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# Incidence of Fodder Cutter (Toka) Hand Injury and their Management in D.I. Khan, Pakistan

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## ABSTRACT

**OBJECTIVE:** This study aimed to determine the incidence of toka hand injuries by age, gender, and occupation and their management in D.I. Khan.
**METHODOLOGY:** This descriptive study was conducted from January to December 2023 in the Department of Orthopaedics, DHQ Teaching Hospital, D.I. Khan, Pakistan. Sixty-six patients presenting to the hospital during 2023 with toka hand injuries were selected. Demographic variables were age, gender, and occupation. Research variables were the site of injury and mode of management. All data was analyzed using SPSS version 29.
**RESULTS:** Out of 66 patients, Toka injuries were predominant in females 39(59.09%). Most patients, 51(77.27%), were aged below 30 years, and 42(63.64%) were non-professional by occupation. The most common site of injury was distal to the wrist 33(50%), while it was 27(40.91%) at the wrist level, and 6 (9.09%) were proximal to the wrist. Debridement and stump formation was done in 40(60.60%) while 26(39.40%) patients underwent fixation and stabilization.
**CONCLUSION:** Toka machine injuries mainly result in hand amputations. Safety features must be identified in this region, workers must be adequately educated, and work-related ergonomics must be ensured. Further advancements in management are also needed.

**KEYWORDS:** Toka injuries, Hand injuries, D. I. Khan, Fodder cutter, Stump, Amputation, Agriculture

## INTRODUCTION

Globally, occupational injuries are responsible for about 10.5 million Disability-adjusted life years (DALYs)[1]. The International Labor Organization (ILO) estimates around 340 million occupational accidents worldwide[2]. Hand injuries are the leading cause of lifelong disability in agriculture-related trauma worldwide[3]. One standard machine used in agriculture is the chaff cutter, which can cause permanent injuries to the upper limb (hand)[4]. A study in India on agricultural-related injuries reported that 45% of injuries were due to chaff-cutter incidents[5] Toka or Fodder (chaff) cutter hand injuries are common in rural areas of Pakistan due to farmers use of fodder cutter machines for food preparation for their cattle[6]. Farmers cut hay into small pieces by using Toka machines. Fingers get trapped into the cutting wheel of the roller, which will result in the crushing or cutting of fingers and hands between the rollers[7]. Each piece of machinery produces a spectrum of soft-tissue injuries

Bone damage is characterized by the loss of a digit or limb, loss of function with permanent disability and serious complications[8]. A survey conducted from November 2022 to April 2023 involved 55 respondents, predominantly from Sindh and Punjab, with findings indicating 507 agricultural injuries where fodder cutter with 201 injuries was a primary source accounting for approximately 40% of all injuries[9]. A study in Sialkot by Mehmood R 2015[10] in 2015 showed that the toka machine was primarily involved in agricultural equipment found in 17 (51.5%) out of 33 patients with agriculture-related injuries. People of all ages and genders are affected by toka machines[11]. The children, while playing with the toka machine, get trapped in their fingers and hands. The main aim of reducing this risk is a quick and precise initial assessment. Injury becomes mismanaged when non-specialists need help understanding the peculiarity of the injuries methodically, initially in the emergency[12]. No significant data is available on different search engines for Toka injuries in D.I. Khan. For this reason, the study was conducted to determine the incidence of toka hand injuries in terms of age, gender, and occupation, along with their management in D. I. Khan. The objectives of this study were to determine the incidence of fodder cutter (Toka) hand injuries based on age, gender, and occupation, along with their management in D.I. Khan, Pakistan.

## METHODOLOGY

This descriptive cross-sectional study was conducted from January to December 2023, in the Department of Orthopedics, DHQ Teaching Hospital, D.I. Khan, Pakistan. Sixty-six patients presenting to the hospital with a history of toka hand injuries were selected. A consecutive sampling technique was used. Patients presenting to the hospital with toka hand injuries were included, and all other patients were excluded. Data of all toka injury patients from January to December 2023 was retrieved from hospital records. Demographic variables were age in two groups (below 30 years and above 30 years), gender in two groups (male and female) and occupation in two groups (professional and non-professional). Research variables were the injury site in three groups (distal to the wrist, at wrist level and proximal to the wrist) and the management mode in two groups (debridement & stump formation and fixation & stabilization). Count and percentage described sample distribution. Population distribution was represented by 95% CI using the standard approximation method through the online statistical calculator[13]. The comparison was based on overlapping with confidence intervals. All data was analyzed using SPSS version 29.

## RESULTS

### *Descriptive Analysis and Estimation of Parameters*

Distribution of Toka injury by age, gender, occupation, site of injury and mode of management: Out of 66 patients with toka injury, 51(77.27%) were aged below 30 years & 15(22.73%) were over 30 years. Twenty-seven (40.91%) were males & 39(59.09%) were females. Twenty-four (36.36%) were professional & 42(63.64%) were non-professional. Thirty-three (50%) were distal to the wrist, 27(40.91%) at the wrist level & 6(9.09%) were proximal to the wrist. Forty patients (60.60%) underwent debridement & stump formation, while 26(39.40%) underwent fixation & stabilization.

In our study, toka injury was higher in females (59.09%, 95% CI 47.23-70.95) than males (40.91%, 95% CI 29.09-52.77), higher in the age group below 30 years (77.27%, 95% CI 67.16-87.38) than above 30 years (22.73%, 95% CI 12.62-32.84), higher in non-professional (63.33%, 95% CI 52.03-75.24) than professional (33.33%, 95% CI 24.76-47.96), highest at level distal to wrist 33(50%, 95% CI 37.94-62.06) than at wrist 27(40.91%, 95% CI 29.05-52.77) & proximal to wrist 6(9.09%, 95% CI 2.15-16.03). Most of the patients undergone debridement & stump formation 40(60.60%, 95% CI 48.82-72.39), while 26(39.40%, 95% CI 27.61-51.18) patients undergone fixation & stabilization as shown in **Table I**.

**Table I: Distribution of Toka injury by age, gender, occupation, site of injury and mode of management in the population of D. I. Khan, Pakistan (n=66)**

| Variables | Attributes | Sample Statistics | | 95% CI for proportion | |
|---|---|---|---|---|---|
| | | Counts | Percentage | Lower | Upper |
| Age | Below 30 years | 51 | 77.27% | 67.16% | 87.38% |
| | Above 30 years | 15 | 22.73% | 12.62% | 32.84% |
| Gender | Male | 27 | 40.91% | 29.05% | 52.77% |
| | Female | 39 | 59.09% | 47.23% | 70.95% |
| Occupation | Professional | 24 | 36.36% | 24.76% | 47.97% |
| | Non- professional | 42 | 63.64% | 52.03% | 75.24% |
| Site of Injury | Distal to wrist | 33 | 50% | 37.94% | 62.06% |
| | At wrist level | 27 | 40.91% | 29.05% | 52.77% |
| | Proximal to wrist | 6 | 9.09% | 2.15% | 16.03% |
| Mode of Management | Debridement & stump formation | 40 | 60.61% | 48.82% | 72.39% |
| | Fixation and stabilization | 26 | 39.39% | 27.61% | 51.18% |

## DISCUSSION

***Distribution of Toka injury by age groups:***

In our study, toka injury was more prevalent in age groups below 30 years 51(77.27%, 95% CI 67.16-87.38) than above 30 years 15(22.73%, 95% CI 12.62-32.84). Similar to our study, higher prevalence in the age group below 30 years was reported by Choudhry NA 2016[13] from southern Punjab out of 73 patients of toka injury, including 56(76.71%, 95% CI 67.02-86.41) below the age of 30 years & 17(23.29%, 95% CI 13.59-32.98) patients 31-60 years, and by Tunio ZH et al.[14] from Sindh out of 56 patients affected by fodder cutter injury, where 36(64.29%, 95% CI 51.74-76.84) were aged below 30 years & 20(35.71%, 95% CI 23.16-48.26) were aged 31-60 years.

Unlike our study, a study by Ahmad et al.[16] from Sialkot, out of 196 patients, showed lower prevalence in the age group below 30 years as 96(48.97%, 95% CI 41.98-55.98) and higher prevalence in the 31-60 year age group as 100(51.02%, 95% CI 44.02-58.02).

***Distribution of Toka injury by gender***

In our study, toka injury was higher in females 39(59.09%, 95% CI 47.23-70.95) than males 27(40.91%, 95% CI 29.09-52.77). Similar to our study, higher prevalence in females was reported by Choudhry NA 2016[14], including 41(56.16%, 95% CI 44.78-67.55) females and 32(43.84%, 95% CI 32.45-55.25) males out of 73 patients.

Unlike our study, higher prevalence in male and lower in females was reported by Wanjara S 2022[16] from Kenya, where 46(98%, 95% CI 93.75-100) were males & 1(2%, 95% CI 0.01-6.25) female out of 47 patients, by Tunio et al.where 38(67.86%, 95% CI 55.63-80.09) were males & 18 (32.14%, 95% CI 19.91-44.37) were females out of 56 patients, by Ahmad S 2018[15] where 129(65.82%, 95% CI 59.18-72.46) were males & 67(34.18%, 95% CI 27.54-40.82) were females, by Ali D 2021[17] from Lahore out of 30 cases of toka injury where 23(76.6%, 95% CI

61.53-91.80) males & 07 (23.4%, 95% CI 8.19-38.47) females, and by Bhatti SH 2021[18] from Sindh out of 193 patients where 133 (68.91%, 95% CI 62.38-75.44) were male and 60(31.08%, 95% CI 24.56-37.62) female.

***Distribution of Toka injury by occupation***

In our study, the incidence of injury was higher in non-professional patients (63.33%, 95% CI 52.03-75.24) than in professionals (33.33%, 95% CI 24.76-47.96). No study showing Toka injury by occupation could be found. The non-professionals are casual workers unfamiliar with these machines, which may cause high incidence.

***Distribution of Toka injury by site of injury***

In our study, toka injury was highest at the level distal to wrist 33(50%, 95% CI 37.94-62.06) than at wrist 27(40.91%, 95% CI 29.05-52.77) & proximal to wrist 6(9.09%, 95% CI 2.15-16.03). Our findings were somewhat similar to the study by Choudhry NA 2016[14] with 24(32.88%, 95% CI 22.10-43.65) distal to the wrist, 22(30.14%, 95% CI 19.61-40.66) at the wrist while the highest prevalence at the level proximal to the wrist in 27(36.98%, 95% CI 25.91-48.06) patients. Also, our findings were somewhat similar to the study by Bhatti SH 2021[18] with 66 (34.20%, 95% CI 27.50-S40.89) distal to the wrist and 34 (17.62%, 95% CI 12.24-22.99) proximal to the wrist. However, the highest prevalence was at wrist 94 (48.18%, 95% CI 41.65-55.76).

***Distribution of Toka injury by mode of management***

Toka injuries are a major contributor to disability in the agriculture sector of Pakistan. In our study, most of the patients undergone debridement & stump formation 40(60.60%, 95% CI 48.82-72.39), while 26(39.40%, 95% CI 27.61-51.18) undergone fixation and stabilization. Unlike our study, Choudhry NA 2016[14] reported higher debridement & stump formation in 70(96%, 95% CI 91.34-100), and only 3(4%, 95% CI 0.44-8.66) patients underwent fixation & stabilization.

Similar to our study, Wanjara S 2022[16] reported 33(70.21%, 95% CI 57.14-83.29) debridement & stump formation and 14(29.79%, 95% CI 16.71-42.86) fixation & stabilization out of 47 patients, Ali D 2021[17] reported 18(60.1%, 95% CI 42.47-77.53) debridement & stump formation and 12(39.9%, 95% CI 22.47-57.53) fixation & stabilization out of 30 patients of toka injury, and Tunio ZH et al.[14] reported 34(60.71%, 95% CI 47.92-73.51) debridement & stump formation and 22(39.29%, 95% CI 26.49-52.08) fixation & stabilization out of 56 patients.

## CONCLUSION

Toka or fodder cutter machine injuries are common in our settings. Most of that results in amputations and permanent disabilities, suggesting increased dependency. Non-professional and non-expert persons of a young age are commonly involved in these injuries.

**Recommendations:** Awareness should be started in print, electronic, and social media. Safety/protective features such as power cut-off, limit switch, trigger/belt deflector system, front shield grill, belt cover, gear cover, wooden foundation, and protection barrier plates must be identified. 20 Proper education of workers in this region, work-related ergonomics, and training of paramedical staff working in the peripheral hospitals to handle these injuries properly are also needed.

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## AUTHOR CONTRIBUTION

All authors contributed equally in the study.

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