second highest producer of wheat after Punjab. Farm mechanization has resulted in extensive use of wheat threshers on Indian farms. It has also increased agricultural injuries. Injuries were mostly of the upper limb and amputations accounted for most of these. Poor light arrangements, unskilled workers, drug/alcohol abuse, fatigue, poor designing and lack of orientation to work on these machines were the contributory factors to such injuries.[4] Amputation of limbs, injury to eye and other disabling injuries are assuming epidemic proportions in the green revolution areas.[5] Thresher accident is another important farm machinery accident in which both male and female agricultural workers get affected. Thresher accidents occur due to neglect of safety precaution during threshing operation. Fingers are the most affected parts of their body in thresher accidents.[6] There is no legislation regulating this issue. This is the reason that the age range of people injured in this industry is considerably wide. Only serious injuries secondary to agricultural machines are being reported to hospitals. So there is under estimation of the injurious effects of careless handling of such equipment.[7] The main effort to prevent agricultural accidents are engineering safe machines, behavioural change of farm worker by education, legislation law, use of personal protective equipments and alcohol intake prevention.[8]

2. Methods :This cross sectional study was conducted on patients who had suffered from physical traumatic injuries including agricultural trauma (less than 12 hours) on arrival at the department of Accident and Emergency Maharaja Agrasen Medical College Agroha, Hisar between January 2018 to December 2018.

### Inclusion Criteria

1. All patients of acute trauma including agricultural injury attending accident and emergency department of Maharaja Agrasen Medical College Agroha.

### Exclusion Criteria

1. Time of injury more than 12 hours.
2. Snake bites, poisonings and assaults due to agriculture land disputes were excluded.

All patients were informed regarding their inclusion in the study and an informed consent was taken. Patients of acute trauma coming to accident and emergency department were isolated and out of which details of agriculture injury were noted down. The collected data was entered into electronic database and was analyzed statistically in SPSS 20.0 Software.

**Ethical clearance:**
Approval to perform our study was obtained from the institutional ethical committee for human research of our institution.

**Results :** A total of 303 agriculture injury cases were identified out of 2591 total trauma cases which were studied and analyzed.

1. Mode of Injury distribution of total trauma patients
Out of total 2591 acute trauma cases 30.68 % patients were of road traffic accident followed by 19.79% assaults. Agriculture injuries comprise 303 (11.69%) cases.

**Table 1. Mode of Injury distribution**

| Sr. No. | Mode of Injury | No. of Patients | Percentage (%) |
|---|---|---|---|
| 1 | Road Traffic Injury | 795 | 30.68% |
| 2 | Household | 188 | 7.25% |
| 3 | Sports | 168 | 6.48% |
| 4 | Assault | 513 | 19.79% |
| 5 | Fall | 403 | 15.55% |
| 6 | Agriculture injury | 303 | 11.69% |
| 7 | Others | 221 | 8.52% |
| Grand Total | 2591 | 100.00% | |

**2. Age& sex Wise Distribution of Agriculture injury patients**
Male patients were 246 (81.18%) and female patients were 57 (18.81%).Male to female ratio is 4.31:1 and maximum patients were of age group of 30-45. In female maximum patients were of 45-60 years age group. More than half of the agriculture injury cases were between the age of 18-45 years. Minimum agriculture injury cases belonged to >60 years age group.

**Table 2: Age wise distribution**

| Sr. No. | Age Group (in years) | Total no. | Percentage(%) |
|---|---|---|---|
| 1 | Less than 18 | 45 | 14.85% |
| 2 | 18-30 | 72 | 23.76% |
| 3 | 30-45 | 98 | 32.34% |
| 4 | 45-60 | 71 | 23.43% |
| 5 | >60 | 17 | 5.61% |
| Total | 303 | 100.00% | |

**3. Month wise Distribution**
**Table 3: Month wise distribution of patients**

| Sr. No | Month | No. Of cases | Percentage |
|---|---|---|---|
| 1 | January | 22 | 7.26% |
| 2 | February | 25 | 8.25% |
| 3 | March | 27 | 8.91% |
| 4 | April | 39 | 12.87% |
| 5 | May | 30 | 9.90% |
| 6 | June | 14 | 4.62% |
| 7 | July | 19 | 6.27% |
| 8 | August | 26 | 8.58% |
| 9 | September | 25 | 8.25% |
| 10 | October | 18 | 5.94% |
| 11 | November | 31 | 10.23% |
| 12 | December | 27 | 8.91% |
| Total | 303 | 100.00% | |

Maximum patients came to hospital in the month of April (12.87%) & May (9.90%) as the April and May is the main harvesting season. Minimum number of patients came in month of June (4.62%). There was again higher number of patients observed in the month of November (10.23%) and December (8.91%).

**4. Time of Injury ( Diurnal variation)**
65.35% patients, out of the total agriculture injury patients were injured in afternoon & evening between 12.00 pm - 08.00 pm, followed by in morning (26.07%) between 04.00 am - 12.00 pm. The least injured patients were observed in night (8.58%).

**Table 4. Time of Injury**

| Sr. No | Time of Injury | No. of Patient | Percentage(%) |
|---|---|---|---|
| 1 | Morning (4:00 am-12:00 pm) | 79 | 26.07% |
| 2 | Afternoon+Evening (12:00 pm-8:00 pm) | 198 | 65.35% |
| 3 | Night (8:00 pm-4:00 am) | 26 | 8.58% |
| Grand Total | | 303 | 100.00% |

**5. Mode of Injury**
23.43% patients out of total 303 agriculture injuries were of tractor related where tractor was being used as a mode to pull trolley or other machines. This was followed by fodder cutter injuries(21.78%) and injuries by animals (13.53%).

**Table 5.Mode of Injury**

| Sr. No. | Mode of Injury | No. of Patients | Percentage (%) |
|---|---|---|---|
| 1 | From tractor related injury involved in agriculture transport | 71 | 23.43% |
| 2 | Cutting fodder | 66 | 21.78% |
| 3 | By animals | 41 | 13.53% |
| 4 | Agriculture related machinery/tool | 37 | 12.21% |
| 5 | Thresher | 21 | 6.93% |
| 6 | Cane crusher | 12 | 3.96% |
| 7 | Tube well related injury | 5 | 1.65% |
| 8 | Digging of well | 2 | 0.66% |
| 9 | Miscellaneous | 48 | 15.84% |
| Grand Total | | 303 | 100 % |

**6. Agriculture injury pattern: frequency and distribution**
Out of the total sample size most common injury was upper limb injury (57.14%), followed by lower limb injury (30.19%).

**Table 6 .Distribution of Injury pattern**

| Sr. No | Distribution of significant Injury | Frequency | %age |
|---|---|---|---|
| 1 | Upper limb injury ( Major fractures) | 176 | 57.14% |
| 2 | Lower limb injury (Major fractures) | 93 | 30.19% |
| 3 | Soft tissue injuries | 14 | 4.54% |
| 4 | Head injury | 7 | 2.27% |
| 5 | Spinal injury | 5 | 1.62% |
| 6 | Thoracic injury | 4 | 1.29% |
| 7 | Pelvic injury | 9 | 2.92% |
| 8 | Abdominal injury | 00 | 0.0% |

**Agriculture injury cases**

**Thresher injury**

**Gandhak Potash gun injury**

**Fodder cutter injury**

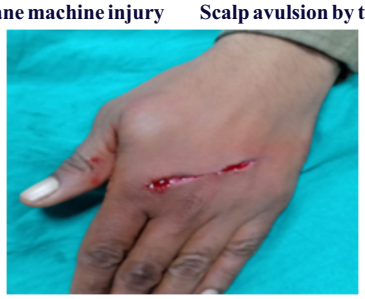
**Injury by trapping in buffalo chain**

**Harrow injury**

**Injury by Flour mill (Aata chakki)**

**Sugarcane machine injury**

**Scalp avulsion by thresher**



**Injury by Spade (kassi)**

**Injury by khal binola machine**

## DISCUSSION

Agriculture is a major industry and a larger population of the world is involved in it. It is also one of the most hazardous occupation and farm workers are at increased risk of injuries. Agricultural injuries are a major cause of morbidity and mortality, both in developed as well as developing countries. Farm mechanization along with increased application of other agriculture inputs, has increased the productivity of Indian farms but it has also increased agriculture injuries. There are a number of epidemiological studies in the U.S. and European countries. However only a few studies have been reported in developing countries like India that provide some information on agriculture injuries but their scope and application are limited.13 The present study was conducted on 303 cases of acute agriculture injuries who were brought to Accident and Emergency department of our institution from 1 January 2018 to 31 December 2018.

Maximum patients were of age group of 30-45 years and followed by 18-30 years group. In all other studies[ 2,3,9,10] also, maximum patients belong to the Age Group of 30-45 years which correlate with our study. This is due to the fact that this age group belongs to the middle age and they are more involved in agriculture activity than young and old age people.

Out of total 303 agriculture injury patients, male patients were 246 (81.18%) and number of female patients were 57 (18.81%).In our study male to female ratio is 4.31:1 which correlate with Thomas H et al 11 and S. K. Patel et al 13 study.

In our study 65.35% agricultural injuries were in afternoon & evening between 12.00 pm - 08.00 pm followed by in Morning (26.07%) between 08.00 am - 12.00 pm. In Scott K. Young et al12 study, the most common time of injury is during evening which correlates with our study. This is based on the fact that all the factor like fatigue, taking rest in evening, feeling lazy, inattentive, sleepy, stress from work and alcohol consumption comes into play by afternoon and evening time.

In all studies[2,9,13,14] including the present study, tractor related injuries were most common. chaff cutter, thresher, animal and hand tool were other major cause of injuries. Tractor, apart from its use in farm activities, is a common mode to transport agricultural materials as well as people in the rural areas. The types of tractor-related incidents recorded were the roll over/overturning, falling from the tractor and run over. There were also the incidences of PTO entanglements. The improper tractor & tractor trailer stability and lack of driving skill were reported as the major reasons of accidents.

In North India, April is the month of farm harvestation. So in the month of April there were more agricultural injuries. In our study number of agricultural injury patients in the month of April were39 (12.87%). Maximum injuries were observed from March-May and November-December.

In our study upper limb injury (57.14 %) was most common which correlate with Devender Bhattarai et al study in which also upper limb injury (61.1%) was most common.

## CONCLUSION:

Agricultural work is the most hazardous occupation worldwide. Farm mechanization has increased the productivity but it has also increased the number of agricultural injuries. The present study emphasize that the need of the hour is to decrease these agriculture injuries by education, engineering, enforcement of law.

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