Clinico-radiological study in head injury due to road traffic accident caused by stray animals

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ABSTRACT

Background: In India, the alarming rise in Road Traffic Accidents (RTAs) is a pressing concern that poses significant threats to public safety and infrastructure. **Aims and Objectives:** The study was conducted to know the clinico-radiological aspect and associated mortality and morbidity of cases of RTAs caused due to stray animals in central India. **Materials and Methods:** This current study was a prospective observational study done in the premier institute of central India from April 2023 to July 2023. All RTA patients due to impact with stray animals attending the trauma and neurosurgery department of our institute for 3 months (April 23, 2023–July 30, 2023) were included in the study. **Results:** A total of 50 patients were recruited for the study. The median age of the patients was 29.00 years (20.00–41.00) (Range). The gender distribution M: F was 38:12. Five (10%) patients reached the T and E within the golden hour (first 1 h). Evening time (42%) was the most common time of accidents (12 PM–6 PM), followed by (6 PM–AM). Analysis of vehicles involved in RTA revealed two-wheelers in 95%, three-wheelers in 3%, and other vehicles in 2% cases. About 34% of total victims were drivers, and 66% were pillion riders or occupants of the vehicle. **Conclusion:** Our prospective, cross-sectional study aimed to highlight the facts of the increased incidence of RTAs due to stray animals roaming freely on roads, thus adding significant morbidity and costs to society.

Key words: Stray animals; Road traffic accident; Head injury; Clinico-radiological study

INTRODUCTION

In India, road traffic accidents (RTAs) are posing significant threats to public safety and infrastructure[1]. Among the various contributing factors, the presence of stray animals on roads is responsible for a considerable number of accidents[2,3]. Stray animals including cattle, dogs, and other domestic and wild animals have become significantly hazardous and they endanger the lives of motorists, pedestrians[4]. India's diverse cultural practices have historically integrated animals into the daily lives of its people. However, with rapid urbanization, migration, and changing demographics, the issue of stray animals on the road has escalated into a serious problem with far-reaching consequences. The absence of adequate infrastructure and lack of comprehensive strategies to address the issue has exacerbated the risk associated with these animals on the road[5,6].

Aims

The aim is to investigate the clinical and radiologicl features of head injuries caused by stray animals. The study aim to provide insight into the severity and prognosis of these injuries and to identify any specific clinical and radiological features that can help in the diagnosis and management of such cases.

Objectives

To determine incidence of head injuries caused by stray animals in the study population. To describe the clinical and radiological features of these injuries including the type and location of injury. To acess the outcomeof these

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injuries including duration of hospital stay,need for surgical intervention and long term neurological sequelae.

MATERIALS AND METHODS

The approval of the institutional ethical board was obtained from Gajra Raja Medical College Institutional Ethical Committee Board under the letter number (13437-62 dated April 18, 2023).

This is a prospective observational study performed in the Department of Trauma and Neurosurgery of the premier institute of central India from April 2023 to July 2023. Fifty patients were included in the study for analysis. Victims of RTA involving animal impact admitted to the trauma center and neurosurgery department were enrolled in the study after due consent of the patient or the accompanying caregiver. Consecutive sampling was done with all eligible participants to create an unbiased environment for the study. Information including basic demographic features, place and circumstances of the injury, details of prehospital interventions if any, and type and mechanism of injury was recorded in a predesigned pro forma. All patients were evaluated as per the ATLS guidelines.

Demographic variables entered included age, sex, type of vehicle involved in the accident, speed of the vehicle, time of injury, time of arrival, mode of arrival, and type of victim (driver and pillion rider). The use of safety gears (helmets/seatbelts) and alcohol consumption was also noted. Clinical injuries were classified as head injury, maxillofacial injury, chest injury, abdominal injury, extremity injury, and STIs.

Inclusion criteria
Inclusion criteria were as follows: All RTA patients due to impact with stray animals attending to the trauma and neurosurgery department of our institute for 3 months (April 23, 2023–July 30, 2023) were included in the study. Patients who provided consent for inclusion in the study were recruited.

Exclusion criteria
Exclusion criteria were as follows: Patients who failed to give consent and refused to participate in the study and trauma patients due to the direct attack of animals were excluded from the study.

Statistical analysis was performed using R, a software environment for statistical computing and graphics (version 3.6.1; Vienna, Austria). Numerical variables (nonparametric) were expressed as a median with interquartile range. Categorical variables were expressed

as a percentage. Bivariate analysis performed by the Chi-square test. The normality of numerical variables was analyzed by the Shapiro–Wilks test. Bivariate analysis between categorical and numeric variables was performed using the Wilcoxon rank-sum test with continuity correction comparing two groups and the Kruskal–Wallis rank-sum test comparing more than two groups. $P<0.05$ was considered statistically significant.

RESULTS

A total of 50 patients were recruited for the study. The median age of the patients was 29.00 years (20.00–41.00) (Range). The gender distribution M: F was 38:12. Five (10%) patients reached the T and E within the golden hour (first 1 h). Evening time (42%) was the most common time of accidents (12 PM–6 PM), followed by (6 PM–12 AM) as shown in Figure 1. Analysis of vehicles involved in RTA revealed two-wheelers in 95%, three-wheelers in 3%, and other vehicles in 2% cases. About 34% of the total victims were drivers, and 66% were pillion riders or occupants of the vehicle. Stray dogs accounted for 28%, cows 28%, pig and buffalo both 10% each, pig and nilgai both 6% each, monkey and donkey both 4% each, cat and dog both 2% each (Figure 2). The
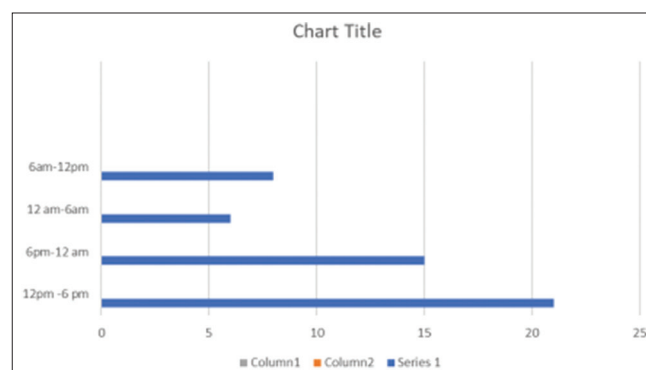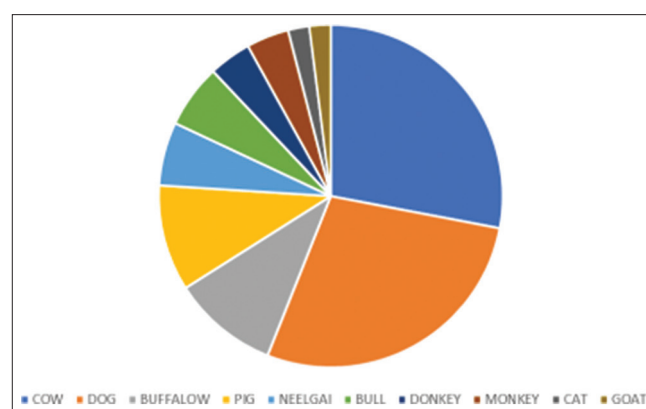

Figure 1: Bar diagram showing injury of patient

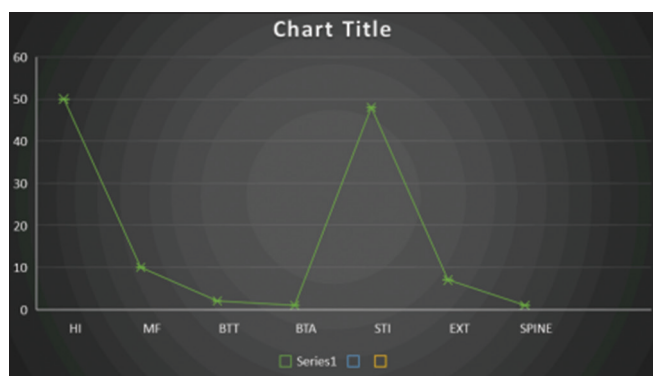**Figure 2:** Pie diagram showing the animal percentage distribution

Figure 3: Line diagram injury pattern among victims

type of impact between animal and vehicle was the front impact (41%), side impact (49%), rear impact (3%), and rollover (7%) of all animal-vehicle collisions (AVCs). The speed of vehicle involved in AVC was categorized as speed <40 kmph (23%), 40–60 kmph (32%), >60 kmph (38%), and cannot tell about speed (7%). Fourteen percent of all victims were found to be under the influence of alcohol. No occupants of two-wheelers wear helmets. The pattern of injury among victims is shown in (Figure 3). The data of xrays, CT scans, procedure done in the neurosurgery trauma department with outcome of patients are as follows, Xray with normal reports 78%, with upper extremity fracture 08%, with lower extremity fracture 06%, with ribs fracture 04%, with clavicle fracture 04%, and with scapula and pelvis fracture 0%. CT scan findings were normal at 04%, with maxillofacial fracture 20%, with brain contusions 80%, with diffuse axonal injury 4%, and with spine fracture 2%. Patients positive for focused assessment with sonography for trauma were 04%. In procedures patients who underwent suturing and dressing were 80%, with splint application 14%, patients who required rapid sequence intubation were 2%, and those who required chest tube insertion 2%. In outcome percentage of patient who discharged after treatment/observation was 4%, those who admitted to ward were 90% and those in the neuro intensive care unit were 06%, no patient was referred to a higher center.

DISCUSSION

The affected victims mainly belong to the prime productive age group[7]. It is not just bad roads, inadequately lit through fares or drink and driving that are causing road accidents. Canines and cattle too have become potential threats for motorists. It is not just the traffic rule violations or bad roads but the menace of the stray animals, namely, the canines and cattle that have become a potential threat for commuters in almost every city of our country. Motorist especially those riding two-wheelers on the city outskirts

acknowledge the canine and bovine menace as a major problem during nighttime as it is difficult to sight them far. The majority of the victims were male (76%). This is consistent with almost all reports on the epidemiology of RTA victims in our country and elsewhere[8-10]. The injury pattern is of wide range, but higher severity was noted among the victims riding under the influence of alcohol or abstinence of safety gear such as helmets. Alcohol dampens the reflexes needed to effectively control the motor vehicles in this dangerous situation. Mitra et al. have noted that drunkards have a higher odds ratio of injury as compared to non-drinkers[9]. Since our hospital is located in the city outskirts, we included patients from nearby districts and villages also. It is not surprising to find patients from nearby states. Poor lights of roads and damaged roads are mainly responsible for RTA in rural areas. Cow and dogs top the chart in our study. Canal et al., in their study in Spain, have also found that dogs are involved in more than 80% of AVC[11]. The dogs suddenly enter the roads and disturb the driver's attention and cause accidents. In cases of two-wheelers, the riders fall and get injured as per the speed of the vehicle as they attempt to avoid colliding with the animals or sometimes the vehicle imbalances as it runs over the animal. The animal is rarely harmed in such a situation, unlike the motorized four-wheelers and heavy vehicles that can be fatal for the canine. In contrast, the cows and oxen tend to bottleneck and block the roads. During darkness, the driver cannot spot the larger mammals and can bump into them. In our series, we find the AVC to be highest between 12 pm and 6 pm. Canal et al. have also reported higher accidents during twilight[11]. This is attributed to a combination of the peak traffic time, slowing of reflexes (driver's fatigue), and the higher number of animals on the road during this period. Furthermore, during this period, there is an increased activity pattern of animals, poor visibility conditions, and glares from animals, all of which contribute to the daily time distribution of RTA. Ang et al., in a study, conducted in Australia found kangaroos to be involved in AVC in more than 50% of cases and dogs contributed to another 11%[12]. While the authors found head injury to be the leading cause of hospitalization in their series, we had external injuries to be the most common presentation. The higher number of speedy motor vehicle involved in their series as compared to two-wheelers in our study might be responsible for these differences[12]. Wilkins et al. found deer to be the most commonly reported animals in AVC and they also stated that more than 70% occurred in dark or unlit locations[2]. Interestingly, the authors further report that even though motorcycles account for <5% of total AVC, they are the one that is more fatal as the drivers are unprotected[2]. It is not surprising

to find victims from remote locations. Police treat all these cases as road accidents and maintain no separate records of stray animals becoming a cause of accidents in the city outskirts. The proper policy should be made regarding the habitat of stray animals after sterilization under the Animal Birth Control Programme[13].

The problem of the rising number of stray animals on roads is also animal specific. There is a rise in the number of stray animals because of uncontrolled population growth. Whereas the cows and other cattle are seen as either they have been disowned or the owners of the livestock also let them off, mostly during the daytime to graze outside and save costs on cattle feed. The municipal corporation has certain rules such as Information Network for Animal Productivity and Health Identification was introduced in Gwalior to track the cattle owners and put fines on them. The central government, 2001, has delegated the municipal corporation and the local authority the power to sterilize street dogs as per the Animal Birth Control Programme for Dogs rules[4]. In our country, capturing and culling of the stray dogs are banned as per "the Prevention of Cruelty to Animals Act, 1960" hence, neutering the dogs is the only solution to control the population[14]. Canal et al. have found that dog-associated AVCs show a "cluster pattern"[11]. Therefore, they have suggested posting of a warning sign board to increase awareness among drivers. Similarly, to control the stray cattle, there is a provision of imposing fines on the owners, and there are shelters also for the homeless[4]. However, the number of such homes for stray animals is insufficient and mostly in urban areas. Deforestation for agricultural and urban land uses has grossly reduced the feeding area for the cattle who have resorted to wandering on roads for feeding on the garbage[15].

Limitations of the study

Sample size is small so it is difficult to develop guidelines for diagnosis and management based on the study findigs. Comparison between clinicoradiological features of head injuries caused by stray animals and motor vehicles is not included in our study.

CONCLUSION

Our prospective, cross-sectional study aimed to highlight the alarming facts of increased incidence of RTAs due to stray animals roaming freely on roads, thus adding significant morbidity and costs to society.

Trauma due to AVC is a preventable cause of RTA. It can be minimized by stringent measures from the governmental

agencies and other stakeholders, including public awareness to make sustainable action plans to prevent animals on streets and major roads. Strict implementation of Motor Vehicle Act to control overspeeding vehicles, avoidance of alcohol, and use of the helmet will reduce associated injuries.

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