



Occupational injuries: Prevalence, Patterns and Associated factors among Agriculture Workers in a developing country

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ABSTRACT

Background

Agriculture is the oldest occupation of settled man. According to the International Labour Organization, it is one of the top three dangerous sectors in the world, and hence, the present study aims to identify agricultural injuries in rural Mysuru, as well as the factors that contribute towards them.

Methods

A community-based cross-sectional study was done over three months among 168 farmers in a selected rural population of the Mysuru district. The participants were interviewed using a pre-tested semi-structured questionnaire. Chi-square test and Fisher's exact test were done using SPSS version 26. A p-value < 0.05 was considered significant.

Results

In the previous 12 months, the overall prevalence of work-related injuries among farmers was 61.9%. The majority of the injuries were caused by hand tools, followed by slipping at work, and most of them occurred in the mornings during rainy seasons (47.1%). Cuts (60.6%), laceration (20.2%), and puncture wounds (15.4%) were the most common injuries among farmers. Increased age, landholding, type of crop grown, increased working hours and the lack of usage of personal protective equipment (PPE) were found to be significantly associated with the increased occurrence of injuries among the farmers.

Conclusion

The prevalence of injury among farmers in the study was high. As a result, regular counseling, awareness, and training programs on the usage of personal protective equipment (PPE) and how to handle these injuries are required.

Key-words: Occupational Health, Farmers, Injuries, Agriculture, Rural, Wound


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INTRODUCTION

An occupational injury is defined as any personal injury, disease, or death that occurs as a result of a job-related accident; an occupational disease, on the other hand, is a condition developed as a result of long-term exposure to risk factors deriving from their work activity. According to the International Labour Organization (ILO), 2.3 million women and men die each year as a result of work-related accidents or diseases, which equates to almost 6000 deaths each day. Annually, there are around 340 million workplace accidents and 160 million sufferers of work-related diseases throughout the world. [1],[2] Women, the poor, and children, who make up the majority of the vulnerable population in Southeast Asian nations, work largely in the informal sector. They frequently lack basic awareness of risks and work long hours in hazardous job environments with little or no personal protective equipment and no health insurance.

[3]

Agriculture is the oldest occupation of settled man after hunting and foraging, and agriculture employs around 70% of all employees across the globe. [4] India is an agricultural country. Agriculture and related activities are the primary sources of income for more than 80 % of rural Indians, and they employ around 52 % of the countries workforce. [5] However, according to the International Labour Organization (ILO), it is one of the three most dangerous sectors in the world, along with mining and building. [6] Farmers are at risk of injury since their jobs require them to do numerous activities in multiple places. The majority of the tasks are carried out in the open air, exposing them to various hazardous working circumstances. This is very common in low-income countries. [7] The increased usage of machinery has also increased the risk of injuries. Musculoskeletal injuries account for the majority of reported nonfatal occupational injuries. The most common types of occupational injuries include fractures, bruising, lacerations, contusions, foreign body penetration, and sprains or

strains. [8] Workplace injuries not only cause illness, disability, and death, but they also have a number of severe economic consequences. The injured victims and their families must pay for their own medical bills as they don't have any other social support and sometimes the same individual may sustain several injuries and these frequent injuries can cause complete disability. As a result, occupational injuries increase the likelihood of extreme poverty since the injured individual is usually the family's main source of income. [9],[10]

With the above background, the present study aims to identify patterns of agricultural injuries and to determine the variables associated with work-related injuries among agricultural farmers in rural Mysuru.

Methodology

A community-based cross-sectional survey was carried out among farmers residing in Suttur village. The study took place for a period of 3 months (August 2021 to October 2021). The study protocol was approved by the Institutional Ethics Committee (JSSMC/IEC/240123/15 NCT/2022-23) and consent was obtained from the participants after explaining the purpose and procedure of the study. Based on the prevalence of 69% of prevalence of agriculture-related injuries from a previous study conducted in rural Nepal [10], at a confidence interval of 95% and an absolute precision of 7%, the sample size was calculated as 168.

The Primary Health Centre, Suttur comes under the rural field practice area of the department of Community Medicine, JSS Medical College, Mysuru. The total householders in this area were 3352 and have a total population of about 12756 people among which 6521 were females and 6235 males. The required sample size of 168 was obtained through house-to-house visits by systematic random sampling in this area. The first house was selected between house numbers one to twenty after which every 20th house was selected for the study.

In case the 20th house selected was locked or didn't have anyone involved in agricultural work, the very next house was selected for the study. If there was more than one member of the family engaged in agriculture, the senior- most member of the family was chosen for the study.

The study employed a self-administered questionnaire (in local language of Kannada) that was created after examining the existing. Before the questionnaire was administered to the real study population, a pilot study was conducted on about 20 farmers in the rural area of Mysuru for validation. As a result, the material validity and reliability of the instrument were established.

The questionnaire covered the following: (1) Socio-demographic details: Age, gender, education, type of labour and crop grown, and working hours. (2) Injury details: place, time, mode, body part and season of injury, hospitalization details, use of PPE(mask, shoes and gloves), and frequency of injuries. The data collected was entered in Microsoft Excel 2019 spreadsheet followed by analysis using SPSS (Statistical Package for the social

science) Windows, Version 26.0. (IBM Corp. Released 2019. IBM SPSS Statistics for Armonk, NY, USA).

The demographic characteristics such as age, gender, education, etc were represented using the arithmetic mean, standard deviation, and percentages. The associations between the selected demographic variables (age, gender, education) and work-related injuries were found using the Chi-Square test/ Fisher's Exact test. Unadjusted Odds Ratio was calculated. The data distribution was represented using appropriate tables. A p-value of less than 0.05 was considered statistically significant.

Results

The overall prevalence of work-related injury among farmers in the selected rural population in Mysuru was 61.9 % during the last 12 months. The mean age of the study population was 47.6 \pm 15.7 years and the majority of them were males (78%). 33.9 % of the subjects received an education of high school level while 29.8% of them were illiterates. The majority of the farmers in this study owned their own land for farming (63.7 %). (Table 1)

Table 1: Socio-demographic characteristics of farmers

Characteristics	Categories	Frequency	%
Age	<30	15	8.9
	30-39	35	20.8
	40-49	42	25
	50-59	45	26.3
	\geq 60	31	18.5
Gender	Male	131	78
	Female	37	22
Education	Graduate	9	5.4
	Intermediate/Diploma	15	8.9
	High school	57	33.9
	Middle school	23	13.7
	Primary school	14	8.3
Landholding	Illiterate	50	29.8
	Yes	107	63.7
	No	61	36.3



The average duration of working hours in a day was 7.7 ± 2.7 hours. Paddy was the main crop grown (49.3%) followed by sugarcane (16.1%). The majority of the participants did not use any Personal Protective Equipment

(PPE) at work and among those who used PPE, 50.6 % use ordinary masks, 33.8 % used boots and 23.4 % used gloves at work. (Table 2)

Table 2: Working characteristics of the farmers

Characteristics	Categories	Frequency	Percentage
Working hours	≤9 hours	118	70.2
	>9 hours	50	29.8
Type of crop	Paddy	83	49.4
	Sugarcane	27	16.1
	Banana	16	9.5
	Ragi	5	3
	Coconut	15	8.9
	Jowar	9	5.4
	Other Vegetables	13	7.7
PPE usage	Yes	77	45.8
	No	91	54.2
Type of PPE (n=77)	Mask	39	50.6
	Boot	26	33.8
	Gloves	18	23.4

During the past one year, out of the 168 interviewed farmers, 104 (61.9%) of them were injured and most of this occurred in the mornings (42.3%) during the rainy season (47.1%). Around 33.6 % of farmers reported having lost two days of their work due to this injury while 23.1 % in spite of the injury went for work. Out of the 104 farmers who sustained an injury, farm equipment-related

injury was sustained in 90 farmers (86.54 %). The majority of the farmers were injured while using hand tools (58.6 %) followed by slipping in the fields (21.1 %). The most frequent type of injury sustained due to this were cuts (60.6%) followed by laceration (20.2 %) and the most frequent body part involved were legs (45.2 %) and hands (45.2 %). (Table 3)

Table 3: Injury related characteristics reported by farmers (n=104)

Characteristics	Categories	Frequencies	Percentage
Environment where injured	Working field	83	79.8
	On the way	12	11.5
	House	9	8.7
Sick leave due to injury (in the past year)	None	24	23.1
	One time	16	15.4
	Two times	35	33.6
	Three times	18	17.3
	More than three times	11	10.6
Season when injured	Rainy	49	47.1
	Winter	26	25
	Summer	29	27.9
Time when injured	Morning	44	42.3
	Afternoon	40	38.5
	Evening	20	19.2
Mode of injury	Hand tool	61	58.6
	Slipping	22	21.1
	Animals	5	4.8
Type of injury	Sharp instruments	29	27.9
	Cuts	63	60.6
	Puncture	16	15.4
	Lacerations	21	20.2
Body part injured	Fracture	7	6.7
	Finger	27	26
	Leg	47	45.2
	Hand	47	45.2
	Knee	10	9.6
	Eye	4	3.8
	Trunk	9	8.6

18 (17.3 %) out of the 104 farmers injured required hospitalization. Accidental poisoning was reported among 9 farmers (8.6 %) while 7 females. Paddy field farmers suffered more injuries and it increased with long working hours. All (6.7 %) farmers reported being having skin diseases and allergies. It was observed that the

incidence of occupational injury increased with increase in age. Males were injured more than these were found to be statistically significant Association between Socio-demographic and the working characteristics of farmers with injuries in last year is given in (Table 4)

Table 4: Association between Socio-demographic and the working characteristics of farmers by injuries in last year

Characteristics	Category	Accidents in one year (%)		Chi-square value	p-value
		Yes (104)	No (64)		
Age	<30 years	8 (7.7%)	7 (10.9%)	14.868	0.005*
	30-39 years	22 (21.2%)	13 (20.3%)		
	40-49 years	28 (26.9%)	14 (21.9%)		
	50-59 years	35 (33.7%)	10 (15.6%)		
	≥60 years	11 (10.6%)	20 (31.3%)		
Gender	Male	80 (76.9%)	51 (79.7%)	0.176	0.675
	Female	24 (23.1%)	13 (20.3%)		
Landholding	Yes	73 (70.2%)	34 (53.1%)	4.990	0.025*
	No	31 (29.8%)	30 (46.9%)		
Type of crop	Paddy	44 (42.3%)	39 (60.9%)	13.673	0.027 [#]
	Sugarcane	19 (18.3%)	8 (12.5%)		
	Banana	9 (8.7%)	7 (10.9%)		
	Ragi	3 (2.9%)	2 (3.1%)		
	Coconut	10 (9.6%)	5 (7.8%)		
	Jowar	6 (5.8%)	3 (4.7%)		
	Other vegetables	13 (12.5%)	0 (0%)		
Working hours	≤9 hours	67 (64.4%)	51 (79.7%)	4.416	0.036*
	>9 hours	37 (35.9%)	13 (20.3%)		
PPE usage	Yes	54 (51.9%)	23 (35.9%)	4.078	0.043*
	No	50 (48.1%)	41 (64.1%)		

The regression model showed that farmers above 60 years of age had a 1.63 odds and age between 50-59 years had 2.88 odds of getting injured when compared to farmers

<30 years. Working hours > 9 hours had 23.96 odds of getting injured than farmers working <9 hours.

DISCUSSION

Increased use of farm equipment, as well as other agricultural inputs, has improved Indian agricultural production and productivity. Meanwhile, it has increased the risks of occupational safety on farms. Agriculture injuries are a major cause of occupational health hazards.^[11]

In the present study, the overall prevalence of agriculture work-related injury among farmers was 61.9 % in the last year. Similar studies were done in rural parts of India which showed a very low prevalence of occupational injuries. For example, a study done in rural Pondicherry reported a 6.2 % prevalence of agriculture-related injury while a similar study in rural Haryana reported an 8% prevalence.^{[12],[13]} A study from Nepal showed a slightly higher prevalence of 69 % in the past 1 year while another study done in China reported a lower prevalence (33 % in 2 years) for agricultural injury compared to our study.^{[10],[14]}

In this study, the majority of the farmers belonged to the age group of 50-59 years (26 %) with a mean age of 47.6 ± 15.7 years and the highest proportion of injuries were from this same age group. Similar studies done in different parts of India and China showed 40-49 years as the groups with the highest number of injury victims.^{[8],[11],[14],[15]} In our study, the farmers who received an education of high school level were injured more when compared to illiterates which were opposite to studies conducted in Nepal and Ethiopia.^{[8],[16]} Further, the farmers who worked for more hours per day were injured more when compared to those who worked for fewer hours.

Out of 104 farmers who got injured in our study, only 18 (17.3 %) required hospitalization and these farmers only went to hospitals only after local treatment had failed to provide relief. The majority of occupational injuries were minor, and most patients are discharged following treatment without needing to be examined or treated

again.^{[17],[18]} According to similar research published in Turkey, 83.6 % of farmers were discharged from the emergency room once their treatments were completed^[19] while similar studies in India revealed that agricultural injuries have a very low death rate.^{[11],[15]} Farmers are known to suffer from a variety of skin disorders as a result of plants, chemical goods, and pesticides. In our study, % of the farmers reported having skin disorders while the prevalence was slightly higher (12.6 %) in a similar study done in Korea by Hyun Sul Lim et.al.^{[20],[21]}

The use of personal protective equipment (PPE) appears to be a neglected topic among farmers. They are unaware of any personal protective equipment (PPE) that is essential for farm work.^[22] In this study, 45.83 % of the farmers were reported to be using PPE and among that 50.6 % were using an ordinary face mask and they were mostly unaware of any PPE required for farm works. In our study, the most common body parts injured were legs (45.2%) and hands (45.2 %). Regular involvement of the legs and hands in farm activities during working hours can increase the risk of injury among them. Similar studies done in West Bengal reported fingers of both limbs as the most affected parts of the body. A similar finding was also observed in a study done by Devendra Bhattarai et.al, in rural Nepal.^{[8],[23],[24]} Farmers may be at greater risk of harm due to a lack of safety precautions such as the usage of personal protective equipment.

In this study, the most common type of injury sustained by farmers were cuts followed by laceration and puncture. The leading cause of agricultural injury in our study was found to be due to hand tools (58.6 %). Agricultural hand tools include Knife, Kudali (pickaxe), Khurpi (weeding fork), Spade, Plain edge sickle, shovel, etc which are still widely used in the farms. These findings were similar to studies conducted in West Bengal and South Odisha.^{[23],[24],[25]} These findings were also similar in Chinese farmers as well.^[14]



LIMITATIONS

Only one farmer was interviewed per household, which may have left out injury data from other family members. Only those farmers available at the time of the survey were included and we could not include the farmers who were not at home. There's also the risk of recall bias in the history of injuries over the previous 12 months. Furthermore, when compared to males, the

number of female responders was significantly lower in the survey. In order to better understand occupational injuries and enhance measures, multicentred prospective studies with employers providing data are needed.

CONCLUSION

The overall prevalence of work-related injury among farmers was high in the study population. Increased age, landholdings, type of crops, long working hours, and the lack of usage of PPE were found to be significant factors associated with injury. The most common cause of this injury was hand tools and the most common body parts involved were hands and legs.

The most common type of injury was cut and the use of PPE was observed to be less among the farmers. As a result, farmers must be educated about illnesses, how to handle injuries, and how to use personal protective equipment (PPE) to help protect those working in these areas.

RECOMMENDATIONS

Identification of hazards related to all kinds of agricultural activities is important in formulating preventive measures. Assessing farmers' knowledge on first aid. Farmers should be educated about their work-related injuries and preventive techniques in their living environments. In this regard on health education of protective and control measures, usage of PPE is vital.

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