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Occurrence and associated risk factors of long bone fractures in food and pet animals in Mymensingh district of Bangladesh: A retrospective study

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Abstract

The aim of this study was to determine the prevalence of fracture and the risk variables connected to its occurrence in calves and cats at Veterinary Teaching Hospital, Bangladesh Agricultural University, Mymensingh. A total of 96 (calves) and 17 (cats) retrospective datasets were compiled between January 2015 and December 2019. Age, sex, breed, season, involvement of the bone, and type of fracture were considered to characterize fractures. To examine the data, simple descriptive statistics were used. At around 6 months, there were the highest rates of long bone fractures in both calves and cats (77%, n = 74; and 65%, n = 11). According to sex variation, fracture was more common in male calves (61%, n = 59) and female cats (76%, n = 13). Calves and cats from native breeds had the highest fracture rates (52%, n = 50) and (100%, n = 17), respectively. The summer season saw the highest rates of long bone fractures in both calves (41%, n = 39) and cats (53%, n = 9). The majority of the fractures in calves (42%, n = 41) were found to be in the metatarsal bone during pre-operative clinical assessment. In cats, this primarily affected the femur (41%, n = 7). Cats (59%, n = 10) and calves (55%, n = 53) had the highest rate of transverse long bone fractures. This study will help to establish the frequency of fractures, which is very important clinically in the examination and diagnosis of fractures in calves and cats.

Keywords: Fracture; Calves; Cats; Occurrence; Mymensingh

1. Introduction

Fracture generally occurs in various degrees of soft tissue damage, including bruising of the muscle, tearing of the arteries, and damage to the periosteum [1]. Trauma from a fall or being struck by a car affects ruminants as well as companion animals. The type of fracture—which could be a hairline, multiple-piece, or compound fracture—and its severity are determined by the etiology, anatomical placement, and age of the animal [2]. Fractures can affect adult animals as well as newborn animals. In Bangladesh, cattle are crucial for ensuring food security, reducing poverty, providing human nourishment, and creating jobs [3]. Long-bone fractures and musculoskeletal injuries in particular are becoming more common due to the growth in farm animals, rapid urbanization, and trauma incidents [4].

Pet animals are particularly prone to orthopedic disorders and other unintentional ailments. Because of their small size and cute personalities, cats are widely regarded as the most popular companion animals in the world. With the relative rise in pet ownership nowadays, bone fractures are a significant issue for cats [5]. Restoration of function and physical integrity with the least amount of bone deformation is the basic goal of fracture care [6]. Diverse animal species, geographical regions, and nations may have different incidences and percentages. The frequency and severity of fracture may be related to the timing of the surgical operation [7,8]. For them to be repaired, understanding the fracture

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occurrence is crucial. This study aims to ascertain the prevalence of fractures in calves and cats in relation to age, sex, breed, season of the year, the involvement of bone, and type of fractures in light of the significance of cattle and cats to the economies of Bangladesh and the detrimental effects of fractures on their productivity and reproductivity.

2. Material and methods

2.1. Duration and Study Area

This study was aimed at finding out how often calves and cats with complaints of locomotor issues were presented to the Veterinary Teaching Hospital (VTH), Bangladesh Agricultural University (BAU), Mymensingh from January 2015 to December 2019.

2.2. Collection of Retrospective Data

Retrospective data on 96 calves and 17 cats were collected from the Mymensingh location of the Veterinary Teaching Hospital (VTH), Bangladesh Agricultural University (BAU). From the clinical data sheet kept by the hospital administration during the study period, the history of each case, information on age, sex, breed, season, bone involvement, and the type of fracture were gathered.

2.3. Study Designs and Sampling Strategies

Age (<6 months and > 6 months), sex (male and female), breed (Indigenous and Crossbred), season (summer: March to June, rainy: July to October, and winter: November to February), involvement of bone (Humerus, Radius Ulna, Femur, Tibia Fibula, Metacarpal, Metatarsal), and type of fracture (Transverse, Oblique, and Complicated) were used to categorize the fracture cases of calves and cats. The date of the incidents that were documented allowed for an evaluation of the fractures' distribution.

2.4. Data Arrangement and Analysis

The percentages of fractures in various breeds, as well as those related to age, sex, season, involvement of bone, and kind, were determined using the information gathered from the data sheet record and structured in a Microsoft Excel spreadsheet. According to the objectives, the calculated data was gathered, tabulated, and organized. The fracture prevalence was calculated by dividing the specific variables of fractures by the total number of locomotion disorder in animals.

3. Results

The highest percentage of long bone fractures were recorded at 6 months (77%, n = 74) and (65%, n = 11), and the lowest rate was recorded at >6 months of age (23%, n = 22) and (35%, n = 6) in calves and cats, respectively (Figure 1a).

According to an analysis of the data, male calves (61%, n = 59) had more fractures than their female counterparts (39%, n = 37). On the other hand, the secondary data revealed that female cats (76%, n = 13) had a higher frequency of fracture than male cats (24%, n = 4) (Figure 1b).

The majority of fractures (52%, n = 50) were found in indigenous breeds, followed by Holstein crosses (33%, n = 32) and Shahiwal crosses (15%, n = 14) (Figure 1c). In the case of cats, native breeds had the highest prevalence of fractures (100%, n=17).

The incidence of long bone fractures in calves was highest in the summer season (41%, n = 39), then in the rainy season (32%, n = 31), and in the winter (27%, n = 26). In comparison to the winter (29%, n = 5) and rainy seasons (18%, n = 3), the fracture was more common in cats during the summer (53%, n = 9) (Figure 1d).

Pre-operative clinical examination data on calves showed that metatarsal bone fractures predominated (42%, n = 41), followed by metacarpal bone fractures (24%, n = 22), femur fractures (12%, n=11), radius-ulna fractures (10%, n=10), humerus fractures (7%, n=7), and tibia-fibula fractures (5%, n=5). However, in cats, the femur (41%) and metatarsal (23%) were the most commonly affected, followed by the humerus and tibia fibula (12%) and the radius ulna and metacarpal bone (6%, n = 1) (Figure 2a).

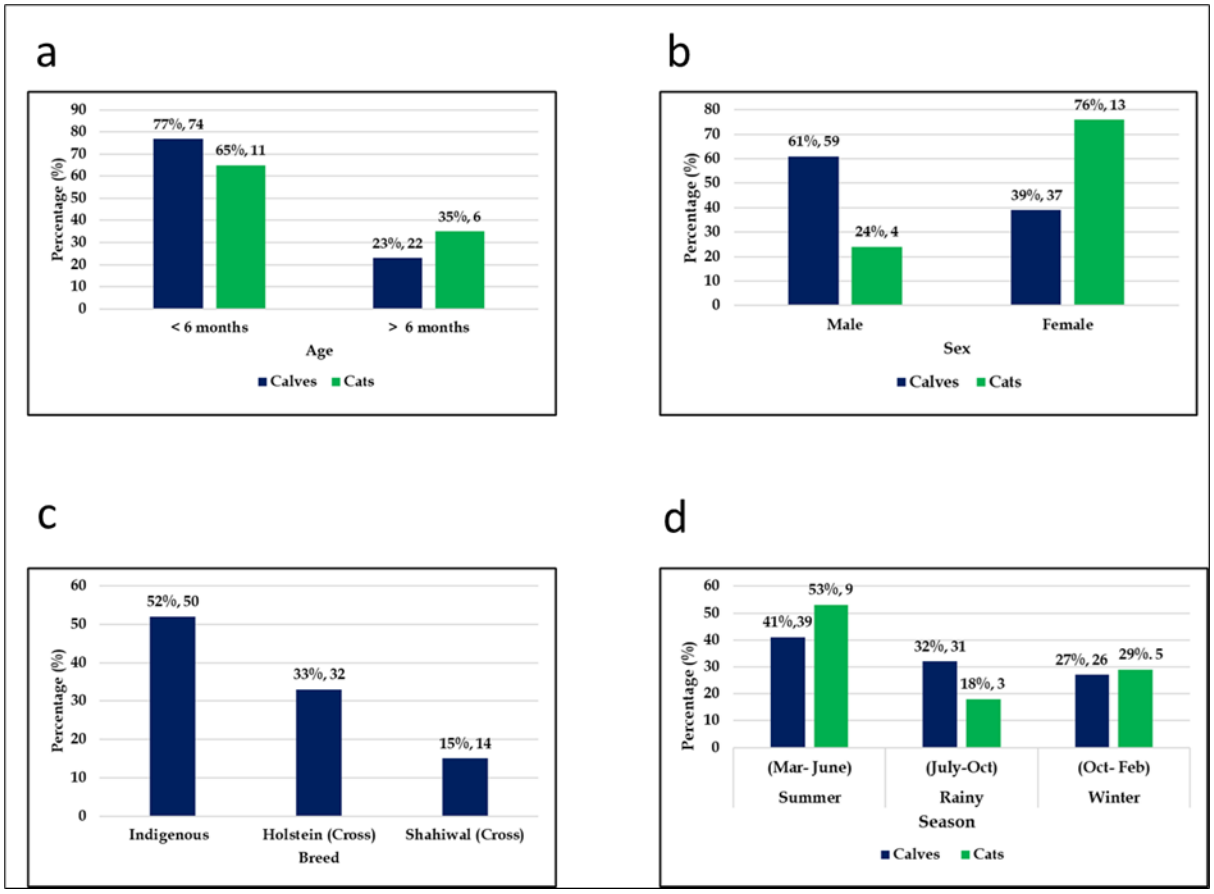

Figure 1 Incidence of long bone fracture in calves and cats. Based on the secondary data, percentages of fractures were distributed on the basis of (a) age, (b) sex, (c) breed, and (d) season

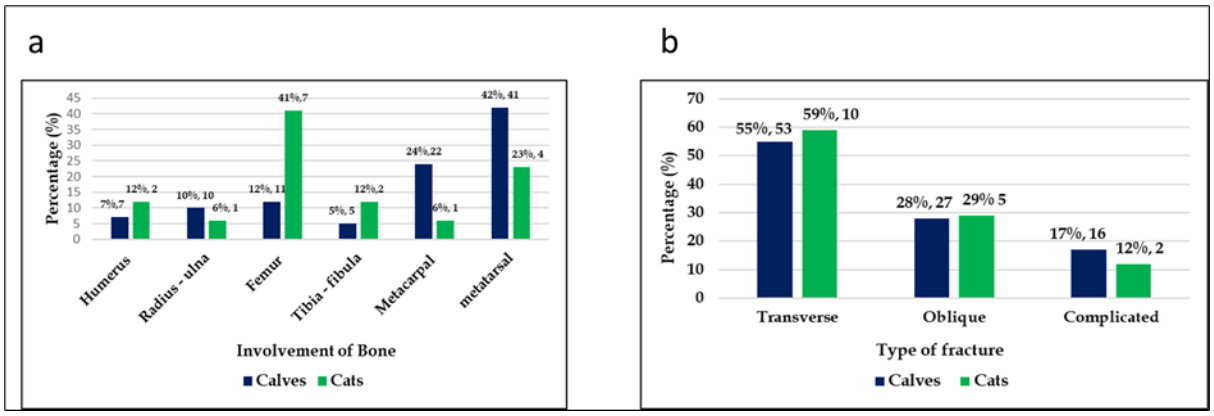

Figure 2 Distribution of fractures in calves and cats on the basis of (a) involvement of bones of fore or hind legs and (b) fracture types

Transverse fractures made up the majority of long bone fractures in both calves and cats (55%, n = 53) and (59%, n = 10), followed by oblique fractures (28%, n = 27), and (24%, n = 4), complicated fractures (17%, n=16), and (17%, n= 3), respectively (Figure 2b).

4. Discussion

In the present study, young (<6 months) calves and cats made up the majority of the population with long bone fractures. The reports of Mohiuddin et al. [9], Ali [3], who also reported a higher frequency of fractures in newborn calves and cats, concur with this finding. Young calves and cats tend to be energetic and playful, which may contribute to their decreased bone density and stiffness, or it may be a result of their immature skeletons [8].

The current study revealed that male calves (n = 59, 61%) had a higher frequency of fracture than female calves (n = 37, 39%). Additionally, it has been noted that male calves are more prone to fractures [10,11]. They may be more prone to car accidents and fractures because of their lively natural behavior and wandering behaviors. According to this study's findings, female cats had a higher incidence of fractures than male cats (n = 13, 76% vs. n = 4, 24%), which is in line with Jani et al. [11]. It can be the result of negligence or attacks by other animals.

In this study, indigenous or local breeds of bovine calves (52%, n = 50) and cats (100%, n = 17) had the highest frequency of long bone fractures. Prior research also revealed a higher frequency of fractures in local breeds [11,12]. Local breeds may experience the highest rate of fractures as a result of their excessive jumping and playing. This finding contradicts the findings of Raghunath et al. [13] Bishnoi et al. [14], who discovered a higher incidence in crossbred bovine calves.

In this study, compared to other seasons, the summer season had the highest frequency of fractures in calves (41%, n = 39) and cats (53%, n = 9). According to Mohiuddin et al. [9], summer and fall saw a larger percentage of fractures than winter and spring months, which is consistent with the results of this study. Due to the chilly weather and rain, many are reluctant to take their pets outside in the winter and rainy season, but in the summer, people frequently take their pets on walks, and fractures are more common during these times [15].

In the present study, 96 calves with long bone fractures were retrospectively documented, and it was discovered that the metatarsal (42%, n = 41) was fractured more frequently than other bones. Although Jani et al. [11] concur with this observation, Kushwaha et al. [6] disagree with it. Metatarsal fractures in calves are most frequently brought on by severe traction during birth, car accidents, unintentional falling or jumping, and abuse or beating [3]. According to this study, the femur bone in cats had the highest frequency of fractures (41%, n = 7) when compared to other bones. Similar results of a greater femur fracture incidence were reported by [13,16]. It's possible that eccentric loading of the femur during weight bearing and spastic muscle contractions are the main causes of femoral diaphyseal fractures [15].

Compared to the various types of fractures in this study, transverse fractures were more prevalent in calves (55%, n = 53) and cats (59%, n = 10). These results concur with the findings of [17,18]. Contrary to the results of this study, Minar et al. [15] reported a higher incidence of oblique fractures than other types of fractures. Oblique and transverse fractures are more common, which suggests that bending or compression forces are the main forces acting on the long bone [18].

5. Conclusion

Analysis of the data collected in this retrospective study at VTH, BAU, Mymensingh, it was determined that young (<6 months) indigenous male calves and cats are most likely to sustain long bone transverse forms of fractures, with a high incidence throughout the summer (March-June). Additionally, understanding the frequency of fractures in this region may assist researchers to develop preventative measures that will lower the incidence of fractures in calves and cats.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The authors declare no conflict of interest.

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