



FARM EQUIPMENT INJURIES IN TERTIARY CARE CENTER IN RURAL INDIA

Plastic Surgery

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KEYWORDS

Agriculture is one of the major occupation in the state of tamilnadu where in nearly 35% of total area of the state is agriculture land. An estimated 42 lakh hectares area is under cultivation as of 2020-2021 statistics. Around 70 percent of the state's population is involved in agricultural activities as this is one of the major means of livelihood in Tamil Nadu.1 [1]

Agriculture is also one of the most hazardous sectors, and it accounts for many work related accidents and occupational diseases every year. About two-third of agriculture injuries involve the upper extremity, with long-term consequences for the workers leading to permanent physical impairment as well as detrimental socioeconomic affects. This study reviews accidental farm equipment injuries in rural tamilnadu, involving upper limb .[2]

From this analysis, it appears that younger male farmers are mostly involved, especially in the harvesting season. The upper limb and hand are often the body parts that sustain most damage as these are mostly involved in driving tractors or other machineries and tools. The most frequent type of lesions are crush injuries, lacerations, fractures . Factors responsible are prolonged working hours, working under poor lighting conditions, working under influence of alcohol, lack of protective devices and lack of safety design in tools.

For these reasons, in the agricultural sector, health education ,safety measures and good practices are needed to promote workers awareness of the sources of risk, highlight more dangerous situations and apply organizational behavioral measures.

MATERIALS AND METHODS

Aim of the study:

1. To identify patterns of injuries in relation to the equipment used.
2. Commonest site of injury.
3. Optimal planning and Surgical measures to reduce the downtime needed for return to work.

This is a retrospective study, conducted in the department of plastic and reconstructive surgery , Thanjavur medical college , Thanjavur, tamilnadu from January 2019 -august 2022. Age, gender, trauma type and anatomical localizations, date of the trauma in order to object whether there is seasonal dispersion pattern, time to reach the hospital, treatment details including microbiology, and hospitalization period were evaluated according to the existing data. The main inclusion criterion of the study group was extremity trauma necessitating operative intervention, which has happened in the farmyard. Associated skull, maxillofacial, spine, thorax and abdominal injuries were excluded from the study as well as farm animal bites, agricultural chemicals, and dust and airborne toxin hazards.

Because of our hospital being a tertiary referral centre, our study group included a high percentage of severe extremity trauma with open fractures and with neurovascular injuries. The protocols for our approach to such severe injuries were as follows. First step of the management of open injuries includes immediate thorough debridement and irrigation of the wound, under surface anaesthesia .

After debridement of the wound, team of surgeons from plastic

surgery, vascular surgery and orthopaedics will examine the injury . Fractures were temporarily fixed with a spanning external fixator or k wires , followed by vascular repair, if any, and tendon ,muscle and nerve repair . Most of the injuries were crush injuries with degloving injury along with loss of skin . Such cases were managed by immediate flap cover in case of clean cut injuries and delayed flap cover in case of severe crush injuries with doubtful viability. Serial debridements were considered in paddy chaffer and sugarcane crush injuries. [4]

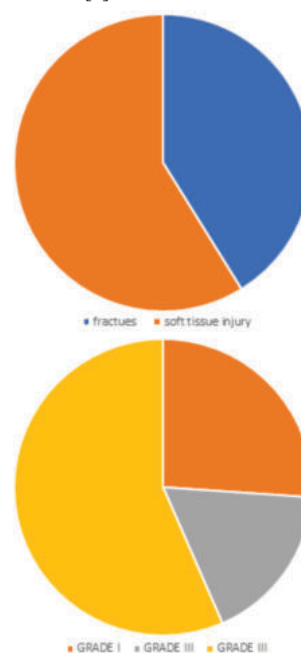
Post operatively ,patients are managed by regular sterile wound dressings, limb elevation, antibiotics according to culture and sensitivity result. Suture removal was done on 10th to 12th post operative day for all upper limb cases. Post operative physiotherapy and rehabilitation were done for all cases.

RESULTS

In this study of farm equipment injuries , 102 cases were included which were admitted between January 2019 to august 2022 in the department of plastic and reconstructive surgery Thanjavur.

Types of Injuries

In our study, the number of patients enrolled were 102 ,out of which, forty two of the patients sustained bone fractures, and others had soft-tissue lacerations . Eleven of these fractures were crush injuries with neurovascular injuries. Twenty three of the fractures were open fractures (13 Grade 3, 4 Grade 2, and 6 Grade 1 according to Gustilo-Andersson Classification.[3]

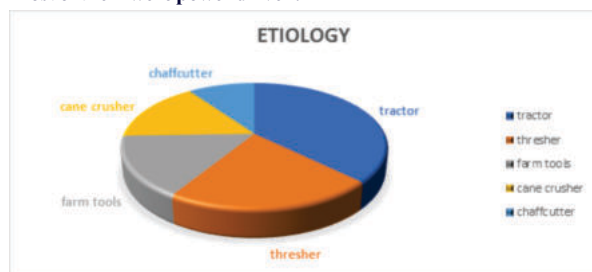


The distribution of the etiologic factors of the farm injured patients as

per frequency of the equipment used.

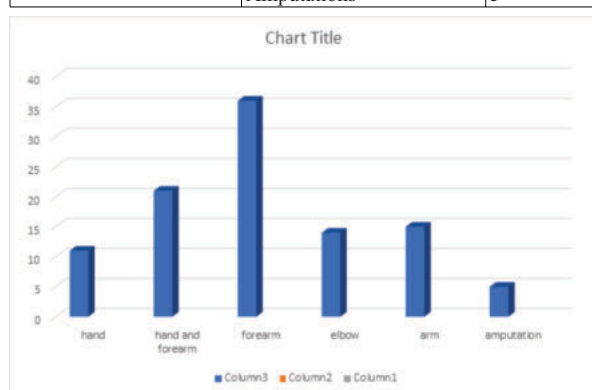
Equipment	Number
Tractor & tractor operated implements	38
Threshers (Including winnowers)	22
Farm tools	16
Cane crushers	16
Chaffcutters (Manual + power operated)	10
Total	102

Most of them were power driven.



The anatomical locations of the injured extremities in order.

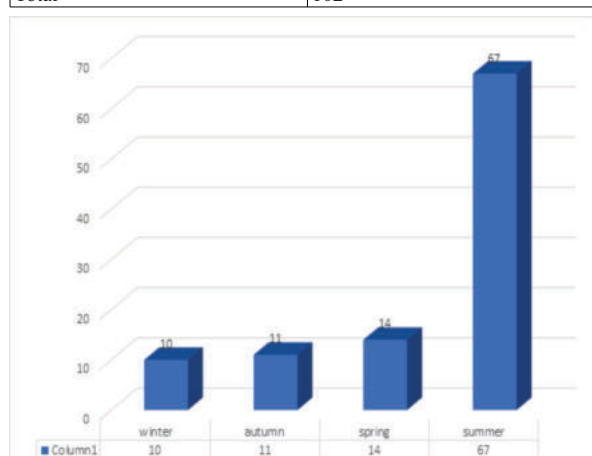
	Injury localization	Number
Upper extremity	Hand	11
	Hand and forearm	21
	Forearm	36
	Elbow	14
	Arm	15
	Amputations	5



Seasonal dispersion pattern of the farm injuries.

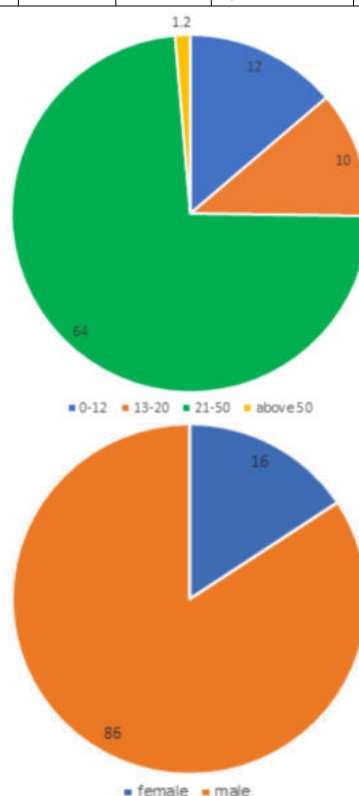
Seasonal distribution for accidents was even for spring and fall, while it was found relatively high during harvest season and relatively less for winter.

Season	Number of cases
Winter	10
Autumn	11
Spring	14
Summer	67
Total	102



Age and sex distribution of study population

Age in year	Male	female	total	percentage
0-12	12	0	12	11
13-20	9	1	10	9.8
21-50	53	11	64	62.7
above 50	12	4	16	15.6



Type of reconstruction

s.no.	Methods of reconstruction	No.of cases
1.	Primary skin closure	11
2.	Amputation stump closures	7
3.	Skin graft	12
4.	Cross finger flap	7
5.	Kutler's flap	3
6.	v-y advancement flap	9
7.	Littler's flap	4
8.	Posterior interosseous artery flap	8
9.	Lateral arm flap	12
10.	Groin flap	13
11.	Hypogastric flap	12
12.	Hand replantation	2
13.	Finger replantation	4

Discussion

In this study, we aimed to define the characteristics and associated morbidity of farm equipment injury to upper limb.

Most of injuries occurred in persons having the productive potential in the age group of 20 - 50 years. This causes the significant loss of income to the whole family leading to financial crisis. Males are most affected than females. Male to Female ratio is about 5.3 : 1

Paediatric population of 0-12 years age group is about 11% of total agricultural injuries. This is mainly because of permitting the children to the farm and inadequate supervision of children while working.

Most of the people are Right handed individuals, so the cut injuries were common in Left hand side. The machinery crush injuries are common in Right hand side being the dominant hand in most of the patients. The incidence of injuries are more common in January - March (1st quarter) of the year (45%). This corresponds to the peak of the harvest season of paddy. The sugarcane harvest and consumption is more at the time of Pongal festival in January. The second peak in incidence is seen in April - May (34.8%). This is the period of summer

vacation of schools and colleges. Children are free to move around. Tender coconut, palm fruit, Banana harvest and consumption is high in this period.

People near to medical college, around Thanjavur town get admitted early. People from adjacent districts and far places of our district are presented to the hospital late because lack of transport facility. Delay also becomes a factor in outcome for recovery.

Awareness in preserving amputated limbs is poor, even though the people aware the amputated part can be reimplanted. The knowledge and method of preservation is lacking.

In our study population fatal injuries were rare. Machinery injuries contribute to 34.8 % of total agricultural hand injuries. Most of the injuries associated with, fracture of finger and hand. Multiple finger injuries were seen in machinery crush injury. The treatment modality is selected according to the nature of injuries, handedness of the patient, age, co-morbidities. Most of the fractures were fixed with 'K' wire and immobilized with POP. Comminuted fractures were managed by Buddy's splint and molding POP. Surgical site infections were managed by wound debridement, sensitive antibiotics, Re suturing and physiotherapy.

Most common organism isolated from wound cultures in infected wounds were Staph aureus. Sensitive to Cefotaxime and Ceftriaxone and erythromycin. Second most common is pseudomonas, sensitive to Ceftriaxone, Amikacin.

Patients who had major amputation, flap necrosis, major crush injuries with multiple fractures, and those who needed secondary procedures taken prolonged time to recover.

Preventive measures:

RISK FACTORS:

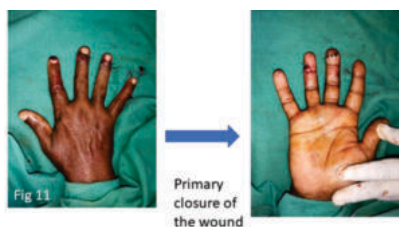
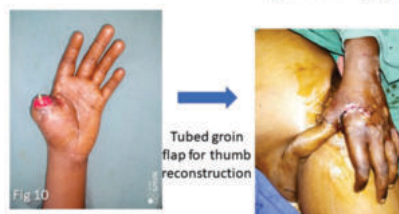
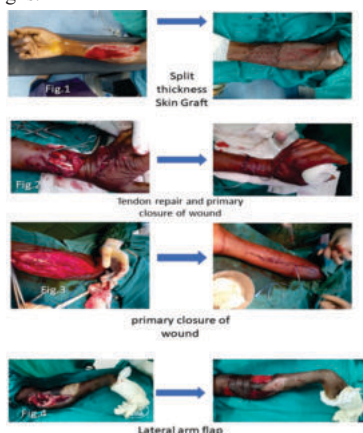
- Carelessness
- Lack of awareness
- Boredom
- Disregard for safety procedures
- Distractions [5]

Injuries were more common at the time of harvest, local festival time, and in summer season. Awareness camps should be conducted before harvest season to the target population regarding prevention, wearing protective gloves", comfortable tight fitted dresses, careful handling of sharp equipment and proper way of operating machineries.

Children should be kept under proper supervision, and should not be allowed in to the premises of machinery areas.

If injury occurs, first aid measures like how to clean the wound, getting tetanus immunization, advice to go nearby primary Health Center or any health units for first aid, Preservation of amputated parts, details about Government 108 ambulance service and private services, the importance of early admission to hospital should be taught to health workers and target population.

Manufacturers of machines can help prevent accidents by designing safety into machines and incorporating guards and other safety devices into their designs.



FARM MACHINERY EQUIPMENT



Tractor



Sugarcane crusher



Thresher



Winnowing machine



Chaff cutter

FARM TOOLS



CONCLUSION

1. Distal hand injuries were common.
2. Local flaps and regional flaps were used for most cases.
3. Groin and hypogastric flaps were used for most of the distal hand and thumb injuries.
4. Functional recovery and reduced downtime was due to early mobilization and regular physiotherapy.

Disclaimer : No conflict of interest. No funding. consent for photographs were obtained for all patients in the study group.

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