Human Fatalities from Wild Elephant Attacks: A Fiveyear Autopsy-Based Study

Saptarshi Chatterjee[1], Ranjan Biswas[2], Tanmay Sardar[1], Shobhan Roy[3]

[1]Associate Professor, Department of Forensic Medicine and Toxicology, [2]Assistant Professor, Department of Psychiatry, Bankura Sammilani Medical College, Bankura, West Bengal, [3]Assistant Professor, Department of Forensic Medicine and Toxicology, Deben Mahata Government Medical College, Purulia, West Bengal

Abstract

Background: Human-Elephant Conflict may take many forms, from crop raiding and infrastructural damage, to injury or death of humans or elephants. Conflicts or co-existence between human and wildlife is mostly attributed to the loss, degradation, and fragmentation of wildlife habitats through human activities like logging, animal husbandry, agricultural expansion, and development projects. The present study is conducted to study the prevalence of fatal wild elephant attacks, the socio-demographic profiles of the victims along with their nature of injuries and the risk factors associated with these conflicts.

Methods: This is a cross-sectional descriptive study, which was conducted by analysing 41 cases of fatal Human-Elephant Conflicts, which attended to B.S. Medical College Police Mortuary between 2015 to 2019.

Conclusion: Authors feel that the blockage of elephant migratory routes, coupled with cultivation of elephant preferred crops and scarcity of food in the forest in some season, inevitably attracts more human-elephant conflicts.

Keywords: *Human-Elephant Conflict, Musth, Crop raiding*

Introduction

Expansion of human settlements and agricultural fields across Asia and Africa has resulted in widespread loss of elephant habitat, degraded forage, reduced landscape connectivity and a significant decline in elephant populations relative to their historical size and overall range [1]. As their habitats shrink, elephants are progressively forced into closer contact with people, resulting into more frequent and severe conflicts over space and resources with consequences ranging from crop raiding to reciprocal loss of life. Fatalities due to animal attack are rare in forensic medical work, but have been known to pose problems due to their potential to mimic homicide [2].

Human-elephant conflicts (HEC) have been a common phenomenon, which accounts for 1,713 human and 373 elephant deaths by unnatural causes, including electrocution and poaching [3]. The conflict occurs when the needs and behaviour of wildlife impact negatively on the goals of humans, or when the goals of humans negatively impact the needs of wildlife [4]. Conflicts or co-existence between human and wildlife is mostly attributed to the loss, degradation, and fragmentation of wildlife habitats through human activities like logging, animal husbandry, agricultural expansion, and development projects [5].

Corresponding author:
Dr. Shobhan Roy
Assistant Professor, Department of Forensic Medicine and Toxicology, Deben Mahata Government Medical College, Purulia, West Bengal

Though human deaths from wild elephant attack is common in various parts of the country, including West Bengal, reports on autopsy-based studies are scarce in literature. The most recent assessment in West Bengal on the number of human injuries and fatalities from wild elephants was conducted about 10 years ago [6]. In this backdrop, the present study is conducted to study the prevalence of fatal wild elephant attacks, the socio-demographic profiles of the victims along with their nature of injuries, who fell prey to these wild elephants. Our study also aims to assess the common risk factors contributing to these HEC, and hence to suggest preventive strategies to be taken to protect the vulnerable population from the wild elephant attack.

Aims and Objectives

1. To study the prevalence of deaths due to wild elephant attacks from 2015 to 2019.

2. To study the socio-demographic profiles of the victims of elephant attacks.

3. To analyse the nature of injuries on the victims.

4. To assess the risk factors of human-elephant conflicts.

Materials and Methods

a. Place of study: Bankura Sammilani Medical College Police Mortuary, Bankura, West Bengal, India.

b. Period of study: 1st January – 30th June, 2020

c. Study population: All the patients sent for autopsy examination at BS Medical College Police Mortuary between 2015 to 2019 (From the Post-Mortem register)

d. Sample size: All the victims of fatal elephant attacks, attended to BS Medical College Police Mortuary for autopsy examination between 2015 to 2019.

· *Inclusion criteria: All the victims of fatal elephant attacks between 2015 to 2019, who attended for autopsy examination at BS Medical College Mortuary.*

· *Exclusion criteria:*

i. Victims of fatal animal attacks, other than elephants

ii. Cases with incomplete or inadequate history

e. Study design: Cross-sectional descriptive study

f. Source of data:

i. Post-Mortem register of Bankura Sammilani Medical College Police Mortuary

g. Statistical analysis: Details regarding the cases were obtained from the inquest report, interviewing the eyewitnesses and the family members of the deceased. All the data were manually checked and edited for completeness in a pre-determined format and were then coded for computer entry. Collected data was recorded in Microsoft Excel worksheet and SPSS IBM 19. The data was collected, tabulated and statistically analyzed by applying student's t-test. The $p < 0.05$ was considered as statistically significant.

Results

1. Prevalence of Fatal Human elephant conflicts

The number of victims due to HEC was maximum in 2015, with a gradual decline over years **[Figure 1]**.

2. Distribution according to age

Majority of the victims of fatal HEC belong to the age group of 30 to 70 years **[Figure 2]**.

3. Distribution according to gender

Of all the victims of fatal HEC, males constituted 63.4% and the rest 36.6% were females.

4. Distribution according to residence

In our study, 38 out of total 41 victims (92.68%), belonged from places situated within 6 kilometres from the jungle.

5. Place of occurrence

28 victims (60.9%) were attacked in the crop fields, 5 victims (12.2%) each in jungles and roads, and the remaining 3 victims (7.3%) in their respective houses.

6. Time of attack

46.3% of the victims were attacked in between 8.00 pm and 12.00 midnight, followed by 28.8% of the victims between 4.00 pm and 8.00 pm. The rest 26.83% of the victims fell prey in between 12.00 at midnight to 8.00 in the morning.

7. Situations leading to Human -Elephant conflicts

As stated by the eye witnesses during interaction and inquiry, 41% of the victims were drunk and were chasing elephants in the crop fields and near households, 27% were returning home after dark from work, 11% had gone collecting fuelwood from the forests and 10% were defecating in the open at night. 3 victims succumbed to the injuries in their sleep, when their mud house's wall accidentally caved in to an elephant's rampage. One woman was attacked by a tusker, as she tried to offer prayers to the elephant in the name of a Hindu god.

8. Distribution according to months

Maximum number of deaths due to HEC was recorded between February to May **[Table 1]**.

9. Causes of death of the victims

In our study, 37 victims (90.2%) died due to trampling of vital organs and three persons died due to traumatic asphyxia as a result of house collapse in their sleep. The body of the woman, who went to offer prayers, exhibited one fatal perforated wound in the abdomen produced by the tusk.

10. Elephants attacking in herd or single

In all the cases, the aggressors were lone tuskers, except three cases where the offender was a female elephant in herd.

Discussion

Elephants are usually peaceful animals [6]. Females may, however, become aggressive when they are excessively irritated by the villagers and when they apprehend dangers to their young. Bulls can be exceptionally aggressive during musth, when they usually venture away from their home range in search of mating opportunities. All elephants may become aggressive when sick, injured or harassed.

According to the Union Environment Ministry, 2,398 people have died since 2014 up to March 31, 2019 due to Human-Elephant conflicts, with West Bengal recording the maximum 403 deaths in last five years [7]. However, in our study, a total of 41 people died due to HEC from 2015 to 2019, with a steady decline in the mortality rate from 2016 onwards. A combination of early warning to detect elephants before they enter the crop fields and the employment of elephant driving squads, coupled with a front line communal guarding strategy proved most successful. Consistent to another study from the same region, the majority of the victims were between 30 to 70 years, with males predominating in all the age groups [6]. Farmers and labourers are mostly males and often go alone in the forest path or work in agricultural lands near forest, and thus, they are most vulnerable to these human-animal conflicts.

Previous studies concluded that elephants do not discontinue using the high-risk human settlements, which were once part of their original home range and instead modify their activities by travelling faster or being nocturnal within such areas [8]. Human mortality and morbidity in population residing around forest areas are primarily due to continued harassment and taunting of elephants while being driven back to forests from crop fields or by getting too close or getting involved in provoking activities to already injured, traumatized, harassed mammals or males in musth or females with young calves. The same findings are being reflected in our study, where more than 90% of the victims recorded their residence within 6 kilometres from the jungle, making themselves more vulnerable to the fatal HEC.

Human-elephant conflicts can be largely attributed to colonialism, with the people taking over the elephants'

indigenous culture, as they are pushed into smaller places and killed outright [9]. Elephants need a large space to roam, with lots of vegetation and abundant water supplies to help them digest all that roughage. When those areas are taken up with human crops, elephants are happy to adjust eating corn or other plants meant for people. This very fact is amplified in our study, where the majority of the deceased were attacked in their crop fields. Chattopadhyay and Das reported that most of the incidents were noted between 4.00 am to 6.00 am [6]. Contrary to this finding, critical time of major HEC in our study was between 8.00 pm to 12.00 at midnight, where almost 3/4th of the victims got affected while chasing elephants under intoxication or during late homecomings from workplaces. The growth of industries in the last ten years with increased employment and increased cash flow, adding to a steep rise of substance abuse and other intoxications, coupled with poor transportation may explain this difference in findings. This tilt in time frame may also be due to increased habits of indoor latrines amongst people of this area, compared to the ones in 2007-2009, when people usually visited outdoors for defaecation.

In order to understand the seasonal patterns of damage by elephants, the attractiveness of crops in relation to wild forage in a particular season, the extent of availability of crops, and the presence of elephants near cultivated areas should be considered [10]. When the attractiveness of crops in relation to wild forage crosses certain threshold, high encounters can be expected, like we observed in our study between the months of February to May. The abundance of rains from June to October determined local agricultural practices and by January-February most of the seasonal crops become ripe, attracting the elephants. Coupled to this, the dry months of March to May, with scarce water and food resources, compel these mammals to descend to low elevated lands from the Dalma Hills in Jharkhand for their steady supplies.

In an attempt to kill, elephants usually first grab the victim with their trunk and then crush them under their feet. Sometimes they throw them from high lifting position on the ground, followed by trampling [6]. Females and older males are less likely to put up much resistance. In concordance to this, 90.2% of the victims of our study died due to trampling of vital organs. The death of the three persons due to traumatic asphyxia as a result of house collapse, can be attributed to accidental encounters with these mammals.

Elephant males tend to move alone or in small temporal groups, whereas females move in family based larger groups [11]. Studies on behavioural strategies between adult males and female-led herds indicate that the solitary tuskers are more ready to assume the risks of crop raiding than females. It has been suggested that females might become obligate crop raiders when living in highly fragmented habitats, where resources are more limited and scattered in human dominated landscapes. Reports in various newspapers also suggest that high number of human deaths occurs in the months of March to May due to sudden unprovoked attacks by lone tuskers [6]. This is also considered to be the mating season of elephants in this region, where many adult bulls are in their musth state. During this musth phase, tuskers become violent and aggressive toward all other animals, even to its own kind. The same results are reflected in our study, where 38 out of 41 victims succumbed to their injuries inflicted by lone tuskers.

Human-Elephant Conflict may take many forms, from crop raiding and infrastructural damage, through disturbances of normal activities such as travel to work or school, to injury or death of humans or elephants. HEC is a problem that poses serious challenges to wildlife managers, local communities and elephants alike.

In the present study, majority of the victims belonged to the age groups of 30 to 70 years, with male preponderance in all the ages. Most of the victims of HEC were affected between 8.00 pm to 12.00 at midnight, in their act of either chasing the mammals under intoxication or while returning home from workplaces in the late hours. Though crop fields were the usual places of encounters, majority of the incidences occurred between February to May. Trampling of vital organs by

lone tuskers remain the usual finding in victims of HEC.

Blockage of elephant migratory routes due to various anthropogenic activities coupled with cultivation of elephant preferred crops in large extent along the forest ranges and lack of food in the forest in some season inevitably attracts more human-elephant conflicts. However, understandings of how people living in or near conflict prone areas use natural resources, and how they make decisions about current and future resource use, remains key to addressing the underlying drivers of Human-Elephant conflict and their spatial variation [1]. Without this knowledge, the task of resolving Human-Elephant Conflict and finding a means for these species to coexist in the Anthropocene is Sisyphean.

Acknowledgements: The authors are grateful to authors, editors and publishers of all those articles, journals and books from where the literature of this article has been reviewed and discussed.

Conflict of Interest: No conflict of interest is associated with this work.

Other Interest: The same article was sent to another Journal for consideration. However, even after receiving the acceptance letter from the editor, the authors refrained themselves from paying the processing charges and publication in the said journal, after finding the Journal not indexed as per The Gazette of India (Board of Governors) dated the 12th of February, 2020.

Source of Funding: None declared

Ethical Clearance: Taken

References

1. Shaffer LJ, Khadke KK, Naithani KJ. Conflict: A review of current management strategies and future directions. Ecol. Evol [Internet]. 2019 [cited on 11th January 2019]. Available from http://www.frontiersin.org/articles/10.3389/fevo.2018.00235/full.
2. Gudmannsson P, Berge J. The Forensic Pathology of fatal attacks by the large mammals inhabiting the Nordic Wilderness- a literature review. Journal of Forensic Science 2019;64(4).
3. Ganesh S. Human-elephant conflict kills 1,713 people, 373 pachyderms in 3 years [Internet]. [cited 10th February 2019] Available from: http://www.thehindu.com/news/national/conflict-kills-1713-people-373-pachyderms-in-3-years/article26225515.ece/amp.
4. Madden F. Creating co-existence between humans and wildlife: Global perspectives on local efforts to address human-wildlife conflict. Hum. Dimens. Wildl 2004;9:247-257.
5. Ruda A, Kolejka J, Silwal T. GIS-Assisted Prediction and Risk Zonation of Wildlife Attacks in the Chitwan National Park in Nepal. Int. J. Geo-Inf 2008;7:369.
6. Chattopadhyay S, Das SK. Human fatalities from wild elephants' attack- a study of fourteen cases. J Forensic Leg Med 2011;18(4):154-57.
7. Environment. Elephants killed over 2,300 people in last five years: Environment ministry [Internet]. [cited 28th June 2019]. Available from: http://www.thehindu.com/sci-tech/energy-and-environment/elephants-killed-over-2300-people-in-last-five-years-environment-ministry/article28208456.ece.
8. Douglas-Hamilton I, Krink T, Vollrath F. Movements and corridors of African elephants in relation to protected areas [Internet]. [cited on 2005]. Available from: http://doi.org/10.1007/s00114-004-0606-9.
9. Langley RL, Hunter JL. Occupational fatalities due to animal related events. Wilderness Environ Med 2001;12(3):168-74.
10. Campos-Arceiz A, Takatsuki S. The Human-elephant conflict in Southeastern Sri Lanka: Type of damage, seasonal patterns and sexual differences in the raiding behaviour of elephants. Gajah 2009;31:5-14.
11. Leimgruber P, Gagnon JB, Selig ER. Fragmentation of Asia's remaining wildlands: implications for Asian elephant conservation. Animal Conservation 2003;6:347-59.