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Original article

PREVALENCE OF DEVELOPMENTAL SKELETAL ABNORMALITIES IN THE DOG IN BULGARIA: A 6-YEAR SURVEY

E. SERGELIDOU & D. DINEV

Department of Veterinary Surgery, Faculty of Veterinary Medicine,
Stara Zagora, Bulgaria

Summary

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A 6-year survey (1 October 2006 – 1 October 2012) on the prevalence of developmental skeletal abnormalities in dogs was performed based on patients' records of the Small Animal Clinic to the Faculty of Veterinary Medicine – Stara Zagora, Bulgaria. From the total number of 6,097 dogs with surgical disorders, developmental skeletal disorders were diagnosed in 230 dogs (3.78%). The incidence of diagnoses was as followed: hip dysplasia (64.35%), panosteitis (16.96%), elbow dysplasia (12.61%), hypertrophic osteodystrophy (3.48%), osteochondrosis (2.62%). The most commonly affected breeds were German shepherd (33.4%), Central Asian Shepherd (7.83%), Golden Retriever and Rottweiler (6.52%), Labrador Retriever (4.78%), and the least frequently – small canine breeds and hunting dogs. Male dogs were more frequently affected. Most of the patients were under 3-years old (91.30%) and all recorded panosteitis cases were in dogs younger than 3 years of age.

Key words: bones, developmental disorders, dog, joints

INTRODUCTION

The group of canine growth-related developmental disorders includes: hip dysplasia, elbow dysplasia, osteochondrosis, osteochondritis dissecans, hypertrophic osteodystrophy and panosteitis. In this group some authors add more diseases like Wobbler, premature closure of the antebrachial growth plates and dislocation of the patella and the shoulder joint in young animals (Fau *et al.*, 2007).

Diseases of the joints and bones relevant to growth are of particular clinical interest because of the frequency with which they are diagnosed.

Most often medium, large and giant breeds are affected (Sturion & Pereira, 1995; Fau *et al.*, 2007; Kirberger & Stander, 2007), because they are usually subjected to rapid growth periods within their first year of development (Janutta & Distl, 2008; Stecyk *et al.*, 2010). Symptoms of pain and lameness can be the result of any trauma to bones, joints or the support-

ing soft tissues, but often they are caused by specific diseases of the bone.

Some authors draw attention to the hereditary factor as the main cause of these diseases (Durmus & Han, 2010) and also to the rapid growth (Janutta & Distl, 2008; Stecyk *et al.*, 2010), nutrition (Sturion & Pereira, 1995; Janutta & Distl, 2008; Krontveit *et al.*, 2010; Corbee *et al.*, 2012), weight (Krontveit *et al.*, 2010; Nap, 2010; Stecyk *et al.*, 2010), hormonal disorders (Simeonova, 2007) and other environmental factors.

The main task of this paper is to investigate the distribution of the above diseases associated with growth, as part of a more comprehensive analysis of the problem.

MATERIALS AND METHODS

A retrospective analysis was performed covering a six-year period, from 1 October, 2006 to 1 October, 2012. The analysis is based on the patient records at the Small Animal Clinic in the Faculty of Veterinary Medicine of Trakia University in Stara Zagora.

The focus of the aggregation of information was given to the clinical diagnosis, breed predisposition, gender and age. The analysis of data was done with the z-test for comparison of proportions.

RESULTS

The results of this statistical survey indicate that from the 6087 surgical cases the number of the dogs with developmental skeletal diseases was 230 (3.78%), out of which 145 male (63.04%) and 85 female (36.96%) (Fig. 1). This group of animals consisted of 38 breeds.

In terms of specific diseases (Fig. 2), they are distributed as followed: hip dysplasia (148/230), panosteitis (39/230), elbow dysplasia (29/230), hypertrophic osteodystrophy (8/230) and osteochondrosis (6/230). The prevalence of hip dysplasia was statistically significantly higher than that of the other growth disorders ($P<0.001$).

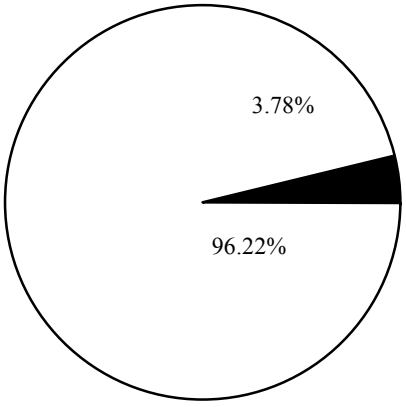

Fig. 1. Prevalence of developmental skeletal abnormalities (black) among all surgical patients referred to the Small Animal Clinic of the FVM in 2006–2013.

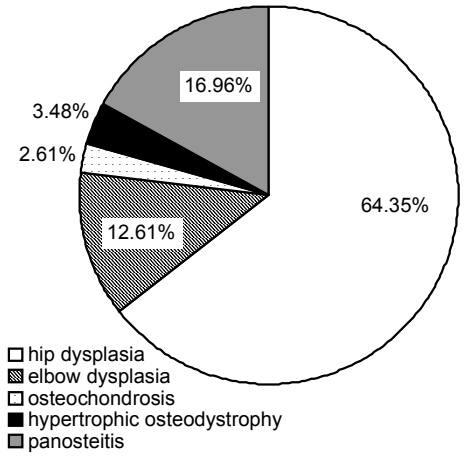

Fig. 2. Prevalence of different developmental skeletal abnormalities in dogs (n=230) referred to the Small Animal Clinic of the FVM in 2006–2013.

Table 1. Breed-specific prevalence of developmental skeletal abnormalities in dogs (n=230) referred to the Small Animal Clinic of the FVM in 2006–2013

Breed	Number (%)
German Shepherd	76 (33.04%) [A]
Central Asian Shepherd	18 (7.83%) [B]
Golden Retriever	15 (6.52%) [B]
Rottweiler	15 (6.52%) [B]
Labrador	11 (4.78%) [B]
Chow-Chow	10 (4.35%) [B]
Other breeds	85 (36.95%) [A]
Total	230 (100.00%)

Different superscripts within a column denote statistically significant differences (P<0.001).

Regarding the breed factor (Table 1), it is found that this group of diseases is more common in German Shepherd (33.04%), Central Asian Shepherd (7.83%), Golden Retriever (6.52%), Rottweiler (6.52%), Labrador (4.78%), Chow-Chow (4.35%) etc, while rarely it is observed in some hunting breeds as well as in small-sized breeds (0.43%).

The category of the growth diseases is occupied mostly by animals at the age of 1–3 years (210 dogs against 20 that are over this age, which is the 91.30%). All the recorded cases of panosteitis were animals under 3 years old (Table 2).

As for the gender, male dogs prevail in each disease, bringing the total percentage of male and female dogs to 63.04 and 36.96 respectively (Table 3).

DISCUSSION

The problem of the skeletal growth disorders seems to interest several authors. Studies regarding the prevalence of these disorders have been performed also in Belgium (Coopman *et al.*, 2008), Turkey (Durmus & Han, 2010), South Africa (Kirberger & Stander, 2007), India (Simon *et al.*, 2010), Croatia (Stanin *et al.*, 2011), Romania (Stecyk *et al.*, 2010) and New Zealand (Worth *et al.*, 2010), the results of which are mentioned below. Some of them, like New Zealand (Worth *et al.*, 2010) and Croatia (Stanin *et al.*, 2011), came up with a strategy for a solution, notably for hip and elbow dysplasia. Therefore it is considered necessary for Bulgaria too.

Table 2. Age-specific prevalence of developmental skeletal abnormalities in dogs (n=230) referred to the Small Animal Clinic of the FVM in 2006–2013

Disease	≤ 3 years of age	> 3 years of age
	number (%*)	number (%*)
Hip dysplasia	131/148 (88.51%) [A]	17/148 (11.49%) [A]
Elbow dysplasia	28/29 (96.55%) [B]	1/29 (3.45%) [B]
Osteochondriosis	6/6 (100.00%) [C]	–
Hypertrophic osteodystrophy	6/8 (75.00%) [C]	2/8 (25.00%) [B]
Panosteitis	39 (100.00%) [B]	–
All diagnoses	210/230 (91.30%)	20/230 (8.70%)

*Percentage for each diagnosis. Different superscripts within a column denote statistically significant differences (P<0.001).

Table 3. Gender-specific prevalence of developmental skeletal abnormalities in dogs (n=230) referred to the Small Animal Clinic of the FVM in 2006–2013

Disease	male	female
	number (%*)	number (%*)
Hip dysplasia	84 (56.76%) ^{A}	64 (43.24%) ^{A}
Elbow dysplasia	21 (72.41%) ^{B}	8 (27.59%) ^{B}
Osteochondriosis	5 (83.33%) ^{C}	1 (16.67%) ^{B}
Hypertrophic osteodystrophy	4 (50.00%) ^{C}	4 (50.00%) ^{B}
Panosteitis	31 (79.49%) ^{B}	8 (20.51%) ^{B}
All diagnoses	145 (63.04%)	85 (36.96%)

*Percentage for each diagnosis. Different superscripts within a column denote statistically significant differences ($P<0.001$).

In this study, hip dysplasia appears by far the commonest skeletal growth disorder in the relevant breeds, as it was already known, while panosteitis and elbow dysplasia follow. Several authors have reported the high frequency with which these diseases are diagnosed in large breed dogs (Coopman *et al.*, 2008; Fau *et al.*, 2007; Souza *et al.*, 2011).

In terms of species distribution, the differences found are dictated by the geographical location of the country and the breeds of dogs that prevail in them. The first position of this indicator in this study belongs to the German Shepherds, while Central Asian Shepherds, Golden Retrievers, Rottweilers and Labrador Retrievers follow. Furthermore, these breeds appear as some of the most affected ones in Brazil (Souza *et al.*, 2011), Poland (Narojek *et al.*, 2008) and India (Simon *et al.*, 2010) plus Bernese Mountain Dog in France (Fau *et al.*, 2007) and Bullmastiff, Chow-Chows and Boerboels in South Africa (Kirberger & Stander, 2007), probably due to their popularity in each country on one hand and the insufficient breeding control on the other.

Most of the affected dogs were under 3-years old, which was expected as this study refers to growth disorders. It is known that the age of onset of each disease is as follows: hypertrophic osteodystrophy: 2–8 months, elbow dysplasia: 5–8 months, osteochondrosis: 4–8 months, panosteitis: 5-12 months and hip dysplasia: 2–12 months (Kowaleski, 2006; Olmstead, 2006; Roush, 2006). However there are patients over these ages, the majority of which is probably due to their late presentation for examination or certification for dysplasia. It is very interesting to mention that there is a close relation between disease and age. In all 16 cases of panosteitis (100%) young animals (under 3 years old) were affected.

Gender is also a subject of attention in many publications. Many authors support that males are more vulnerable to these diseases than females (Beuing *et al.*, 2000; Kirberger & Stander, 2007; Kowaleski, 2006; Janutta & Distl, 2008; Simon *et al.*, 2010; Souza *et al.*, 2011). There are other researches though, in which the sick female dogs are more than the male ones (Fau *et al.,* 2007).

CONCLUSIONS

For a period of 6 years (01 October 2006 to 01 October 2012) from the total number of 6087 surgical cases presented in the Small Animal Clinic, 230 dogs (3.78%) were registered with disorders of the locomotor system related to growth (hip dysplasia, elbow dysplasia, osteochondrosis, hypertrophic osteodystrophy and panosteitis).

The frequency of these diseases is distributed as follows: hip dysplasia (64.35%), panosteitis (16.96%), elbow dysplasia (12.61%), hypertrophic osteodystrophy (3.48%) and osteochondrosis (2.62%).

The diseases of this group are more commonly found in German Shepherds (33.4%), Central Asian Shepherds (7.83%), Golden Retrievers and Rottweilers (6.52%), Labradors (4.78%) and rarely in other breeds, such as hunting or small breeds (0.43%).

It is reaffirmed that this type of disorders occurs more frequently in male and in very young dogs.

REFERENCES

Beuing, R., C. Mues, B. Tellhelm & G. Erhardt, 2000. Prevalence and inheritance of canine elbow dysplasia in German Rottweiler. *Journal of Animal Breeding and Genetics,* **117**, 375–383.

Coopman, F., G. Verhoeven, J. Saunders, L. Duchateau & H. van Bree, 2008. Prevalence of hip dysplasia, elbow dysplasia and humeral head osteochondrosis in dog breeds in Belgium. *Veterinary Record,* **163**, 654–658.

Corbee, R. J., M. A. Tryfonidou, I. P. Beckers & H. A. W. Hazewinkel, 2012. Composition and use of puppy milk replacers in German Shepherd puppies in the Netherlands. *Journal of Animal Physiology and Animal Nutrition,* **96**, 395–402.

Durmus, A. S. & M. C. Han, 2010. Elbow dysplasia in German Shepherd in Turkey. *Journal of Animal and Veterinary Advances,* **9**, 1614–1616.

Fau, D., D. Remy & J. P. Genevois, 2007. The genetics and detection of hereditary orthopaedic diseases in dogs. *Le Nouveau Praticien Veterinaire Canine-Feline*, **33**, 32–36.

Grandjean, D. & B. M. Paragon, 1996. Dietary induced disorders in the puppy. *Recueil de Médecine Vétérinaire*, **172**, 519–530.

Janutta, V. & O. Distl, 2008. Review on canine elbow dysplasia: Pathogenesis, diagnosis and genetic aspects. *Deutsche Tierarztliche Wochenschrift*, **115**, 172–181.

Kirberger, R. M. & N. Stander, 2007. Incidence of canine elbow dysplasia in South Africa. *Journal of the South African Veterinary Association*, **78**, 59–62.

Kowaleski, M. P., 2006. Osteochondrosis. In: *Saunders Manual Of Small Animal Practice,* 3rd edn, eds S. J. Birchard & R. G. Sherding, Elsevier, pp. 1194–1202.

Krontveit, R. I., A. Nodtvedt, B. K. Saevik, E. Ropstad, H. K. Skogmo & C. Trangerud, 2010. A prospective study on canine hip dysplasia and growth in a conhort of four large breeds in Norway. *Preventive Veterinary Medicine,* **97**, 252–263.

Nap, R. C., 2010. Overweight and joint development. *Dier en arts,* **25**, 170–175.

Narojek, T., K. Fiszdon & E. Hanysz, 2008. Canine elbow dysplasia in different breeds. Bulletin of the Veterinary Institute in Pulawy, **52**, 169–173.

Olmstead, M. L., 2006. Disorders of the coxofemoral joint. In: *Saunders Manual Of Small Animal Practice,* 3rd edn, eds S. J. Birchard & R. G. Sherding, Elsevier, pp. 1115-1122.

Roush, J. K., 2006. Miscellaneous diseases of bone. In: *Saunders Manual Of Small Animal Practice,* 3rd edn, eds S. J. Birchard & R. G. Sherding, Elsevier, pp. 1186–1193.

Simeonova, G., 2007. Hormonal and radiographic studies in German Shepherd dog

with hip dysplasia. *Trakia Journal of Sciences*, **5**, 59–64.

Simon, M. S., R. Ganesh, S. Ayyappan, G. D. Rao, R. S. Kumar, M. Manonmani & B. C. Das, 2010. Incidence of canine hip dysplasia: A survey of 272 cases. *Veterinary World*, **3**, 219–220.

Souza, M. M. D. de, S. C. Rahal, C. R. Padovani, C. R., M. J. Mamprim, M. J. & J. H. Cavini, 2011. Orthopedic diseases of hind limps in dogs: Retrospective study. *Ciencia Rural,* **41**, 852–857.

Stanin, D., M. Pavlak, Z. Vrbanac & D. Potocnjak, 2011. Prevalence of hip dysplasia in dogs according to official radiographic screening in Croatia. *Veterinarski Arhiv*, **81**, 235–248.

Stecyk, R. E., L. C. Burtan & I. Burcoveanu, 2010. Frequency and etiopathogenesis of hip dysplasia in dogs. *Progress and perspectives in veterinary medicine, Iasi, Romania*, 10–11.

Sturion, D. J. & P. M. Pereira, 1995. Diagnosticos radiograficos de caninos e felinos com hiperparatireoidismo nutricional secundario. *Semina: Ciências Agrárias*, **16**, 28–33.

Worth, A. J., J. P. Bridges & G. Jones, 2010. Reduction in the incidence of elbow dysplasia in four breeds of dog as measured by the New Zealand Veterinary Association scoring scheme. *New Zealand Veterinary Journal*, **58**, 190–195.

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Correspondence:

Eirini Sergilidou
Department of Veterinary Surgery
Faculty of Veterinary Medicine
Student's Campus,
6000 Stara Zagora, Bulgaria
e-mail: eirini.ser@hotmail.com