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Incidence of long bone fractures in dogs a retrospective study (2016-2021)

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Abstract
A 5-year retrospective study was conducted from 2016 to 2021 to determine the incidence of long bone fractures in dogs presented to the Department of Veterinary Surgery and Radiology, Veterinary College, Bidar. A total of 1834 dogs with surgical problems were presented, including 170 cases of long bone fractures. Femur fractures were found to be more common, followed by tibia-fibula, radius-ulna, and humerus. The primary factor leading to the fracture was automibile accident. Compared to other age groups, dogs aged 1-6 months had the highest incidence. Occurrence was higher in Non-descript breeds, followed by Labrador, German Shepherd and others. Transverse fractures were the most common, followed by oblique, spiral, multiple and comminuted fractures.

Keywords: Long bones, fracture, dog, incidence

Introduction
In dogs, fractures of long bones are a common orthopedic problem. Physiological and non-physiological forces are exerted on long bones. In exceptional situations such as car accidents, gunshot wounds and falls, un-physiological forces can occur. These forces can be transmitted directly to the bone and exceed the bone's ultimate strength, which can lead to a fracture (Jain *et al*., 2018) [9]. Among the long bones, the femur (37.00%) had the highest incidence of fractures in dogs, followed by the ulna (28.70%), tibia-fibia (20.0%), and humerus (7.90%). (Kallianpur *et al*., 2018) [10]. The most common direct cause of fractures in dogs was a automobile accident followed by a fall from a height (Aithal *et al*., 1999, Ozak *et al*., 2009, Minar *et al*., 2013 [15] and Kallianpur *et al*., 2018) [1, 16, 15, 10]. A retrospective study was conducted with the aim of identifying the prevalence, occurrence and classification of fractures in dogs.

Material and Methods
The dogs of different ages, breeds and sexes presented to the Department of Veterinary Surgery and Radiology of the Veterinary College in Bidar underwent a thorough clinical, orthopedic evaluation and radiological examination (Fossum, 2007 and DeCamp, 2016) [7, 5]. All available records and radiographs from 2016 to 2021 were reviewed and information on incidence and different types of fractures was tabulated.

Results and Discussion
A total of 1834 dogs with surgical problems were presented to the Veterinary Surgery Department of the Veterinary College in Bidar. Among all cases presented because of surgical problems, long bone fractures were diagnosed in 170 cases (9.26%). Compared to the front leg, the hind leg showed a higher incidence of long bone fractures. The femur (35.29%) has a higher incidence of fractures, followed by the tibia-fibula (26.47%), radius-ulna (23.52%), and humerus (14.70%). These results were similar to Aithal *et al*. (1999) [1], Beale (2004) [4], Kushawa *et al*. (2011) [14], Ali (2013) [2], Elzomor *et al*. (2014) [6], Jain *et al*. (2018) [9] and Kallanipur *et al*. (2018) [10] who reported the higher incidence of femoral fractures in dogs. In the current study automobile accident (47.05%) was major cause for fracture followed by fall from height (29.41%), hit injury (14.70%), dog bite (5.88%) and unknown reasons (2.94%). These findings were in accordance with Aithal *et al* (1999) [1], Rani *et al* (2004) [17], Ali (2013) [2], Minar *et al* (2013) [15], Jain *et al* (2018) [9] and Kallianpur *et al* (2018). Animals involved in automobile accidents were likely to be hit from behind, because their hindquarters might be

slow to react. This could be the reason for higher incidence of fracture in hind limbs. The animal might be aware of the impeding trauma and attempted to flee, putting their hind limbs at a risk of being hit with a significant amount of force (Harasen, 2003) [8].

Fractures were recorded in age groups from 1 month to 10 years. During the current observation period, dogs in the 1-6 month age group had the highest fracture incidence (47.05%), followed by 7-12 months (23.52%), 1-4 years (21.17%) and 4- 10 years (8.23%). These results were similar with Balagopalan *et al* (1995) [3], Aithal *et al* (1999) [1], Rao *et al* (1999) [22], Rani *et al* (2004) [17], Yanik *et al* (2005) [23], Kushwaha *et al* (2011) [14], Sran *et al* (2016) [21] and Jain *et al* (2018) [9] who reported a higher incidence of fracture in younger animals. This might be attributed due to fact that the young ones were more active and not learnt to cope up with hazards unlike their older counterparts as opined by Kolata *et al* (1974) [13]. Further, cortices of young dogs are comparatively thinner than the adult and not resist even minor trauma may result in easy fracture as opined by Schwarz (1991) [24] and Aithal *et al* (1999) [1].

The breed-based study found that fracture incidence was highest in Non-descript dogs (52.94%), followed by Labrador Retriever (23.52%), German Shepherd (11.76%), Pomeranian (5.88%), Doberman Pinscher (2.94%) and Spitz (2.94%). Similarly, Sran *et al.* (2016) [21] and Jain *et al.* (2018) [9] reported a higher fracture incidence in unspecified (43.90%) dog breeds, followed by German Shepherds (11.56%), Labrador (10.5%), and others. The higher incidence fractures in Non-descript dogs in the present study might be due to the higher population of these dogs in the area of study. Free living and straying nature of these dogs might make them more prone to automobile accidents (Aithal *et al*., 1999) [1].

The present study revealed that the male dogs (64.70%) are more prone to fracture in comparison to female dogs (35.30%) which was similar to previous findings as reported by Balagoplan *et al* (1995) [3], Kumar *et al* (2013) [25], Ali (2013) [2], Rhangani (2015) [18] and Jain *et al* (2018) [9] opined that males are more aggressive and tend to wonder more than females which make them more prone to fracture due to fall and accidents. More number of fracture cases reported in male dogs might be attributed with fact that, the people of the locality have more preference for male dogs under the study. Thus population of male dogs might be more in presentation.

The incidence of fractures based on the type of fracture revealed that transverse fractures (55.35%) were the most common, followed by oblique fractures (22.32%), spiral fractures (9.82%), comminuted fractures (9.82%) and Greenstick fractures (2.67%). collected data (Fig. 6). These findings were similar to Rani *et al.* (2004) [17], Sran *et al.* (2016) [21], Karve (2017) [11] who reported high occurrence of transverse fracture. Higher incidence of oblique/transverse fracture indicates that the predominance of bending or compression forces as the cause of fracture as opined by Smith (1985) [20]. Contrary to this reported by Balagopalan *et al.* (1995) [3], Aithal *et al.* (1999) [1], Sirin *et al.* (2013) [19], Rhangani (2015) [18], Jain *et al.* (2018) [9] and Keosengthong *et al* (2019) [12] who recorded highest incidence of oblique fractures.

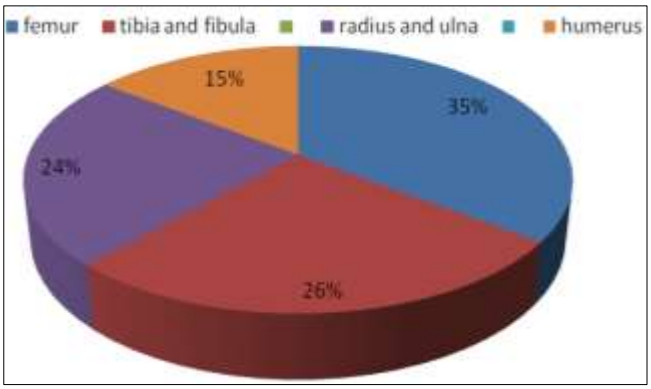

Fig 1: Incidence of fractures according to the bone involved

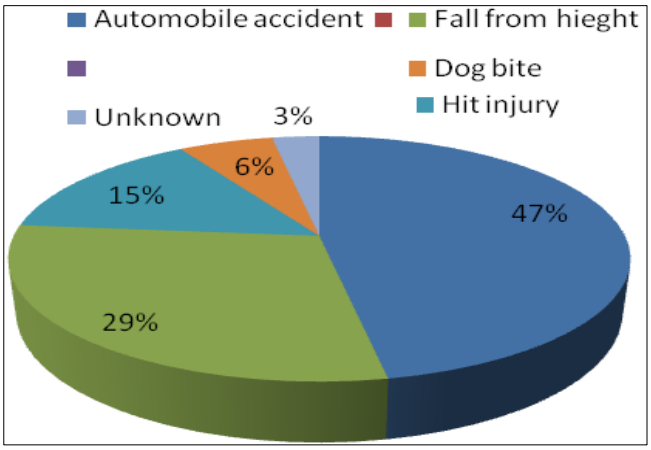

Fig 2: Etiology of fracture

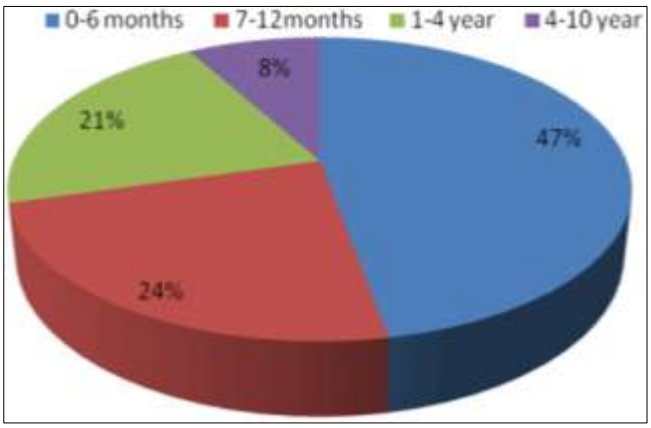

Fig 3: Incidence of fracture according to age

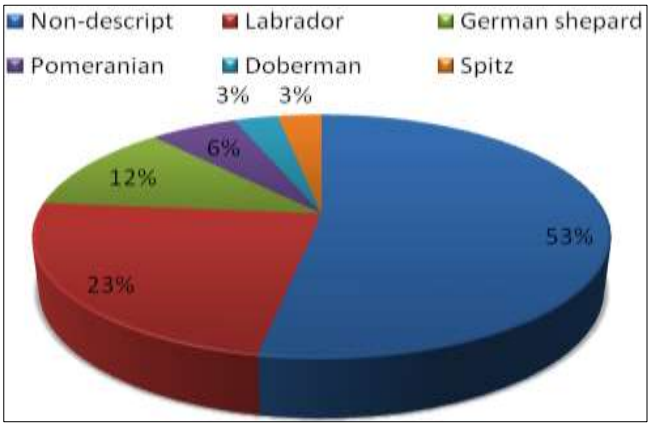

Fig 4: Incidence of fracture according to breed

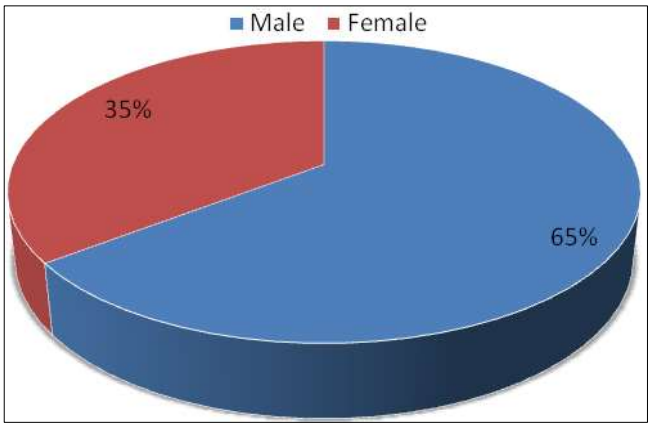

Fig 5: Incidence of fracture according to sex

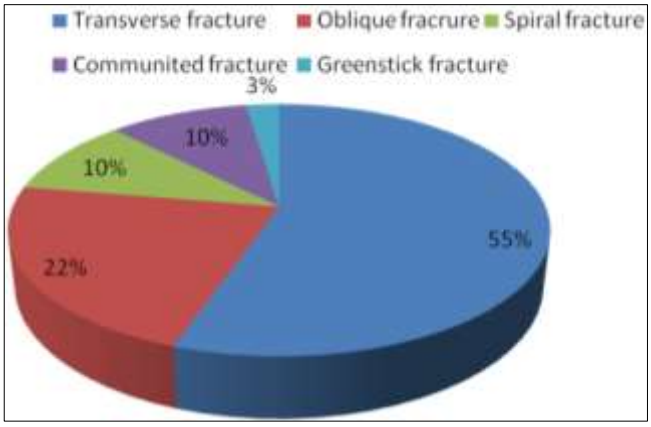

Fig 6: Incidence of fracture according to the type

Conclusion

Currently, it has been observed that the incidence of fractures were more common in male pups less than one year old, and Non-descript dogs were affected more often. The incidence of femur fracture was higher than that of other bones. Automobile accident was main cause of fracture. Transverse fractures were the most common.

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