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Retrospective study on incidence of avian long bone fractures

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A retrospective study was conducted from February 2019 to January 2024 to assess the incidence and pattern of fractures in avian species presented to the Veterinary Clinical Complex and the School of Wildlife Forensic and Health, Jabalpur. Data were analysed based on bird species, affected limbs, fractured bones, and anatomical locations. Of all animal fracture cases recorded, avian fractures accounted for 9.01%. Among birds, hind limb fractures were most common (50.56%), followed by wing fractures (34.83%) and fractures of other body regions (14.61%). The tibio-tarsus was the most frequently fractured bone (31.46%), and psittacines represented the most affected avian order (26.35%). Wild birds exhibited a higher fracture incidence (60.48%) compared to domestic birds. The overall results indicate that increased urbanization, habitat loss, and human-related injuries contribute significantly to avian fracture patterns in this region. This study highlights the need for improved preventive measures and timely veterinary intervention to mitigate fracture prevalence in avian populations.

Keywords: *Avian fractures, Fracture incidence*

The avian skeletal system is significantly lighter than that of mammals. A considerable proportion of avian bones are pneumatic and connect to the respiratory system, reducing overall weight to facilitate flight. Unlike mammalian bones, avian bones lack a well-developed Haversian system, and their medullary cavities are reinforced with bony struts that contribute to structural strength (Tully, 2002). Due to limited soft-tissue protection—particularly in the distal limbs, where only tendons and skin surround the bones—avian bones are more prone to shattering upon impact (Bennet and Kuzma, 1992). Their high calcium content further increases brittleness, making fractures more likely (Goody et al., 2012).

This retrospective study was conducted using cases recorded at the Department of Veterinary Surgery and Radiology, Veterinary Clinical Complex (VCC), College of Veterinary Science and Animal Husbandry, Nanaji Deshmukh Veterinary Science University, Jabalpur, and the School of Wildlife Forensic and Health (SWFH), Jabalpur, from February 2019 to January 2024. Data were compiled by categorizing bird species, fractured limbs, affected bones, and fracture locations (Figs. 1-6). The compiled data were analysed and expressed as percentages.

Among all animal fractures documented during the study period, the highest incidence was recorded in canines (41.77%), followed by caprines (24.72%), other species (17.43%), and avian species (9.01%). Within avian cases, hind limb fractures were most common, accounting for 90 of the 178 fractures (50.56%). Wing fractures constituted 34.83% (62/178), while fractures in other body regions represented 14.61% (26/178). The tibio-tarsus was the most frequently affected long bone, comprising 31.46% (56/178) of avian fractures, followed by the radius-ulna complex at 21.35% (38/178). The tarso-metatarsus was the least commonly affected long bone, with an incidence of 8.99% (Table 1; Fig. 7).

Fig.1: Right tibio-tarsus fracture in a domestic turkey bird.

Fig. 2: Left ulnar fracture in a blue rock pigeon.

Fig.3: Right tibio-tarsus closed fracture in a domestic turkey bird.

Fig.4: Left humerus fracture in an Indian roller bird.

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Fig. 5: Right radius-ulna open fracture in a shikra.

Fig.6: Right tibio-tarsus closed fracture in a domestic turkey bird.

Table 1: Occurrence of specific bone fracture in birds.

Sl. No.	Bone involved	No. of fractures in birds	Percent (%)
1	Tibio-tarsus	56	31.46
2	Radius-ulna	38	21.35
3	Humerus	24	13.48
4	Femur	18	10.11
5	Tarso-metatarsus	16	8.99
6	Others	26	14.61
	Total	178	

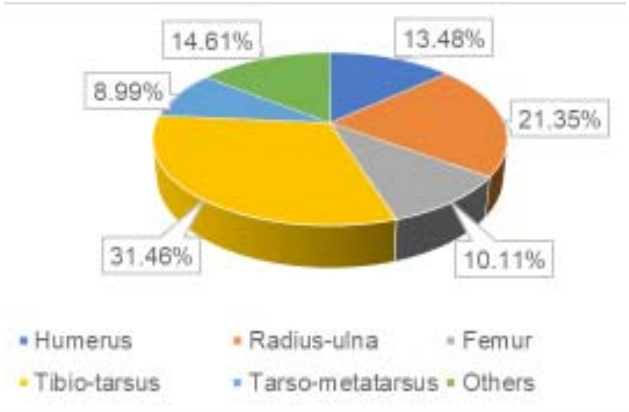

Fig. 7: Number of specific bone fracture in birds.

Table 2: Distribution of fracture according to broad classification in birds.

Sl. No.	Avian class	Number of fracture cases	Percent (%)
1	Psittacine	44	26.35
2	Columbiformes	39	23.35
3	Raptors	31	18.56
4	Water birds	21	12.57
5	Galliformes	17	10.18
6	Others	15	08.98
	Total	167	

When categorized by avian order, psittacines had the highest fracture incidence - 44 of 167 birds (26.35%)—followed by columbiformes (23.35%), raptors (18.56%), water birds (12.57%), galliformes (10.18%), and other avian species (8.98%) (Table 2; Fig. 8). Wild birds (101/167; 60.48%) showed a markedly higher fracture prevalence compared to domestic birds (39.52%).

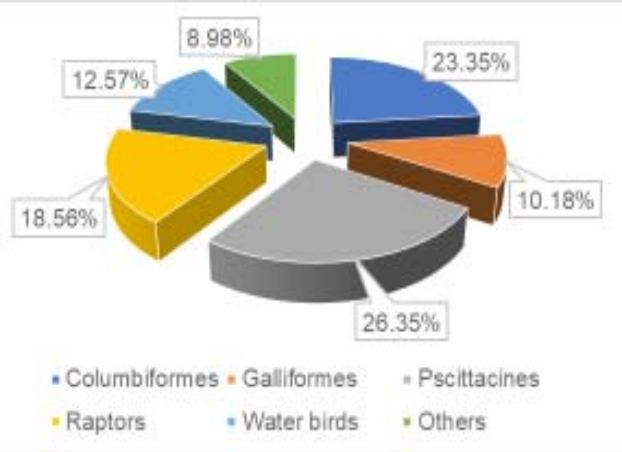

Fig.8: Distribution of fracture according to broad classification in birds.

Singh et al. (2015, 2017) reported fracture incidences of 0.95% and 1.27%, respectively, while Pramod et al. (2021) documented a 2.26% incidence and Kumar et al. (2023) reported 1.18% in animals. The comparatively higher incidence observed in the present study may be attributed to the predominantly urban location of case registration. Pramod et al. (2021) reported a 16.25% fracture incidence in birds, consistent with the relatively high avian fracture incidence observed here. This trend may relate to increased urbanization, habitat loss, migration-related stress, and human-induced injuries.

The species-wise distribution of fractures observed in this study corresponds with findings by Singh et al. (2018), who documented the highest incidence in canines (54.34%), followed by caprines (36.13%), bovines (8.13%), and other species (1.40%). Similar results were reported by Pramod et al. (2021), with fractures mainly in canines (43.26%), avians (24.65%), other species (12.09%), and bovines (11.16%). Kumar et al. (2023) also observed a higher incidence in canines (61.31%) and a lower incidence in avians (2.92%). The predominance of canine fractures likely reflects their larger population in urban areas.

In birds, the present study revealed a higher incidence of hind limb fractures compared to wing fractures. However, Kothamdi (2014) and Patel (2018) reported significantly higher wing fracture rates (75.87% and 60%, respectively), presumably linked to the timing of their studies during the kite-flying festival, when bird collisions are more common. In contrast, Pramod et al. (2021) and Sindhu et al. (2023) found higher hind limb fracture rates, consistent with the current findings. Sindhu et al. (2023) reported 64.04% pelvic limb and 35.96% wing fractures.

The tibio-tarsus was the most commonly fractured bone in this study, aligning with previous research

citing its high vulnerability due to reduced muscular protection and frequent exposure to traumatic forces (Arias et al., 2015). Radius-ulna fractures were the next most common. Pramod et al. (2021) similarly recorded the tibiotarsus as the most affected bone (58.33%), followed by the radius-ulna, ulna, and humerus. Sindhu et al. (2023) also documented the highest fracture frequency in the tibiotarsal region (43.82%), followed by the radius-ulna (16.85%), humerus (13.48%), femur (13.48%), tarsometatarsus (6.74%), and carpometacarpus (5.62%). The higher susceptibility of the tibio-tarsus and radius-ulna may be explained by limited muscle protection compared with the femur and humerus.

Fracture distribution across avian orders varies widely among studies. Wright et al. (2018) reported 86% of fractures in psittaciformes, followed by passeriformes (10%) and columbiformes (3%). In contrast, Patel (2018) found the highest incidence in raptors (38.88%), followed by water birds (27.77%), galliformes (16.66%), psittacines (11.11%), and columbiformes (5.55%). Such variation is likely influenced by differences in study location, season, and species encountered. Sindhu et al. (2023) reported fracture distributions of 40.45% in psittaciformes, 31.46% in galliformes, 19.10% in columbiformes, and 8.99% among other avian orders.

In the present retrospective study, wild birds exhibited a higher fracture incidence than domestic birds. This may be attributed to increased risks associated with habitat loss, migration, predation pressure, and anthropogenic trauma. Domestic birds, by contrast, benefit from greater environmental stability, controlled management, and reduced exposure to hazards.

The findings suggest that rising urbanization, habitat degradation, and human-associated trauma are major contributors to the observed fracture patterns in avian species within this region. These results underscore the importance of implementing effective preventive strategies and ensuring prompt veterinary care to reduce the incidence and impact of fractures in bird populations.

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