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Incidence of long bone fracture in bovine

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Abstract

Fractures in dairy animals, especially cattle and buffaloes, are a major concern in large animal orthopedic practice, leading to significant economic losses. The present study was conducted at the Department of Veterinary Surgery and Radiology, Veterinary College and Research Institute, Namakkal, Tamil Nadu, from April 2024 to March 2025, to evaluate the occurrence and pattern of long bone fractures in bovines. Out of 8,844 large animal clinical cases, 1,877 (21.22%) were bovine, of which 89 (4.74%) were orthopaedic cases. Out of 89 orthopaedic cases in cattle, 80 (89.89%) were of long bone fractures. The highest incidence was recorded in Jersey crossbred cattle (67.5%), followed by non-descript breeds (23.75%) and buffaloes (3.75%). Most fractures occurred in animals below one year of age (56.25%) and were more common in females (73.75%). Metacarpal and metatarsal fractures predominated, mainly due to falls (50%) and vehicular accidents (28.75%). Open fractures were more frequent (61.25%) than closed ones. The findings highlight the need for improved preventive management and emphasize the efficacy of biological osteosynthesis in bovine fracture stabilization and recovery.

Keywords: Bovine, long bone fracture, epidemiology, metacarpus, metatarsus, biological osteosynthesis

Introduction

Fractures in dairy animals, particularly cattle and buffaloes, pose a significant challenge in large animal orthopaedic practice, resulting in considerable economic losses to farmers. These injuries commonly arise from self-inflicted trauma or external causes such as herd interactions or farm machinery accidents. The prognosis of fractures depends on factors such as severity, bone involved, anatomical location, and fracture type. Among appendicular fractures, those involving the metacarpus and metatarsus are most frequent, followed by tibia, radius-ulna, humerus, and femur. Conventional immobilization methods like casts and splints, though economical, often lead to complications such as pressure sores, muscle atrophy, and delayed healing. Transfixation pinning, a commonly adopted technique, is also associated with postoperative pin tract infections, particularly in bovines. Recent advancements emphasize biological osteosynthesis, a principle-based approach aimed at minimizing soft tissue damage, preserving vascular integrity, and promoting natural bone healing through minimally invasive fixation. This study was undertaken to evaluate and compare the occurrence and pattern of long bone fractures in cattle and buffaloes, with the objective to emphasize the treatment strategies and to improve the clinical outcomes.

Materials and Methods

The present study was carried out in the department of Veterinary surgery & Radiology Large Animal Surgery Unit, Veterinary Clinical Complex, Veterinary College and Research Institute - Namakkal, Tamil Nadu. The incidence of long bone fracture in bovine regarding to age, breed, gender and etiology were recorded during 12 months of study period, April 2024 to March 2025.

Two orthogonal radiographic views, namely antero-posterior and medio-lateral, were obtained for all six bovines to confirm the presence of fracture, determine the exact anatomical location, and identify the type of fracture.

Results

The total number of cases presented to Large Animal Surgery Unit, Veterinary Clinical Complex, Veterinary College and Research Institute - Namakkal during 12 months of study period (April 2024 to March 2025) were 8844. Out of these, bovine cases presented were 1877 (21.22%) (Table 1, Fig. 1). Among these bovine cases, the fracture cases in bovines were 89 (4.74%) (Table 1, Fig.2).

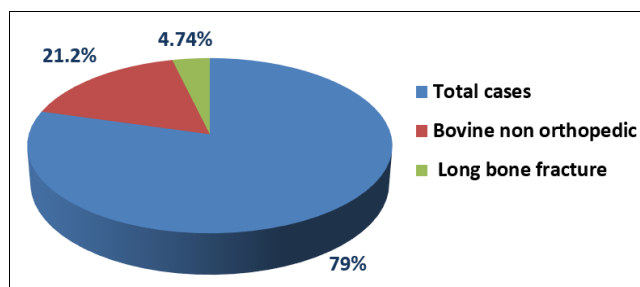


Fig 1: Incidence based on orthopaedic presentation

Breed wise occurrence of long bone fractures

Occurrence of long bone fractures was highest in Jersey cross breed (n=54, 67.5%) followed by non-descript (N/D) (n=19, 23.75%), Holstein Friesian cross (n=4, 4.49%) and Buffalo (n=3, 3.75%).

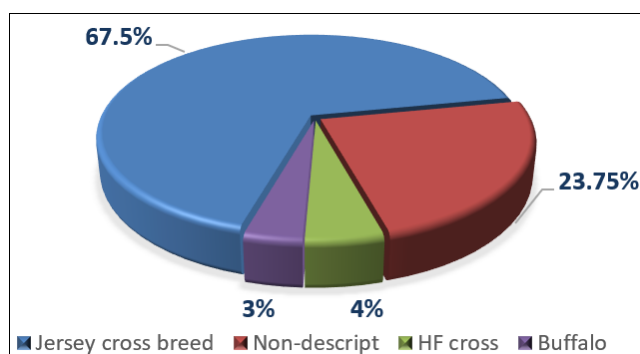


Fig 2: Breed-wise occurrence of long bone fracture in bovines

Age wise occurrence of long bone fractures

Highest occurrence of bovine long bone fractures was observed in less than one year age (n=45, 56.25%), in-between one to two year age (n=26, 32.5%) followed by more than two years of age (n=9, 11.25%).

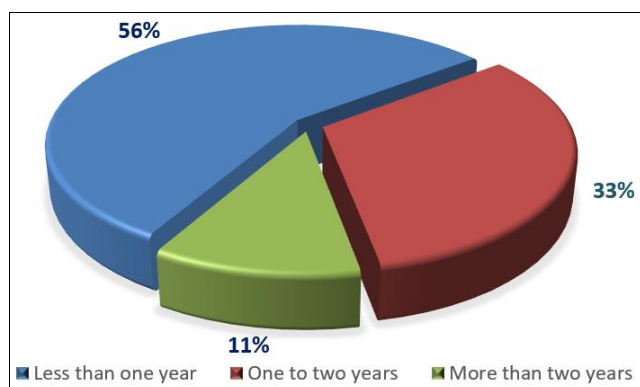


Fig 3: Age-wise occurrence of long bone fractures in bovines

Gender wise occurrence of long bone fractures

With regard to gender, among all the 80 long bone fracture cases presented occurrence was more in females (n=59, 73.75%) than in males (n=21, 26.25%).

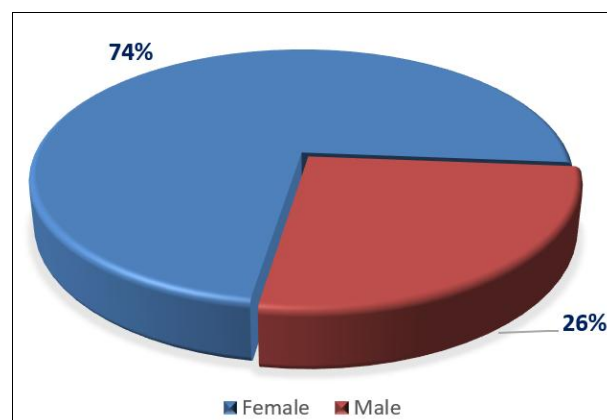


Fig 4: Gender wise occurrence of long bone fracture in bovines

Bone wise occurrence of long bone fractures

Among these bovine cases, the fracture cases in bovines were 89 (4.74%) (Table 1, Fig.2). Out of 89 fracture cases, 18 cases (20.22%) were metatarsal fractures, 23 cases (25.84%) were metacarpal fractures, 12 cases (13.48%) were tibia fractures, 11 cases (12.35%) were femur fractures, 9 cases were humerus (10.11%), 9 cases (10.11%) were hip dislocation and 7 cases (7.86%) was radius fracture (Fig. 3). The total number of long bone fracture were eighty.

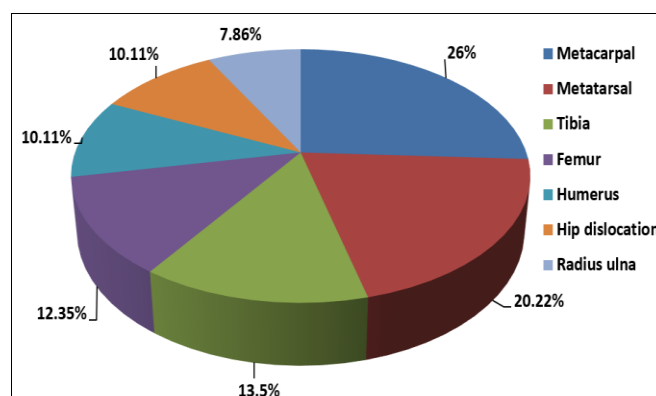


Fig 5: Occurrence of long bone fractures in bovine

Etiology of long bone fracture in bovines

The etiological assessment of long bone fractures in the selected bovines revealed that falling from the height while grazing were the predominant cause, accounting for 50% (n = 40) of the cases. This was followed by automobile accident associated traumatic fracture, which also contributed to 28.75% (n = 23) of the cases. Training associated accident 21.25% (n = 17) of the total fracture incidences.

Type of fracture

Out of the total 80 long bone fracture cases in bovine, open fracture cases were 61.25%(n=49) and closed fractures were 38.75%(n=31)

Animal presentation status

Out of the total 80 long bone fracture cases in bovine, standing cases were 72.50%(n=58) and recumbent cases were 27.50%(n=22).

Pregnancy status of animal

Out of the total 80 long bone fracture cases in bovine, non-pregnant animals were 68.75%(n=55) and pregnant animals were 31.25%(n=25).

Discussion

The present study provides an overview of the occurrence and pattern of long bone fractures in bovines presented to the Large Animal Surgery Unit, Veterinary College and Research Institute, Namakkal, during a one-year period (April 2024 - March 2025). The findings were analyzed and compared with previous reports to understand the influence of various epidemiological factors such as breed, age, gender, etiology, and anatomical distribution on fracture incidence.

The overall incidence of fractures among bovine cases presented to the hospital was 4.74%, which aligns with the findings of Thilagar *et al.* (2002) ^[1], who reported an incidence of 9.7% in cattle and 7.92% in goats, and Yadav *et al.* (2019b) ^[5], who recorded 103 fractures in large ruminants with a similar proportional distribution between open and closed fractures. The predominance of long bone fractures (89.89%) in the present study indicates that these bones are highly susceptible to trauma due to their weight-bearing function and exposure to external impact forces.

Breed-wise occurrence

The highest occurrence in Jersey crossbred cattle (67.5%), followed by non-descript breeds (23.75%), indicates a possible genetic or management-related predisposition. Crossbred cattle, being comparatively more active and managed intensively for milk production, may be more vulnerable to traumatic injuries. Similar trends have been observed by Velavan *et al.* (2014) ^[3], who suggested that managemental and behavioral factors contribute significantly to fracture incidence in dairy cattle. The relatively lower incidence in buffaloes (3.75%) supports the observation of Yadav *et al.* (2019a) ^[4] that cattle are approximately 1.5 times more susceptible to fractures than buffaloes. Buffaloes, being heavier and less active, are more prone to forelimb fractures, while cattle tend to sustain injuries to the hindlimbs.

Age-wise occurrence

The majority of fractures occurred in animals below one year of age (56.25%), followed by those aged 1-2 years (32.5%). Young calves are particularly predisposed due to their higher activity levels, immature skeletal structure, and weaker cortical bone. These findings are consistent with Tulleners (1996) ^[11], who reported that most metacarpal and metatarsal fractures occurred in animals below three years of age, with nearly 70% of affected animals being less than one year old. Similarly, Arican *et al.* (2014) ^[2] observed a higher incidence of fractures in young calves, particularly involving the metacarpal bone. Similar report also observed by Ramkumar (2024) ^[12].

Gender-wise occurrence

In the present study, female animals (73.75%) showed a higher incidence of fractures compared to males (26.25%). This may be attributed to the higher population of female animals in dairy herds, which are more frequently handled for milking, feeding, and movement, thereby increasing their risk of trauma. Contrarily, Singh *et al.* (1983) ^[10] reported a higher incidence in males, which may reflect regional differences in management practices and herd composition. Ramkumar (2024) ^[12] observed fracture were predominant in female calves than male calves.

Bone-wise occurrence

Among the long bone fractures, the metacarpal (25.84%) and metatarsal (20.22%) bones were most frequently affected,

followed by the tibia (13.48%), femur (12.35%), humerus (10.11%), and radius (7.86%). These findings are in close agreement with the observations of Tulleners (1996) ^[11] and Arican *et al.* (2014) ^[2], who reported metacarpal and metatarsal fractures as the most prevalent types in bovine. The higher frequency of fractures in the distal limb segments can be attributed to the minimal soft tissue coverage, direct exposure to trauma, and the concentration of mechanical stress in these regions.

The occurrence of hip dislocation (10.11%) in this study further highlights the susceptibility of large ruminants to pelvic limb injuries during falls or slips. Newman and Anderson (2006) similarly noted that fractures of the humerus and femur accounted for nearly 30% of bovine limb fractures, reinforcing that both distal and proximal bones are at risk depending on the nature of trauma.

Etiology of fractures

The most common cause of fracture in the present study was falling from height during grazing (50%), followed by automobile accidents (28.75%) and training-related trauma (21.25%). These findings corroborate earlier reports by Aithal and Singh (1999) ^[6] and Raghunath *et al.* (2007) ^[7], who also identified falls and road traffic accidents as leading causes of fractures in large animals. Kushwaha *et al.* (2011) ^[8] and Varalakshmi (2016) ^[9], Ramkumar (2024) ^[12] likewise emphasized falls and slips from height and vehicle collisions as the predominant etiological factors. The role of training-related injuries, particularly in bullocks used for events such as *jallikattu* and racing, is consistent with regional management practices.

Nature of fractures and clinical presentation

In the present study, open fractures (61.25%) were more prevalent than closed fractures (38.75%), which agrees with the findings of Yadav *et al.* (2019b) ^[5], who observed a higher proportion of open fractures in cattle due to the minimal soft tissue protection around the distal limb bones. The higher percentage of standing cases (72.5%) compared to recumbent animals (27.5%) suggests that early presentation and stable fracture configurations allowed partial weight-bearing.

Among the animals examined, non-pregnant females (68.75%) outnumbered pregnant ones (31.25%), which may reflect their greater mobility and handling frequency, thereby predisposing them to accidental trauma.

Conclusion

In summary, the present findings reaffirm that metacarpal and metatarsal fractures are the most common long bone injuries in bovine, particularly in young Jersey crossbred females, primarily caused by falls and vehicle accidents. The predominance of open fractures underlines the importance of timely surgical intervention and strict aseptic management to minimize complications. These results support the ongoing shift toward biological osteosynthesis and minimally invasive fixation techniques to promote faster recovery and better functional outcomes in bovine fracture management.

Conflict of Interest

Not available.

Financial Support

Not available.

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