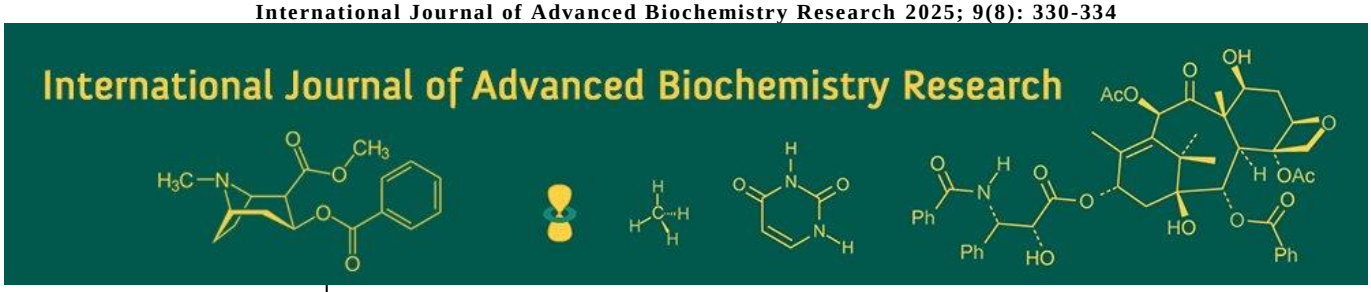

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Retrospective study on vertebral fractures in dogs

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Abstract
Vertebral fractures in dogs can lead to serious neurological damage and even death. These injuries are often the result of traumatic incidents or underlying health conditions. A study was conducted at the Veterinary Clinical Complex, Veterinary College, Bidar, covering the period from March 2023 to July 2025. The study focused on cases where vertebral fractures were confirmed using radiography, myelography and Computed Tomography (CT). Data collected included the dog's breed, age, sex, weight, the cause of injury, the location of the vertebral fracture, neurological status at presentation and the outcome. Out of 14,032 dogs examined during the study period, 2,091 were referred to the surgical department. Among these, 742 were orthopaedic cases and 1,349 were soft tissue cases of the 742 orthopaedic patients, 67 had conditions affecting the vertebral column. Vertebral fractures were diagnosed in 9.02% of these cases. The thoracolumbar region (T11-L2) and the lumbar spine (L3-L7) were the most frequently affected areas. Most fractures resulted from trauma, including road traffic accidents, dog attacks and falls. Younger dogs were more commonly affected. All cases exhibited neurological deficits and the severity of these deficits at the time of presentation had a significant impact on survival chances. Vertebral fractures in dogs are primarily trauma-related and their occurrence varies depending on the dog's breed size and the location of the injury along the spine. Early detection and careful assessment of neurological function are essential for predicting outcomes.

Keywords: Vertebrae, spine, fracture, dogs, essential, predicting outcomes

Introduction
The nervous system plays a vital role in enabling animals to perceive and respond to their environment. Any condition that disrupts the normal function of the central or peripheral nervous system can lead to a wide range of symptoms. These symptoms vary depending on the location and severity of the disorder and may range from mild signs such as behavioural changes, pain, weakness, and numbness to more severe manifestations like seizures, tremors, loss of coordination, paresis, or even paralysis of one or more limbs. Neurological disorders and spinal cord injuries are commonly seen in dogs. With the growing stray dog population in metropolitan areas, incidents of trauma, especially those caused by vehicle collisions becoming more frequent. The leading causes of such trauma include road traffic accidents, falls from heights, animal attacks and occasionally gunshot injuries (Bagley *et al*., 2000) [2]. Spinal fractures and dislocations can be classified based on the mechanical forces that cause them. For example, compressive forces between vertebrae may lead to vertebral body compression fractures, resulting in a reduction in vertebral height without significant displacement. Fracture lines may run transversely through the vertebral body (indicative of compressive failure) or may be oblique, reflecting a shear-type failure Downes *et al*. (2009) [5]. Posterior paresis or hind limb weakness in dogs requires a structured approach. This includes collecting a thorough history, considering signalment, conducting physical and neurological examinations and identifying the location of the lesion. The diagnostic process continues with differential diagnosis and developing a diagnostic plan that involves the use of specific supplementary tests. Proficiency in performing and interpreting neurological assessments is crucial for accurate lesion localization and successful diagnosis Downes *et al*. (2009) [5]. Traditionally, plain radiography and myelography have been the primary tools used to detect spinal cord conditions. However, with advancements in imaging technologies like Computed Tomography (CT) and magnetic resonance imaging (MRI), identifying spinal disorders and pinpointing lesions has become significantly easier and more precise.

Despite these advancements, there is a lack of comprehensive studies in India that investigate the prevalence, diagnosis and treatment (both medical and surgical) of spinal disorders in dogs. Moreover, many veterinary hospitals and even academic institutions lack the infrastructure and expertise to perform complex spinal surgeries. Myelography and spinal surgical procedures require specialized training, equipment, and instrumentation, which are not widely available. As a result, there is a pressing need to develop and simplify diagnostic and surgical techniques for managing spinal conditions in dogs, making them more accessible to veterinary teaching hospitals across the country.

Materials and Methods

Between March 2023 to July 2025, a retrospective study was conducted focusing specifically on canine vertebral fracture cases. From a total of 14,032 dogs examined during this period, 742 were identified with various types of fractures. Among these, 67 dogs were confirmed to have sustained vertebral fractures and were selected for detailed evaluation. Each of the 67 cases underwent thorough orthopaedic and neurological examinations to assess the extent of injury and any associated neurological deficits. Diagnostic imaging, including plain radiography, myelography, and computed tomography (CT), was performed in all cases. These imaging techniques were used to accurately determine the location of the fractures, the specific vertebrae affected and the severity of spinal involvement. The medical records of each animal were carefully reviewed to collect relevant clinical and demographic information. This included details such as breed, sex, age and the suspected cause of the vertebral fracture. Common causes considered included trauma from vehicle accidents, falls and animal bites. The collected data were systematically analyzed and the results were expressed in percentages to identify trends and prevalence. This study aimed to provide a better understanding of the patterns of vertebral fractures in dogs, their clinical presentation and the diagnostic process, thereby supporting improved treatment planning and preventive strategies.

Results and Discussion

Distribution of breeds

Table 1 and Figure 1 illustrate the breed-wise distribution of the 67 dogs diagnosed with vertebral fractures out of a total of 742 fracture cases. Overall incidence of 9.02% for vertebral fractures among dogs presenting with orthopaedic injuries. A total of seven distinct breeds were identified among the affected dogs. The majority of cases involved Mongrel dogs, which accounted for 67.16% of the total (N=45). This high representation is likely due to the large stray dog population, particularly in urban areas, where these animals are more frequently exposed to trauma, such as a vehicular accident observed by Vani (2010). Golden Retrievers were the second most affected breed, comprising 11.94% (N=8) of the cases, followed by Labradors at 8.95% (N=6). German Shepherds represented 4.47% (N=3) of the cases, while Dobermans made up 2.98% (N=2). A single Dachshund (1.49%) was also recorded with a vertebral fracture.

Table 1: The distribution of breeds

Breed	Number	Percentage (%)
Mongrel	45	67.16
Golden retriever	08	11.94
Labrador	06	8.95
German shepherd	03	4.47
Pomeranian	02	2.98
Doberman	02	2.98
Dachshund	01	1.49
Total	67	100%

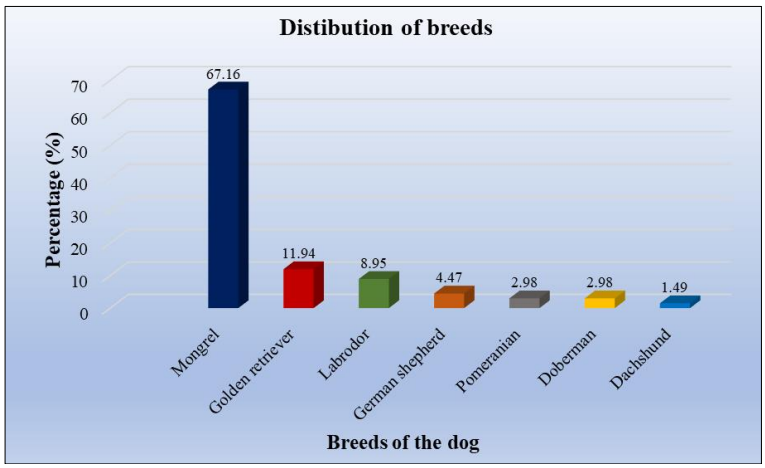

Fig 1: The distribution of breeds

Age distribution

Figure 2 illustrates the age-wise distribution of vertebral fractures among the 67 affected dogs. The data clearly show that younger dogs were more prone to sustaining vertebral fractures. The highest incidence was observed in the age group of 3 to 6 months, which accounted for 43.28% of the cases. This was followed by puppies younger than 3 months, comprising 31.34% of the cases. Dogs aged between 6

months and 1 year made up 16.41%, while adult dogs over 1 year of age represented the smallest group, at just 8.95%. The findings highlight a significant predisposition of vertebral fractures in juvenile dogs. This increased vulnerability in younger age groups may be attributed to factors such as incomplete skeletal development, greater physical activity and lack of coordination. Additionally, young puppies, especially those in urban or stray environments, are more likely to encounter accidents due to their inquisitive behaviour and reduced supervision, a trend consistent with previous studies Aithal *et al.* (1999) [1] reported that younger dogs, aged less than one year were more frequently affected than adults which may be due to more activity and have not learnt to cope with hazards unlike adults.

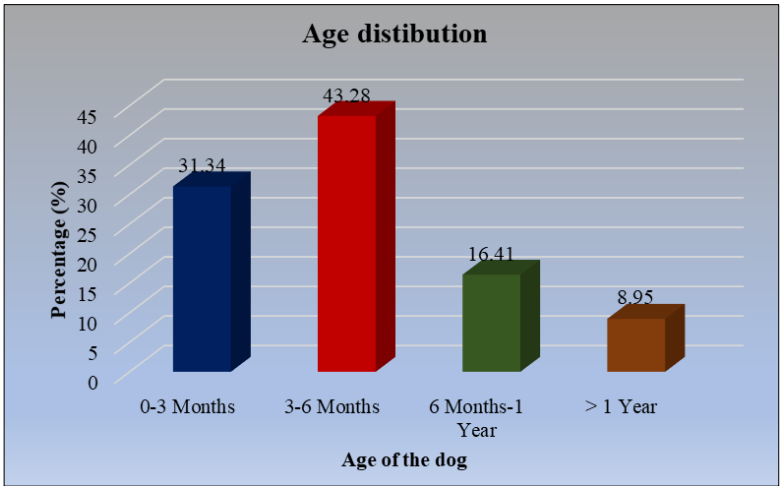

Fig 2: Age distribution

Gender distribution

Figure 3 presents the distribution of vertebral fracture cases based on gender. Out of the 67 dogs diagnosed with vertebral fractures, 35 were males (52.23%) and 32 were females (47.76%). The data indicate a slightly higher incidence of vertebral fractures in male dogs compared to females. Aithal *et al.* (1999) [1] also reported a higher incidence of fractures in males than in females, attributed to their greater aggressiveness and tendency to wander more, making them more vulnerable to fractures than females. Chandy (2006) [4], Nagaraja (2007) [6] also made similar observations. However, the difference between the sexes was relatively small, suggesting that both male and female dogs are nearly equally susceptible to spinal injuries under similar conditions.

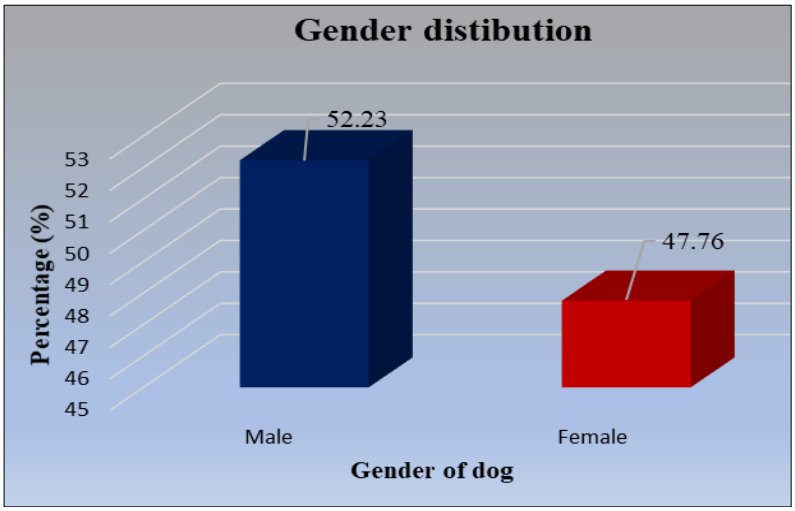

Fig 3: Gender distribution

Cause of fracture

Figure 4 illustrates the various causes of vertebral fractures observed in the 67 dogs included in the study. The most common cause identified was road traffic accidents responsible for 27 cases (40.29%). These injuries often occurred in urban areas with dense vehicle movement and minimal control over stray animals. Carberry *et al.* (1989) [3] reported 88.24% of spinal injuries in dogs and cats following automobile accidents. Chandy (2006) [4] reported 58.82% of spinal trauma in dogs and cats by automobile accidents. Nagaraja (2007) [6] reported 36.92% of spinal injuries in dogs due to automobile accidents. dog bite injuries, were the second most frequent cause, accounting for 18 cases (26.86%). This high incidence may be linked to territorial aggression or pack-related conflicts, particularly in stray or free-roaming dog populations. Falls from height were reported in 12 cases (17.91%), typically involving young, active dogs or those in multi-story housing

environments with open balconies or stairs. Human-inflicted trauma, categorised as abuse, was identified in 6 cases (8.95%). Though less common, such cases raise serious animal welfare concerns and highlight the need for public education and stricter enforcement of animal protection laws. In 4 cases (5.97%), the exact cause of trauma could not be determined due to lack of history or absence of witnesses.

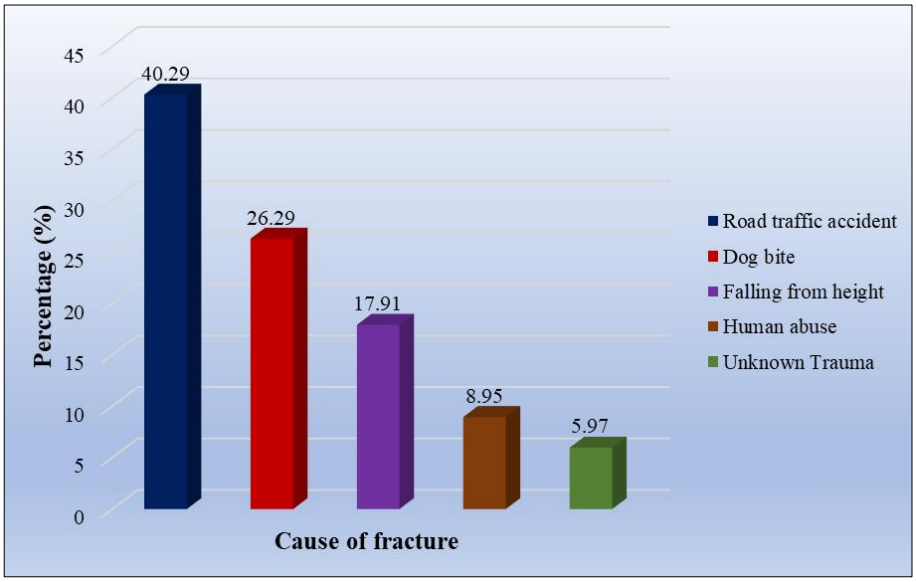

Fig 4: Cause of fracture

Location of fracture

Most vertebral fractures were related to the lumbar vertebrae (N=36, 53.73%), followed by thoracic vertebral fracture (N=30, 44.77%) and cervical fracture (N=1, 1.49%). No sacrum fracture was seen throughout the study (Figure 5).

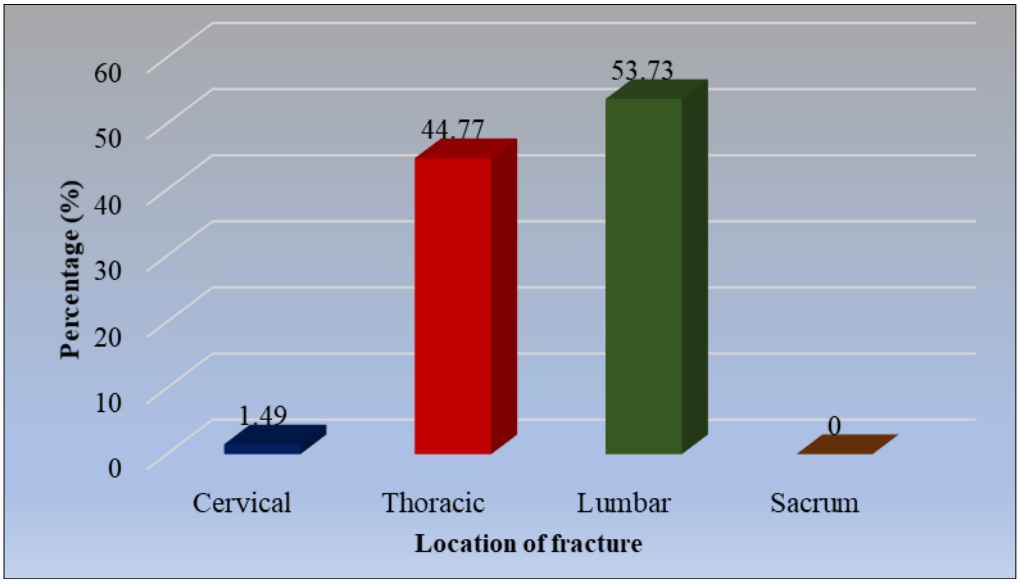

Fig 5: Location of fracture

Conclusion

Vertebral fractures in dogs represent a critical clinical challenge, primarily driven by traumatic events. A deeper understanding of fracture patterns, age and breed susceptibility and the neurological consequences of such injuries is vital for timely diagnosis, effective treatment planning, and improved patient outcomes. Moreover, these insights can aid in formulating preventive strategies, such as better urban animal control, early intervention for young dogs at risk and increased public awareness to reduce avoidable trauma.

Acknowledgement

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