



Original Contribution

**LONG BONE FRACTURES IN CATS: A FIVE-YEAR
RETROSPECTIVE STUDY (2016-2020)**

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ABSTRACT

PURPOSE: The aim of this study was to investigate the prevalence of long bone fractures among cats, presented at the Small Animal Clinic, Faculty of Veterinary Medicine, Trakia University, a center that attracts cases from all over Bulgaria, and to analyze their seasonal, breed-, sex- and age-related distribution.

METHODS: The study cohort comprised 267 cats with long bone fractures. All patients were analyzed retrospectively for a period of five years (2016 to 2020). Data about cat signalment (breed, sex, age, body weight) and fractured bone were evaluated.

RESULTS: The cases with fractured femur were statistically significantly ($p=0.0001$) more prevalent ($n=139$; 52.06%) than those of all other affected long bones. Long bone fracture tended to occur most commonly in male (54.68%), than female (45.32%) cats. Statistically significantly ($p<0.0001$) younger cats (65.54%) were presented with long bone fractures than adult animals (34.46%). In 71.54% of the cases the body weight was 2 – 4 kg, in 14.61% - 4 - 6 kg, in 12.36% under 2 kg and in 1.49 % over 6 kg.

CONCLUSION: In general, young male cats with body weight more than 2 kg were mainly affected. Most commonly encountered fractures were those of the femur, followed in descending order by fractures of the tibia, radius/ulna and humerus.

Key words: long bone, fracture, cats, retrospective study

INTRODUCTION

The constantly increasing number of small animals is responsible for the relatively high occurrence of orthopedic diseases (1-3). Bone fractures in cats comprise 1.1% of all clinical cases in practice (4). Most of them refer to fractures of long bones of the hind legs. The femur is the most commonly affected – femoral fractures are 20-25% of all fractures seen in cats (5-7).

Fractures result from extreme-force impact, e.g. compression, bending, twisting, and pulling (8-9). In cats, the main causes are traffic accidents

and falls from height due to the so called “high-rise syndrome” (10-12). Those associated with primary bone tumors are very rarely observed (13).

The aim of this study was to investigate the prevalence of long bone fractures among cats, presented at the Small Animal Clinic, Faculty of Veterinary Medicine, Trakia University, a center that attracts cases from all over Bulgaria, and to analyze their seasonal, breed-, sex- and age-related distribution.

MATERIAL AND METHODS

Data from 4066 cats, all patients of the Small Animal Clinic at the Faculty of Veterinary Medicine, Trakia University, Stara Zagora, Bulgaria, were analyzed retrospectively for a period of five years (2016 to 2020). Out of them, 2837 were treated at the Surgery ward. The study cohort comprised 496 cats with fractures

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admitted for orthopedic and radiological examination; 267 of them were subsequently diagnosed with long bone fractures. Data about cat signalment (breed, sex, age, body weight) and fractured bone were evaluated. According to the age, the patients were divided into two categories – young (<18 months of age) and skeletally mature (>18 months of age). Four weight groups were presented: less than 2 kg; 2 – 4 kg; 4 – 6 kg and over 6 kg. The distribution of referred patients in different months of the year and according to the seasons: spring (March, April, May), summer (June, July, August), autumn (September, October, November) and winter (December, January, February) was also analyzed.

The z-test for two independent proportions was used to compare the differences among the

prevalence of cats with long bone fractures in the different groups.

RESULTS

Bone fractures in cats present 17,4% of all surgical conditions in this species. The three bones most commonly affected are long bones, pelvic bones and mandible. In 70.41% of all cases, the hind limb was affected vs 29.59% of fractured forelimb bones ($p<0.0001$). The cases with fractured femur were statistically significantly ($p=0.0001$) more prevalent ($n=139$; 52.06%) than those of all other affected long bones: tibia/fibula ($n=49$; 18.35%), radius/ulna ($n=40$; 14.98%) and humerus ($n=39$; 14.61%) (**Figure 1**).

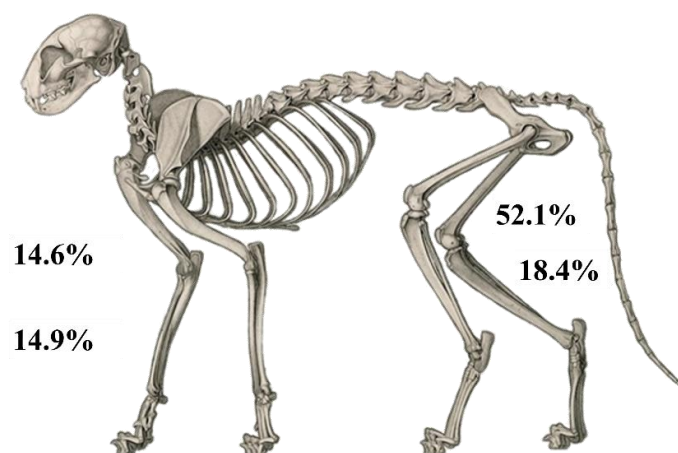


Figure 1. Long bone fracture incidence in cats.

Seasonal distribution

The monthly distribution of long bone fractures in studied years is presented in **Figure 2**. The majority of long bone fractures were registered during the summer months (June, July, August: $n=105$), followed by autumn (September, October, November: $n=73$), spring (March, April, May: $n=50$) and winter period (December, January, February) with 39 cases. The incidence of long bone fractures during the summer months exceeded significantly those in spring ($p=0.018$) and winter ($p=0.009$).

Sex distribution

According to the present survey, long bone fracture tended to occur most commonly in male

($n=146$; 54.68%), than female ($n=121$; 45.32%) cats.

Breed distribution

The cat population evaluated in this study was constituted mainly of European shorthair cats ($n=253$; 94.76%), followed by Angora cats ($n=7$; 2.62%), Persian ($n=3$; 1.12%) and Britain shorthair ($n=2$; 0.75%) breeds. The study cohort included also one Russian blue cat and one sphynx.

Age

The age of the cats included in this study ranged from 1 month to 14 years. Statistically significantly ($p<0.0001$) younger cats < 18 months of age (65.54%) were presented with long bone fractures than adult animals (> 18 months of age; 34.46%).

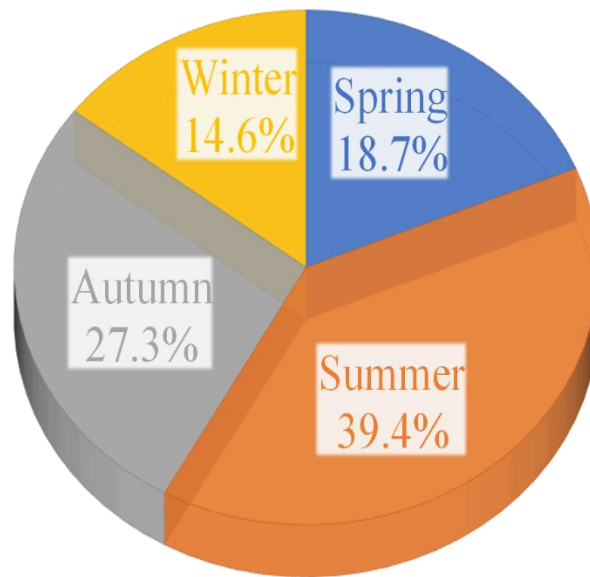


Figure 2. Seasonal distribution of long bone fractures in cats.

Body weight distribution
The body weight of the cats ranged from 0.1 kg to 10 kg. In 71.54% of the cases the body weight

was 2 – 4 kg, in 14.61% - 4 - 6 kg, in 12.36% under 2 kg and in 1.49 % over 6 kg (**Figure 3**).

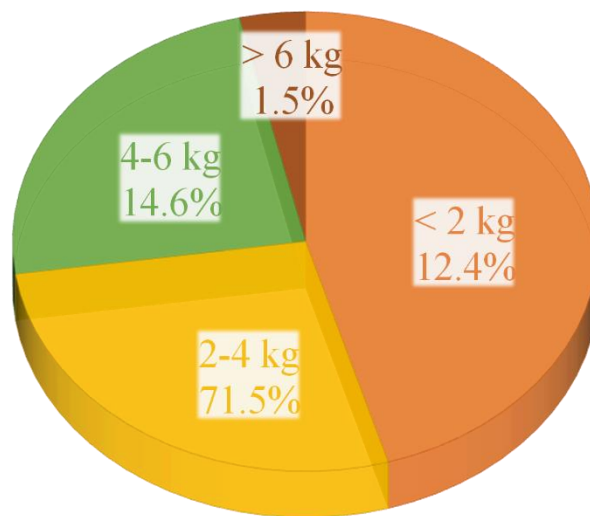


Figure 3. Long bone fracture distribution according to the weight.

DISCUSSION

In the current study, cats with fractures were 12.2% of all feline patients admitted at the Small Animal Clinic at Faculty of Veterinary Medicine, Trakia University, Bulgaria. This is a significantly higher percentage than the rate (1.37%) reported by Das et al., 2020 (14). With respect to the surgical cases in our practice, the

incidence of fractures in cats was 17.48%, a comparable percentage to those of Muhammad et al., 2021 (15) - 18.23%, and Ben-Ali, 2013 (3) - 23%.

Depending on the season, most long bone fractures occurred during the summer (June, July, August) and autumn (September, October, November) months, which coincided with the

breeding season of cats. During the same period of the year, newborns are gradually becoming active, still learning to protect themselves from the surrounding world and are therefore susceptible to all kinds of injuries, including fractures.

The majority of studies revealed a predominant prevalence of pelvic limb fractures. Ben-Ali, 2013 (3) found out that 59.8% of fractures affected the pelvic limb, which was confirmed by our results (70.41%). In a more recent survey (16), this percentage was even higher (79.89%), and according to Harasen, 2009 (13) it reached 87%. The probable reason was that in car accidents, cats are injured at the moment they cross the street and protection of the caudal part of the body is impossible. In addition, traumatic injuries resulting in a fracture in the cranial body part would lead to head or chest trauma, which in most cases are fatal (17).

Among long bone fractures in cats, those of the femur fractures were the most common. Ben-Ali, 2013 documented that these cases comprised 25% of all fractures in this animal species (3). Out of all recorded pelvic limb fractures in cats, the proportion of femoral fractures increased to 73.94%, which is similar to the date of Paskalev et al., 1998 (18) (77.41%) and significantly exceeding the results reported by Elzomor et al., 2014 (19) (59.80%) and Cardoso et al., 2016 (16) (63.64%). Contrary to the expectations that the femur is surrounded from all sides by muscles, excessive impact of the forces and the body weight load make it susceptible to fractures.

Although the values in both sexes are insignificantly different, fractures of long bones tended to occur more often in males. Aithal et al., 1999 believe that the main reason is that male cats are more aggressive, tend to fight with other males, which leads to more injuries (20). According to Singh et al., 2015, owners prefer keeping a male cat as a pet, which inevitably leads to an increase in their population and thus, to a higher relative proportion of fractures (21). According to the breed, 94.75% of fracture cases were in European shorthair cats, followed by Angora and Persian cats. Cardoso et al., 2016 reported the highest frequency of 90.07% in

crossbred, followed by 6.38% in Siamese and 3.55% in Persian cats (16). The predominance of one or another breed is related to socio-economic factors and the preferences of the owners.

Regarding the age, the majority of cases occurred in adolescent animals, which could be attributed to their higher activity, lack of experience, so they become more often victims of dangers of various kinds (20, 22).

The results of the study showed that 73.41% of cats with long bone fractures weighed more than 2 kg. Our data were confirmed by Cardoso et al., 2016, who found that 68.08% of cats weighed 2 kg or more (16). The differences in weight could be explained by the breed characteristics and nutrition of the individuals included in the study.

CONCLUSION

The highest incidence of long bone fractures in cats was observed during the summer months of the year. In general, young male cats with a body weight of more than 2 kg were mainly affected. Most commonly encountered fractures were those of the femur, followed in descending order by fractures of the tibia, radius/ulna, and humerus.

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