

Radiographic evaluation of bone disorders in referred dogs to Veterinary Hospital of Shahid Chamran University of Ahvaz

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Abstract

Skeletal disorders are included in companion animals relatively significant percentage between referred cases to the Hospital or Clinic in every region. The major skeletal problems have been reported among growing young dogs and large breeds; while small breed dogs are prone to some bone diseases. Lack of balanced nutrition (especially for calcium and phosphorus) is one of the effective factors in the arising of bone disorders. The aim of the present study was to determine the incidence and types of bone defects such as fractures, infections, neoplasia and other skeletal acquired complications in the limb organs, head and vertebral column. The present survey was done during eleven years (2004 to 2014), based on the prepared radiographs in Veterinary Hospital of Shahid Chamran University of Ahvaz; in the following, factors such as age, gender, breed and location were detected for their relationship with bone complications. In this study, bone disorders were detected such as fractures, osteomyelitis and osteoarthritis, neoplasias, dislocations in dogs and other complications like panosteitis, osteochondrosis and osteodystrophy in young animals. The results are presented as descriptive statistics. A total of 4355 referred cases to Radiology Department, 1054 cases (24.20%) were related to dogs. Out of these, 425 cases (40.32%) had skeletal disorders, out of which 46.59% and 53.41% were related to large and small breeds respectively. Skeletal disorders included fractures, luxations and other complications. The most important of these cases were radial fracture (26.71%), femur (28.34%), tibia (22.46%) and ulna (27.95%). The age of the studied animal, were in the range of two months to nine years-old. In term of gender, 62.35% of the dogs were male and 37.65% female. No significant difference was seen for age between mature (51.29%) and immature (48.71%), gender, location and breeds (large and small) statistically. In conclusion, the highest incidence of skeletal disorders was femoral (28.34%) and ulna (27.95%) fractures, respectively. The obtained results showed that radiography is a valuable method to recognize skeletal disorders and the detection of the frequency in dogs.

Key words: Radiography, Bone disorders, Fracture, Dog, Ahvaz

Introduction

Bone disorders are included a relatively significant percentage of referred dogs to hospitals or Veterinary clinics in each region. Orthopedic disorders consist of hip dysplasia and osteochondrosis, panosteitis, hypertrophic osteodystrophy, dislocation of

patellar joint, non-infectious necrosis of the femoral head, intervertebral disc diseases and rickets in small animals. Most bone problems have been reported in growing young dogs of large breeds, while small breed dogs are also prone to some other

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bone diseases. Imbalance in the diet (especially in terms of calcium and phosphorus) is considered as one of the effective factors in causing bone diseases. Bone diseases can be controlled by modifying the diet to some extent. Food control for prevention of weight gain and the balance of minerals, vitamins, protein and other indices, play a role in control of animal weight, is a very important issue in pets (Hazewinkel, 2005).

Incidence of bone fracture in dogs has been reported differently. In our country, Iran, referred cases of bone problems always constitute a relatively significant percentage of dogs to hospitals and other therapeutic centers. The clinical signs can be varied according to the bone which is affected and may be characterized as lameness, swollen and bleeding (Smith et al, 2001; Vandenberg et al, 2013).

It is important that studies of the skeleton be made in standard positions. The standard views for limb bones are craniocaudal (dorsopalmar, dorsoplantar) and mediolateral. At least two views, taken at right angles to one another, are required for proper evaluation of the status of a bone. It is necessary to know the positions of the various centers of ossification in the young animals and the times at which the physes close. Young animals appear to have very wide joint spaces, because the cartilaginous models on which the epiphyses and the small bones of the carpus and tarsus are developing. Growth is completed in dogs by approximately 10 to 14 months of age. However, considerable variations may occur in the times of physal closure, even in animals of the same breed. In the long bones, the proximal humeral epiphysis is the last to mineralize. The pelvic symphysis may not fuse for several years. Variations occur in the appearance of bones in some breeds, such as chondrodystrophic animals (Kealy, 2010).

There are several principle causes of bone fracture in dogs and cats, such as road traffic accident, falling from heights, human

abuse, animal biting, indoor trauma and unknown trauma. Several studies had reported that the most common cause of bone fracture was road traffic accident accidents (Libardoni et al, 2016; Uwagie-Ero et al, 2018). Incidence in epidemiology is a measure of the probability of occurrence of a given medical condition in a population within a specified period of time. Considering the practical aspects of the current investigation and the emphasis on conducting applied research, the researchers' prediction is that by conducting a comprehensive survey in this field, unknown aspects of orthopedic problems in dogs are identified; therefore, the aim of the present study was to determine the incidence and types of bone defects such as fractures, infections, neoplasia and other skeletal acquired complications in the limb organs, head and vertebral column. The present study was done during eleven years from early 2004 to late 2014, based on the prepared radiographs in Veterinary Hospital of Shahid Chamran University of Ahvaz; for this purpose the factors such as age, gender, breed and location were detected for their relationship with bone complications also.

Materials and methods

Ethical approval

This survey was approved by the Animal Care and Research Committee of Shahid Chamran University of Ahvaz. It was conducted based on the Guidelines for Animal Care and Use (Ethical code: 95581148).

Data collection

Data were collected from the owner of medical records at referral Veterinary Teaching Hospital, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz. Searches were made on all skeletal disorders as a retrospective study during eleven years (from 2004 to 2014). Dogs with skeletal complication were confirmed by the history, clinical, orthopedic, and

radiographic examinations, then were submitted to surgery department which was not included in this survey.

During this time, a total of 4355 referred cases to Radiology Department, 1054 cases (24.20%) were related to dogs. Of these, 425 cases (40.32%) had skeletal disorders. In the meantime, 46.59% and 53.41% were related to large and small breeds respectively. The age of the studied animals were in the range of two months to nine years-old and were divided as into mature and immature. In this study, 62.35% of the dogs were male and 37.65% female. The percentage of skeletal lesions was calculated and then the disorders such as types of fractures and their diversity in bone, osteomyelitis, malignant, osteoarthritis, and dislocation of joints, and in young dogs complication such as panosteitis, osteochondrosis and osteodystrophy (hypertrophic and fibrosis) were investigated. Fractures were classified according to sources (Shales, 2008). Classification of bone fracture had been done based on the body parts, and specific bone fractures which included: A-Incidence of specific limb (forelimbs / hind limbs) fractures, B- Incidence of specific appendicular bone fractures. Forelimb (Humerus, radius and ulna), Hindlimb (Femur, tibia and fibula), and the number of the other bone fractures were also recorded.

It should be noted that in the first stage, while taking accurate statistics of the number of referred cases to the Radiology department, radiographs related to bone complications were separated from the rest of the files in dogs. In addition, the files without complete owner information or radiographs with inappropriate and uninterpretable quality were not used in this research. To review the radiology images, regardless of the radiologist's previous diagnosis, all the images were re-examined and interpreted, and their diagnosis was recorded. Then the profile registration forms were reviewed and finally matched with the new diagnosis.

Statistical test

Data about age, sex, and breeds were collected, and then were added to the Microsoft Excel, stored separately and exported to analytical software using the Chi-square test. Values of $P \leq 0.05$ were considered as statistically significant.

Results

In the present study, there were 4355 referral files from different departments of the hospital to the radiology department within a range of 11 years. Of these, 425 cases (40.32%) had skeletal disorders. In the meantime, 46.59% and 53.41% were related to large and small breeds respectively. Skeletal disorders included fractures, luxations and other complications. The most important of these cases were radial fracture (27.95%), femur (22.46%), tibia (17.11%) and ulna (1.07%). The age of the studied animals, was in the range of two months to nine years-old. In this study, 62.35% of the dogs were male and 37.65% female. Statistically no significant difference was seen for age between mature (51.29%) and immature (48.71%), gender, location and breed (large and small) ($P > 0.05$).

By reviewing the documents, the used foods included: homemade, commercial and mixed foods. Since in most cases, there was a combination of the above food types in the diet of dogs, it was not possible to analyze them accurately; therefore, it was not possible to investigate the effects of diet on the skeletal disorders.

In table 1, 374 cases (88%) were related to fractures, 6 cases (1.41%) with tumors or osteomyelitis, 6 cases (1.41%) with orthopedic diseases of young and growing dogs and 39 other cases (9.18%) with articular complications. Out of 183 cases, 161 (87.98%) were related to fractures in fore limb, 187 cases (90.78%) in hind limb, and 26 cases (72.22%) in head and vertebral column. The highest fracture disorder was in hind limb and the lowest one in head and

vertebral column. More details are given in the section below (Table 1).

Types of disorders and skeletal complications are shown in fore limb in Table 2. Out of 183 cases of bone disorders related to the fore limb, 15 cases (9.32%) were observed in scapula, 39 cases (24.22%) in Humerus, 43 (26.71%) in

radius, 45 cases (27.95 %) in ulna, three cases (1.86 %) in carp, six cases (3.73%) in metacarpus and 10 (6.21%) in digits. The highest complication was in ulna (27.95%) and the lowest one in carp (1.86%) in the fore limb. More details are given in the section below (Table 2).

Table 1: Types of disorders and bone complications in different organs during 11 years (2004-2014) in referred dogs to Veterinary Hospital of Shahid Chamran University of Ahvaz

Bone disorders organ	Fractures	Tumors and osteomyelitis	Orthopedic diseases in young and growing dogs	joints	Total
Fore limb	161 (87.98%) Aa	3 (1.64 %) Ac	6 (3.28%) Abc	13 (7.10%) Ab	183
Hind limb	187 (90.78%) Aa	2 (0.97%) Ac	-	17 (8.25%) Ab	206
Head and vertebral column	26 (72.22%) Ba	1 (2.78%) Ac	-	9 (25%) Ab	36
Total	374	6	6	39	425

The difference in uppercase letters indicates the existence of a significant difference between the indicates of each column. The difference in lowercase letters indicates a significant difference in each row.

Table 2: Types of disorders and bone complications in forelimb during 11 years (2004-2014) in dogs referred to Veterinary Hospital of Shahid Chamran University of Ahvaz

Bone complications organ	Scapula	Humerus	Radius	Ulna	Carp	Metacarpus	Digits	Total
fractures	15 (9.32%) Ab	39 (24.22%) Aa	43 (26.71%) Aa	45 (27.95%) Aa	3 (1.86%) ABd	6 (3.73%) Acd	10 (6.21%) Abc	161
Tumors and osteomyelitis	-	2 (66.67%) Ba	-	-	1 (33.33%) Ba	-	-	3
Orthopedic diseases of young and growing dogs	-	2 (33.33%) Ba	3 (50%) Ba	1 (16.67%) Ba	-	-	-	6
joints	1 (7.69%) Bb	4 (30.77%) Bab	-	-	6 (46.15%) Aa	-	2 (15.38%) Bab	13
Total	16	47	46	46	10	6	12	183

The difference in uppercase letters indicates the existence of a significant difference between the indicates of each column. The difference in lowercase letters indicates a significant difference in each row.



Figure 1: Incomplete fracture in tibia



Figure 4: fracture in olecranon



Figure 2: complete fracture in tibia and fibula



Figure 5: Luxation in right hip joint



Figure 3: Overriding fracture in radius and ulna

Types of disorders and bone complications are observed in hindlimb in the studied dogs. Out of 206 cases of bone complications related to hind limb, 12 cases (6.42 %) were observed in ilium, 15 cases (8.02%) in ischium, 14 cases (7.49%) in pubis , 5 cases (2.67 %) in pelvic symphysis, 53 cases (28.34%) in femur, 42 cases (22.46%) in tibia, 32 cases (17.11 %) in fibula, two cases (1.07 %) in tarsus, four cases (2.14 %) in metatarsus and eight cases (4.29 %) in digits. The highest complication was observed in femur (28.34%) and the lowest one in tarsus (1.07%). Regarding the joint complications 17 cases, of which 9 cases (52.94%) were related to the hip joint, where about 50% (4 case) of the complications of the mentioned joint are related to complete and incomplete dislocation of this joint. More details are given in the section below (Table 3).

Table 3: Types of disorders and bone complications in hindlimb during 11 years (2004-2014) in dogs referred to Veterinary Hospital of Shahid Chamran University of Ahvaz

Bone complications Organ	Ileum	Ischium	Pubis	Symphysis	Femur	Tibia	Fibula	Tarsus	Metatarsus	Digits	Total
Fractures	12 (6.42%) Acd	15 (8.02%) Ac	14 (7.49%) Ac	5 (2.67%) Adc	53 (28.34%) Aa	42 (22.46%) Aab	32 (17.11%) Ab	2 (1.07%) Ac	4 (2.14%) Ac	8 (4.29%) Acde	187
Tumors and osteomyelitis	-	-	-	-	-	1 (50%) Ba	-	-	1 (50%) Aa	-	2
Joints	Hip 9 (52.94%) Aa	Stifle 5 (29.41%) Bab	-	-	-	-	-	3 (17.65%) Ab	-	-	17
Total	21	20	14	5	53	43	32	5	5	8	206

The difference in uppercase letters indicates the existence of a significant difference between the indicates of each column. The difference in lowercase letters indicates a significant difference in each row.

Table 4: Types of disorders and bone complications in skull and vertebral column during 11 years (2004-2014) in dogs referred to Veterinary Hospital of Shahid Chamran University of Ahvaz

Bone complications organ	Skull	Maxilla	Mandible	Face	Vertebrae				Total
					Neck	Thorex	Lumbar	Tail	
Fractures	-	6 (23.08%) Aa	4 (15.38%) Aa	2 (7.69%) Aa	-	5 (19.23%) Aa	6 (23.08%) Aa	3 (11.54%) Aa	26
Tumors and osteomyelitis	-	-	1 (100%) Aa -	-	-	-	-	-	1
Joints	-	-	-	-	-	3 (33.33%) Aa	6 (66.67%) Aa	-	9
Total	-	6	5	2	-	8	12	3	36

The difference in uppercase letters indicates the existence of a significant difference between the indicates of each column. The difference in lowercase letters indicates a significant difference in each row.

Out of the thirty six cases of bone complications for the skull and vertebral column, 26 cases were fractures, one case tumors and osteomyelitis (in mandible), and 9 cases joint complications. Out of 26 fractures, 6 cases (23.08%) were related to the maxilla, 4 cases (15.38%) the mandible, 2 cases (7.69%) face, 5 cases (19.23%) thorax vertebrae, 6 cases (16.67%) lumbar vertebrae and 3 cases (8.33%) tail vertebrae. Tumors and osteomyelitis were 1 case (100%) in the mandibl bone. Out of the nine of the bone complications for the joints, 3 cases (8.33%) were in the thorax vertebrae and 6 cases (16.67%) in the lumbar vertebrae.

Discussion

The obtained results showed that the highest incidence of skeletal disorders in the population of referral dogs in Ahvaz region was femoral and ulna fractures at 28.34% and 27.95%, respectively. Considering that Veterinary Hospital of Ahvaz is the only specialized center for companion animal diseases in Khuzestan province, most cases of accidents and bone diseases refer to this center (even those cases that go to outside clinics) due to the lack of diagnostic equipment; so the results are considered with a large extent to indicate that the prevalence of skeletal complications is relatively high in dog's population of Ahvaz region.

Most of the articles are as case reports in the field of bone complications in pets, including dogs, both in Iran and other countries. Harris and Langley-Hobbs (2013) reported a case of idiopathic ischemic necrosis in the carpal bone of a dog. The affected dog was six years-old, female, ovariohysterectomized and was of Mixed breed. The animal was referred with a 6-week history of lameness. Radiographic findings confirmed bone complications (bone lysis) in the involved bone. Kishimoto et al, (2009) examined the femoral-pelvic joint in 22 healthy Border collie dogs. In their study, mean values of dorsolateral subluxation score was 45.7% ($\pm 10.2\%$) using CT-scan technique. In the present study, about 50% of joint complications are related to complete or incomplete dislocation of the hip joint.

Ghadiri et al, (2011) reported a case of Lumbosacral Transitional Vertebra (LTV) Type-3 in a German shepherd dog. In their research, the affected dog was seven years-old and was referred to Veterinary Hospital of Ahvaz with a 2-week history of intermittent lameness and pain in the sacro-lumbar area. In another research, Ghadiri et al, (2007) reported the radiographic findings of HOD in a Mixed breed puppy. They reported HOD-related lesions consisting of new periosteal bone formation around the distal metaphysis of the radius, ulna, and tibia. Soroori et al, (2012), reported that among 1896 cases referred to the radiology department 49 dogs were suffering from osteoarthritis complications. In their research, it was shown that in 15 cases of the studied dogs, there was complications in the vertebral column and in 34 other cases, the disorders were in forelimb and hindlimb organs. In addition, bone complications were reported in large breed more than small breed dogs. Old age and overweight were reported as two important and predisposing factors in the development of degenerative changes in joints.

Chalmers et al, (2006) used the method of bone density determination in the femur head to diagnose osteoarthritis in the early stages. In another study, Smith et al, (2001), investigated the effect of various factors such as age, gender, breed and weight on the occurrence of radiographic signs of osteoarthrosis in the Pennsylvania Veterinary College. It was determined that weight was the most important risk factor in the development of osteoarthrosis in all breeds. But the gender was not a determining factor in the occurrence of complications. Also, the level of infection in the German shepherd breed was 4 times higher than other breeds. Barder et al, (1983), in a study conducted on 130 cases of humerus fractures in dogs and cats, reported that the percentage of fractures in different parts of the humerus was as follows: four percent in the proximal part, 47% in the body, 12% in the condyles and 37% in the distal part of the bone.

Pelvic fractures are relatively common in Veterinary Medicine, and in some reports, it accounts for 20-30% of fractures. In addition, several cases of pelvic fractures are related to multiple fractures. Also, 59 to 83 percent of hip dislocations have been reported in connection with trauma (Unger et al., 1990). In Veterinary reports, 20-25% of fractures have been reported in femur bone. In stifle joint dislocations, 75 to 80% of dislocations were occurred in the medial region (Unger et al., 1990). Tibia fractures are relatively common in dogs and cats also, and up to 21% of fractures are related to long bone (Unger et al, 1990). In the present study, the percentage of fractures in different parts of the pelvis was 24.60 percent which is consistent with the above results. In the present study, the percent of femoral fractures was obtained 28.34% which is relatively similar with other research results.

Eatezadi et al, (2006), conducted a retrospective study of dog hindlimb fractures by radiology. In the above study, in total, 187 cases of different fractures

were investigated, seventy four cases were in the femur, 50 cases in the tibia, 25 cases in the fibula, 21 cases in the pubic bone and 17 cases in the ilium. Also, in their study, it was found that a high percentage of fractures in immature animals and the highest incidence of fractures were in the femur. In the present study, the highest incidence of skeletal disorders was in femur bone at 28.34% that was similar with results of above research.

In another research by the Keosengthong et al, (2019), the incidence of bone fractures was 1.7% and 1.1% in dogs and cats, respectively. Regarding the breeds in both the dogs and cats, mongrel breed were the most affected at 40.6% and 66.3%, respectively. Abo-Soliman et al, (2020) showed that male dogs and cats had a higher incidence than females, as well as, the highest records of fractures were in mongrel breed dogs and cats. The bone fracture mostly occurred in dogs younger than one-year-old, and in cats with age range of one to three years.

Laflamme (2001) and Linda et al, (2019) showed that excessive dietary calcium can cause bone deformities and even cause deficiency in other nutrients, including zinc. Tryfonidou et al, (2002) showed that excessive caloric intake and disproportionate amounts of calcium affect skeletal diseases, especially in large breed puppies. These researchers showed that if the amount of calcium is higher than 3% of the dry matter of the diet, it can lead to bone deformities in dogs. Hazewinkel, (2005) reported that the ratio of calcium to phosphorus should be in the range of 1 to 1.5, but at the same time, the absolute amounts of each mineral are more important than the above ratio. For example, if the absorption of energy is not controlled in the diet, or if the amount of minerals in the diet is not within the normal range, it causes development of bone diseases. It should be noted that other factors such as genetics, exercise, and trauma play an important role

in causing bone injuries, especially in puppies (Stockman et al, 2013).

In a study by Kitshoff et al, (2013), 109 dogs were reviewed with 135 mandibular fractures. Small breed dogs and dogs less than eight months of age predominated (102 cases). Dog fights were the most common aetiology in their study (68). The molar region was the most commonly affected region (56). Evaluation of the radiographs revealed that transverse, relatively unstable, and displaced fractures were the most common regions. The majority of fractures involved teeth in the fracture line, with the first molar frequently involved. The majority of fractures were open. Eliasi et al. (2014) conducted a survey on the radiographic files of the population of dogs referred to the radiology department in the field of breed, age and gender factors on the complication of pelvic-femoral joint dysplasia (2011-2013). The incidence of hip dysplasia in large breed dogs (German shepherd and Doberman pinscher) was more common than in small breed dogs (Perkins and Dachshund). In regard gender, they were seen more in females, and for age, it was seen more in range of 5 months to 2 years. There were no differences between different groups for age, gender and breed. In another survey, Samani et al, (2014) worked on cats (40 cases) referred to Veterinary Hospital of Ahvaz University. They observed that most fracture problems were related to lumbo-sacral fractures. The occurrence rate of the recent fracture was 50% and it was reported in young ages between 1.5 and 8 months, which was significantly different from older age groups, but it was not significant for gender. The current work was carried out in continuation of the previous studies with a greater extent.

Metatarsal fractures are considered for 1.8 to 11% of all fractures in dogs (Ness et al, 1996). Benjamin et al, (2010) announced that most metatarsal fractures are caused by trauma. Greyhound dogs were more prone to metatarsal fractures. The ages of dogs

were different for metatarsal and metacarpal fractures reported from 2 months to 10 years. Okumura et al. (2000) reported a metatarsal fracture in a 12-year-old male pit bull terrier, and Seibert et al. (2011) announced this bone complication in a 4-year-old female pit bull terrier. The most important clinical findings are pain, swelling, presence of wound and crepitus sound during examination in metatarsal fractures (Fitzpack et al, 2011). The present results were nearly similar to the previously recorded findings by other researchers.

In the study conducted on the effects of ozone therapy on experimental fracture healing in the rabbit model, they reported that ozone was effective in improving the fracture repair process (Mohammad Hoseni et al, 2022).

In another survey on radiographic assessment of hip joint after femoral head and neck osteotomy and its relationship

with clinical findings in dogs, it was concluded that revision surgery to resection of ossicles, especially in the neck region and lesser trochanter, can improve the patient's condition (Tayebi et al, 2023).

In conclusion, the most important of these cases were radial fracture (27.95%), femur (22.46%), tibia (17.11%) and ulna (1.07%). The highest incidence of skeletal disorders in dogs was femoral and ulna fractures at 28.34% and 27.95%, respectively, from all the obtained results, regarding the causes of fractures in different parts, 45.32 percent are related to accidents, 24.43 percent are due to falling from a height, 17.13 percent of fractures are due to conflicts between animals, and 13.12% were due to unknown causes. The results showed that radiography is a valuable method to recognize skeletal disorders together with their frequency in dogs.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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ارزیابی رادیوگرافی عوارض استخوانی در سگ‌های ارجاعی به بیمارستان دامپزشکی دانشگاه شهید چمران اهواز

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چکیده

عوارض استخوانی در حیوانات خانگی، درصد نسبتاً قابل توجهی از موارد ارجاعی به بیمارستان یا کلینیک را در هر منطقه شامل می‌شود. عمده مشکلات استخوانی در سگ‌های جوان در حال رشد و نژادهای بزرگ گزارش شده است؛ ضمن این که سگ‌های نژاد کوچک نیز به برخی دیگر از بیماری‌های استخوانی مستعد می‌باشند. عدم تعادل در جیره غذایی (به ویژه از نظر کلسیم و فسفر) یکی از عوامل مؤثر در ایجاد عوارض استخوانی محسوب می‌شود. هدف از انجام مطالعه حاضر، تعیین میزان شیوع و انواع ضایعات استخوانی نظیر شکستگی‌ها، عفونت‌ها، تومورها و دیگر عوارض اکتسابی استخوانی در اندام‌های حرکتی، سر و ستون مهره‌ها بود. مطالعه حاضر در طی ۱۱ سال و بر اساس رادیوگراف‌های تهیه شده در بیمارستان دامپزشکی دانشگاه شهید چمران اهواز انجام شد؛ در ادامه فاکتورهای نظیر سن، جنس، نژاد و محل عارضه، جهت تعیین ارتباط با عوارض استخوانی نیز بررسی شدند. در این مطالعه، ضایعات استخوانی از قبیل شکستگی‌ها، استئومیلیت و استئوآرتریت، نتوپلازی‌ها، دررفتگی‌ها در سگ‌ها و دیگر عوارض نظیر پان‌اوستئائیتیس، استئوکندروز و استئودیستروفی در حیوانات جوان تعیین شدند. نتایج، به صورت آمار توصیفی، ارائه شده‌اند. جمعاً از ۴۳۵۵ مورد ارجاعی به بخش رادیولوژی، ۱۰۵۴ مورد (۲۴/۲۰ درصد) مربوط به سگ‌ها بودند. از این تعداد، ۴۲۵ مورد (۴۰/۳۲ درصد) دچار عوارض استخوانی بودند که ۴۶/۵۹ و ۵۲/۴۱ درصد، به ترتیب مربوط به نژادهای بزرگ و کوچک بودند. عوارض استخوانی شامل شکستگی‌ها، دررفتگی‌ها و دیگر عوارض بودند. از مهم‌ترین این موارد می‌توان شکستگی رادیوس (۲۶/۷۱ درصد)، ران (۲۸/۳۴ درصد)، درشت‌نی (۲۲/۴۶ درصد) و زند زیرین (۲۷/۹۵ درصد) را نام برد. سن حیوانات مورد مطالعه، در محدوده ۲ ماهگی تا ۹ سالگی قرار داشتند. از لحاظ جنسیت، ۶۲/۳۵ درصد از سگ‌ها، نر و ۳۷/۶۵ درصد از آن‌ها ماده بودند. از لحاظ آماری، تفاوت معنی‌داری از لحاظ سن، بین بالغین (۵۱/۲۹ درصد) و نابالغین (۴۸/۷۱ درصد)، جنس، محل عارضه و نژاد (بزرگ و کوچک) مشاهده نگردید. در قسمت نتیجه‌گیری، بیش‌ترین شیوع عوارض استخوانی، به ترتیب شکستگی‌های استخوان ران (۲۸/۳۴ درصد) و زند زیرین (۲۷/۹۵ درصد) بودند. نتایج به دست آمده نشان داد که رادیوگرافی یک روش قابل اطمینان، برای تشخیص عوارض استخوانی و تعیین فراوانی آن‌ها در سگ‌ها می‌باشد.

کلمات کلیدی: رادیوگرافی، عوارض استخوانی، شکستگی، سگ، اهواز

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