



## AGRICULTURE RELATED INJURIES; SPECTRUM & MANAGEMENT OUTCOME IN GENERAL SURGICAL UNIT

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**ABSTRACT:** Traumatic injuries related to agricultural related profession can lead to serious disability and even mortality. **Objectives:** To study the spectrum of agricultural production related injuries and their management outcome in General Surgical unit. **Study Design:** Retrospective Descriptive, Interventional. **Study Period:** January 2012 to December 2013. **Setting:** Surgical Department Aziz Bhatti Shaheed Teaching Hospital Gujrat & Surgical department Islam Medical & Dental College Sialkot. **Material & Methods:** Data of 33 patients involved in an accident and sustained injury while operating agriculture machine/ equipment is being presented with reference to age, gender, nature of injury, type of equipment /machine involved and management outcome. **Results:** Record of total 33 patients with agriculture related injuries was analysed retrospectively. Male population is more involved in agriculture related accidents seen in 20 out of 33 patients (60.6%), female involvement in such accidents is not uncommon seen in 13 patients (39.9%). Fodder Cutter (TOKA) was the commonest agricultural equipment found involved in 17 (51.5%) cases. Traumatic amputation both minor or major type of upper limb was most frequent injury seen in 19 (57.7%) cases and infection was the commonest complication occurred in 13 cases. Fournier's gangrene and tetanus was the most dreadful complication with 100% mortality. Overall mortality was 03.03%. **Conclusions:** Agriculture machinery related accidents cause serious injuries that lead to disability, morbidity and often mortality. Victims are usually young. Awareness campaigns regarding hazards and safety measures in using agriculture machinery should be launched with the help of media. Re-implantation / re-vascularization surgery must be considered in case of limb amputations in selected cases.

**Key words:** Agricultural injuries, Fodder Cutter injuries, traumatic amputation

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### INTRODUCTION

Traumatic injuries related to agricultural related profession can lead to serious disability and even mortality<sup>2</sup>. There are only a few studies on the characteristics and prevention of these injuries<sup>3,4</sup>. In countries like North America, Western Europe and Australia where such injuries are identified it is considered to be among the leading causes of disability and mortality<sup>5</sup>.

In America, injury risk of people working in agriculture (52/100.000) is stated to be higher than that of workers in mining and building industries<sup>6,7,8</sup>. In Turkey, according to the data of Turkish Statistical Institute for 2007, there are approximately 4,000,000 registered agricultural machines and implement.<sup>8</sup> 30% of the overall population work in agricultural activities<sup>1</sup>.

Pakistan is considered as an agricultural country and a majority of people living in rural area are involved in agricultural production and dairy farming activities. District Gujrat is expanded predominately on rural area with vast agricultural land. Powered agricultural machinery is being used in addition to the traditional manual equipment. Majority of people do not practice safety measures either due to lack of knowledge or due to will full neglect<sup>9,10</sup>. Fodder cutter (Toka) of both manual and powered type are among the commonest tool being used by people for the preparation of fodder for their cattle. These injuries are the one of leading causes of disability in the form of limb amputation in most of the causes.

Despite such high rate of agricultural activities, there is no medical data on occupational hazards

in Pakistan. The current paper is the study that highlight the cases related to work with agricultural machines, presented to an Emergency Department and managed in General Surgical unit of district hospital in Sialkot and Gujrat. We aimed to stress the importance of these injuries, outline preventive measures by describing kind of lesion, injury severity, mechanism, site as well as age, gender, morbidity and mortality.

**MATERIAL AND METHODS**

This is a retrospective, descriptive, interventional study conducted during the period from January 2012 to December 2013 at surgical unit, Aziz Bhatti Shaheed (Teaching) Hospital (ABSTH) Gujrat and surgical unit Islam Medical & Dental College Sialkot. ABSH is a teaching hospital affiliated with Nawaz Sharif Medical College, University of the Gujrat. Surgical Department catering 60 beds, 30 beds each in both male and female wards. Surgical department is accredited with College of Physicians & Surgeons of Pakistan for postgraduate training in surgery. Islam Teaching Hospital is affiliated with Islam Medical College Sialkot a private sector medical college. Department of Surgery is accredited with College of Physicians and Surgeons of Pakistan for fellowship in General Surgery.

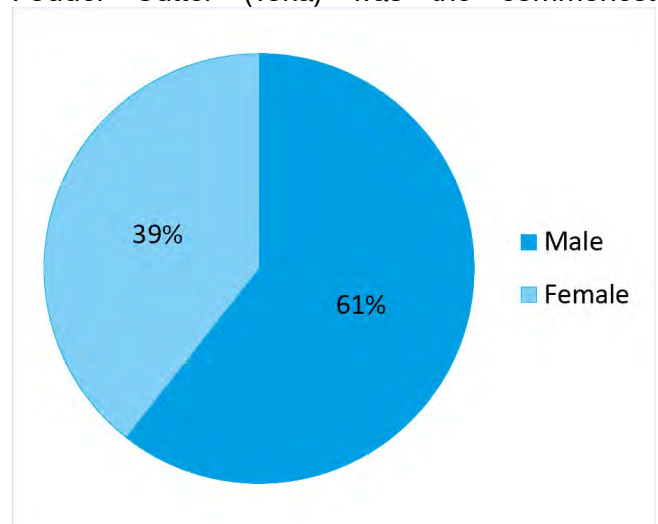
The patients of all age groups and gender with injury during operating / using agricultural production were included in the study. Patients sustaining injuries with equipment/ tools other than those used in agricultural activities were excluded.

Patient’s profile, history of incidence, type of agricultural equipment being used were recorded. Site, nature, type and extent of injury was documented. Radiological investigations like X-Ray of limb where involved, were performed in additional to base line investigations like Haemoglobin, Blood grouping. Patients were resuscitated with intravenous fluids, Fresh blood was transfused where indicated. Broad spectrum antibiotics were started empirically. Resuscitation monitored clinically with improvements in vital signs and urine output. Analgesia and tetanus

prophylaxis given. Injuries were managed in operation theatre under anaesthesia on their merit. Surgical intervention in the form of refashioning, stump formation, simple debridement and antiseptic dressing Etc was performed. Details were recorded on a preformed preforms and results were formulated, analysed and compared with literature.

**RESULTS**

A total of 33 patients with agriculture related machine injuries were managed in both study setups. 20 patients (60.60%) out of 33 were male whereas 13 (39.9%) were female. Youngest patient was a 13 year old boy whereas oldest was a 61 year old male. Mean age was 34.15 Years. Fig I. Fodder Cutter (Toka) was the commonest



**Figure-1. Sex distribution of patients with agriculture related injuries**

agricultural machine involved in the causation of injury seen in 17 (51.5%) patients followed by Tractor involved in 6 (18.18%) patients. Breakup given in Table I.

Agricultural machine/ equipment	Number & %age
Fodder Cutter ( Powered TOKA)	17 (51.05%)
Tractor	06 (18.18%)
Wheat Thresher	05 (15.15%)
Tube Well	02 (06.06%)
Harvester	02 (06.06%)
Seader	01 (03.03%)

**Table-I. Type of agricultural machine/ equipment involved in incidence**

Traumatic amputation, major or minor of one of the upper limb was the most common type of injury observed in agricultural workers, inflicted while making food with fodder Cutter (Toka) for their cattle. This was seen in 19 (57.57%) out of total 33 patients, followed by crush injury of limb seen in 4 patients (12.12%) Break up is given in Table II.

Nature of injuries inflicted with agriculture machine	Number & %age
Traumatic amputation (Minor / Major upper limb)	19 (57.57%)
Crush injury of limb	04 (12.12%)
Avulsion injury (Genitalia + Scalp)	02 (06.06%)
Fracture	02 (06.06%)
Soft tissue injury Laceration	02 (06.06%)
Multiple injury	02 (06.06%)
Dislocation	01 (03.03%)
Sprain	01 (03.03%)

**Table-II. Nature of injuries inflicted with agriculture machine/ equipment**

Refashioning of the amputated limb and stump formation was the most frequent surgical intervention performed in 21 (63.6%) cases. Four (12.12%) patients were referred for expert plastic surgical intervention. Break up of various surgical interventions is given in Table III.

Surgical intervention	Number & % age
Refashioning of amputated limb and stump formation	21 (63.63%)
Debridement / Antiseptic dressings / Skin grafting	05(15.15%)
Fixation of fracture	02 (06.06%)
MUA for shoulder dislocation	01 (03.03%)
Referral for Plastic Surgical intervention	04 (12.12%)

**Table-III. Management / Surgical interventions**

Wound infection was the most frequent complication seen in 11 (33.33%) cases. One patient developed tetanus whereas one developed Fournier’s gangrene, both were died. Mortality was 03.03%. Complications break up given in Table IV.

Nature of complication	Number & %age
Wound infection	11 (33.3%)
Fournier’s gangrene	01 (03.3%)
Tetanus	01 (03.3%)

**Table-IV. Complication**

**DISCUSSION**

In Pakistan approximately 60 % of total population is living in rural area and are involved in agriculture related activities like farming and livestock. According to World Bank agriculture report, economically active population in agriculture (number) in Pakistan was 24902000 in 2008<sup>15</sup>. Total number of registered agricultural machinery including tractors was 2657 in 1990<sup>15</sup>. Rural people use agricultural machines for their field work and to look after their cattle. Hence it is mandatory to identify and study risk factors in agricultural accident. Agricultural production is an industry and back bone of a country and agricultural related accidents must be addressed with occupational hazards.

Agricultural machines are dangerous, lack of awareness, safety precaution, and slightest mistake can lead to serious injuries with disastrous outcome in the form of loss of limb or life. In present study, results indicates agriculture machines causes’ serious injuries leading to permanent disability and loss of life.

Male population is predominately involved in such accidents and sustain injuries. Female involvement is not uncommon as seen in our study, as female are actively participating in agricultural field work along with their male counterparts in Indo- Pak region. Most young population encountered in such accidents, mean age in our study was 34 year, and is comparable with a same type of study conducted in Turkey<sup>1</sup>. Children are not spared from such accidents, our youngest patient was a 13 year old boy, sustained traumatic amputation of right forearm while assisting in Fodder Cutter.

Agricultural industry is different from other industrial occupations, in agricultural work people of all ages in a family participate<sup>11,12</sup>. There is no legislation regulating this issue. This is the



Photograph I: Manual Fodder Cutter (TOKA)



Photograph II: Powered Fodder Cutter (TOKA)



Photograph III: Tube well with uncovered shaft & belt



Fig-1. Traumatic amputation at wrist (Wheat Thresher injury)



Fig-2. Scalp avulsion (Wheat thresher Injury)

reason that the age range of people injured in this industry is considerably wide. Many studies show that young farmers are affected more with non-fatal injuries than older ones, whereas older farmers more commonly receive fatal injuries.<sup>2,13</sup> The most common machine causing injuries in our study was Fodder Cutter (TOKA) being used for preparation of food (Hay maker) for cattle. Entrapment of hand in Fodder Cutter while push grass into it is the mechanism of traumatic partial or complete amputation of upper limb found in our study.

In a Turkish study the most common agriculture machine involved in such accidents was tractor<sup>1</sup>. The underlying reason for injuries due to tractor, was fall seen both in our as well as Turkish study<sup>1</sup>. Tractors without any protective gear or cabins lead to injuries due to the presence of more than one worker, using them as a means for human transportation<sup>1</sup>. Injuries due to entrapment in tube-well shaft is another mode of infliction of agriculture related injuries as most of Tube-Wells being operate in fields have open / uncovered shaft and belt, inviting entrapment of clothing of nearby field workers. These type of instalments is always a risk of electrocution injuries too.

Only serious Injuries secondary to agricultural machines are being reported to hospitals, even if we consider that patients with slight injuries may not have presented to hospital, result still suggest that those machines cause serious injuries, and we are under estimating the injurious effects of careless handling of such equipment.

It is appreciable that in most of the cases upper limb was involved in the form of amputations and fractures. Bio mechanic and ergonomic precautions have an important place in the prevention of industrial accidents, but they would not matter so much in accidents due to agricultural related machines, because of major contributing factors, such as intention to finish work in shortest time, stress and exhaustion<sup>1</sup>.

Delayed medical care and transportation from rural areas is a one of major contributing factor

of high morbidity and permanent disability in cases of limb amputation where re-implantation and revascularisation surgery can be attempted, if patient reach an appropriate health care facility within suitable time limit required for such interventions.

Limitation of our study is including only those patients who reported and treated in two medical setups. Although number of cases appears to be low, but our data reflects that number of agriculture related injuries may be very high due to under reporting. Multicentre large studies over longer period are suggested to know true prevalence and impact of agriculture related injuries over the human resource of population with reference to disability and mortality.

Following recommendations may be considered to make the farmer / rural masses aware of the dangers & hazards of agricultural machinery, and to observe various safety measures to avoid such accidents.

- 1: Agricultural equipment manufacturers should be registered and optimum standards of safety must be laid down
- 2: Agricultural production activities related accidents should be included in occupational hazards
- 3: Awareness campaigns regarding agricultural related accidents and safety measures should be launched among the population by using both print and electronic media
- 4: People should be stressed to reach immediately to an appropriate health care facility within shortest possible time, in case of limb amputation to avail the chance of re-implantation/ revascularisation
- 5: Medical & Paramedics working at primary and secondary health care centre should be trained in handling and transport of amputated limb to specialized centre to avail maximum chances of success of re-implantation/ revascularisation surgery.

## CONCLUSIONS

Agriculture machinery related accidents causes

serious injuries that lead to hospitalization, disability in the form of limb loss and often loss of life. Victims are usually young. Awareness campaigns regarding hazards and safety measures in using agriculture machinery should be launched with the help of media. Re-implantation / re-vascularization surgery must be considered in case of limb amputations and patient must be transported with in shortest possible time to an appropriate medical facility to get maximum chances of success.

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### PREVIOUS RELATED STUDY

Muhammad Akram, Muhammad Rehman Gulzar, Muhammad Nazim, Javed Iqbal. AGRICULTURAL MACHINES INJURIES; INCIDENCE. (Original) Prof Med Jour 16(4) 485-488 Oct, Nov, Dec, 2009.

### AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. N.	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Dr. Riffat Mehmood	Review of literature	Dr. Riffat
2	Dr. Sajid Aziz	Data collection	Dr. Sajid Aziz
3	Dr. Shazia Jehan	Data interpretation	Dr. Shazia Jehan
4	Dr. Muhammad Ateeq	Drafting of script etc	Dr. Ateeq