

Nonfatal agriculture injuries in children - A retrospective study

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Received – 16 August 2016

Initial Review – 18 September 2016

Published Online – 15 October 2016

ABSTRACT

Introduction: A larger proportion of the population in the world is involved in agriculture. Agricultural injuries are a major cause of morbidity and mortality both in developed as well as developing countries. These injuries can occur in all age groups.

Objective: Since India is a predominantly agricultural country, we undertook this study to find out the pattern of agricultural injuries in children. **Materials and Methods:** This is a retrospective hospital-based study. Children <18 years of age, who presented to the hospital with agriculture-related injury from January 2009 to January 2013, were included in the study. The following data were recovered for each case - age, sex, type and cause of injury, and the body part involved. All fatalities were excluded from the study. Simple frequencies and percentages were obtained for various variables. **Results:** A total of 146 patients were included in the study. 94 (64.4%) were males and 52 (35.6%) were females. The most common age group involved was 7-13 years. Fractures and dislocation were the most common injuries (29.7%). Most of the injuries were to the upper extremities (57.3%). There was a wide variety of causes of agricultural injury in our study, falls and slips being the most common cause. **Conclusion:** Our study shows that males in the age group of 7-13 years were the most frequent victims of agricultural injuries. Falls and slips were the most common mechanism of injury with fracture and dislocations being the most common type of injury. The results from this study will help in identifying the risk factors for agriculture injuries in children and also to look for the prevention measures to be applied.

Key words: Agriculture injury, Children, Nonfatal

Agriculture is a major industry and a larger proportion of the population in the world is involved in it [1]. It is also one of the most hazardous occupations, and farmers are at an increased risk of both fatal and nonfatal injuries [2,3]. Almost 60% of the agricultural workforce is in the developing countries, more than 20% of them being in India [4]. Unlike other industries, children make up a substantial portion of the agricultural workforce. Agricultural injuries are a major cause of morbidity and mortality both in developed as well as developing countries. These injuries can occur in all age groups. Children may sustain agricultural injuries either while taking part in agricultural work or as bystanders.

In developing countries, agriculture is an unorganized industry and there is overlap between the agricultural workplace and homes, making children more susceptible to injuries. According to the National Agricultural Statistics Service, US Department of Agriculture [5], in developing countries, at least 250 million children between 5 and 14 years, work in the agriculture industry and almost 50% of these are working on full-time basis.

Most of the data published on agricultural injuries in children are from developed countries. Muckala [6] reported that 30-40% of agriculture injuries are sustained by children. Rivara [7], Davis et al. [8], and Wilk [9] in their studies found that 23,000-27,000 children suffer from nonfatal injuries each year. According to the

data from National Institute for Occupational Health and Safety, USA, in 2001, approximately 6128 nonfatal injuries occurred in children under 10 years of age, and 200 of these children were not actually working when the injury occurred [10]. In another study in central Wisconsin, USA, over a period of 2-year, 27% of farm injury victims seeking emergency care were children [11]. In India, Mohan and Patel [12] reported in their study that 16% of all agricultural injuries occurred below 14 years of age. Results of a study by Stueland et al. [11] show that there is 5% increase in injury risk for every hour worked by a child <18 years of age. Since India is a predominantly agricultural country, we undertook this study to find out the pattern of agricultural injuries in children.

MATERIALS AND METHODS

This is a retrospective hospital-based study conducted at a tertiary care center of North India. All children <18 years of age, who presented to the hospital with agriculture-related injury from January 2009 to January 2013, were included in the study. The following data was recovered for each case - age, sex, type and cause of injury, and the body part involved. All fatalities were excluded from the study. Simple frequencies and percentages were obtained for various variables.

RESULTS

During the study period, 2163 patients <18 year of age were admitted to the hospital with trauma, of which, 193 (8.9%) were due to agriculture-related injuries. 47 patients of agricultural injuries expired during treatment and were excluded from the study. Out of the 146 patients included in the study, 94 (64.4%) were males and 52 (35.6%) were females. The maximum number of victims was in the age group of 7-13 years, followed by 14-18 years (Table 1). Fractures and dislocations were the most common injuries (29.7%), followed by lacerations and puncture wounds (26.0%) (Table 2). Most of the injuries were to the upper extremities (57.3%) and another 21.8% were to the lower extremities (Table 3). There was a wide variety of causes of agricultural injury in our study (Table 4). Falls and slips accounted for the most common cause of injury (43.1%).

DISCUSSION

Agricultural injuries in children are common in both developed and developing countries [13]. Unlike other industries, farmers work for long hours, thus increasing their chances of injury. Stueland et al. [11] showed that there is 5% increase in injury risk for every hour worked by a child <18 years of age. Our study showed that of all the admitted trauma victims <18 years age, 8.9% were due to agriculture-related injury. Mohan and Patel [12] reported that 16% of all agriculture-related injuries occurred in children <14 years of age. In our study, 46.5% of agricultural injuries in children occurred in the age group of the 7-13 year. The high rate of injury in this age group may be due to physical immaturity, lack of experience, and inquisitiveness in agricultural work.

Other studies [14-16] reported peak rate of agricultural injuries in the early adolescent years. This may be due to the fact that in low-income countries, children in the family work with the adults as an unpaid employee to reduce the financial burden of hiring a paid labor. Furthermore, because all the family members are involved in agriculture, there is a lack of child care options and these children are left unattended and sustain injuries even without participating in the farm work. In the present study, 64.3% of children injured were males. A high incidence of agriculture injury in boys has also been reported earlier.

The most common type of injury in our study was dislocation and fractures (28.5%). Rivara [7] in his study found 1 in 5 injuries among children was a fracture-dislocation. However, Stueland et al. [11] found that lacerations and contusions were the major types of injury. Our finding indicates that falls and slips constitute the most common mechanism of injury. These resulted from falls and slips while carrying or lifting heavy loads, fall from height, falling off a tree or ladder, falling off trucks and tractors. Falls accounted for 22.9% injuries in a study done by Sosnousk et al. [17] and for 12.5% injuries in a study done by Smith et al. [18].

The most common body part involved by agricultural injury was the upper extremity. These injuries were in the form of

Table 1: Sociodemographic data

Age group	Males (64%)	Females (36%)	Total (%)
0-6	11	09	20 (14)
7-13	40	28	68 (46)
14-18	43	15	58 (40)
Total	94	52	146

Table 2: Type of injuries

Injury type	Number (%)
Laceration/puncture	56 (25)
Dislocation/fracture	64 (29)
Contusion/abrasion/hematoma	31 (14)
Crush injury	17 (8)
Strains/sprains	10 (4)
Avulsion and amputation	21 (9)
Burns	16 (7)
Concussion	09 (4)
Total	224

Table 3: Body part injured

Anatomical part	Number (%)
Head, neck, and face	23 (12)
Trunk	18 (9)
Upper extremity	113 (57)
Lower extremity	43 (22)
Total	197

Table 4: Cause of injury

Type	Number (%)
Falls and slips	119 (43)
Vehicle (tractor, cycle, and bullock)	29 (11)
Hand tools	48 (17)
Machinery	37 (13)
Animal	13 (5)
Chemicals	21 (8)
Falling objects	09 (3)
Total	276

fractures, dislocations, lacerations, finger crushes, and abrasions. Similar results were also seen in studies done by Rivara [7] and Sosnouska et al. [17]. The reason of upper extremity being the most common body part involved may be because of use of hand tools which is quite common in our country [19] and also because upper extremity is most commonly used to prevent the fall and slips.

As long as agriculture involves families, children will continue to be exposed to agriculture hazards. There has to be a robust injury surveillance system for preventing such accidents on farms. Behavioral changes can be brought about through education, law enforcement, and supervision along with the use of automatic safety devices and modifications in the equipment design. Effective and timely medical care is recommended to reduce mortality and morbidity.

One of the limitations of this study was that this is a hospital-based study. In low-income countries, many injuries are treated at home and are never reported. Literature has shown that population-based studies gave different results as compared to hospital-based studies, and this study being a retrospective one, we could not evaluate the exact cause of injury, e.g. due to tractors, hand tools, and tillage equipment. However, we have reported the type of injury and mechanism of injury. Furthermore, there are no well-defined systems for recording agricultural injuries, especially in children and preexisting conditions of children were not explored.

CONCLUSION

Males in the age group of 7-13 years were the most frequent victims of agricultural injuries. Falls and slips were the most common mechanism of injury with fracture and dislocations being the most common type of injury. The results from this study will help in identifying the risk factors for agriculture injuries in children and also to look for the prevention measures to be applied.

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Funding: None; Conflict of Interest: None Stated.

How to cite this article: Huda F, Wasim S. Nonfatal agriculture injuries in children - A retrospective study. *Indian J Child Health*. 2016; 3(4):305-307.