Study Regarding the Evolution with Age of Ultrasound Prostate Dimensions in German Shepherd Dogs

Gabriela Korodi[1], Olimpia Colibar[2], Horia Cernescu[1], Vasile Ardelean[1], Gheorghe Bonca[1], Călin Mircu[1], D. Popovici[2]

[1]Dept. of Animal Reproduction, Faculty of Veterinary Medicine, University of Agricultural Science and Veterinary Medicine of Banat, 300645 Timisoara, Calea Aradului 119, Romania
[2]Dept. of Animal Nutrition, Faculty of Veterinary Medicine, University of Agricultural Science and Veterinary Medicine of Banat, 300645 Timisoara, Calea Aradului 119, Romania

Abstract
The aim of this study is to analyze the evolution with age of the prostatic dimensions in German shepherd dogs. For the veterinarians, these results could help to recognize more easily a pathological state of the German shepherd dog's prostate, only by an ultrasound examination. After examining 22 German shepherd dogs, for dogs of 2 to 5 years old, we obtained a mean prostatic volume of 16.239 cmc, for dogs between 6 and 10 years old the mean prostatic volume was 37.712 cmc and for dogs older than 10 years, the mean prostatic volume was 40.327 cmc. In conclusion, regarding the results, it can be affirmed that in German shepherd dogs, prostate dimensions are increasing with age.

Keywords: age, dogs, prostate, ultrasound, volume

1. Introduction

Prostate disease is a common problem in old dogs [1]. In humans, there are age-specific physiological ranges of prostatic volume, serum prostate specific antigen (PSA) levels and serum testosterone concentrations [2]. Knowing the evolution of these factors for dogs, along with age, is also essential as a diagnostic tool in prostate pathology. This means that, if there is a known, standardized, physiological interval for prostatic volume, any value which overcome that interval, should indicate a potential prostate illness.
Until now, studies regarding this subject, are not sufficient.
The aim of this study is to contribute to the realization of age-related physiological standards regarding the prostatic volume for German shepherd dogs.

* Corresponding author: Gabriela Korodi

2. Materials and methods

The ultrasonographic prostate volume in 22 German shepherd dogs was measured. Dogs were selected, by anamnesis, to have no history of prostatic disease. They were divided into three groups of ages: G1 between 2 and 5 years; G2 between 6 and 10 years, and group G3, containing over 10 years old dogs. By dividing dogs in these three category of age, 11 of them were included in the group G1, 7 were included in the group G2, and 4 of them in the third group, G3.
The prostate volume was determined by a formula, using a 2D ultrasound. The mathematical formula was suggested in the literature by Kamolpatana et al., [3]. It was considered to be the most precise way for calculation of dog's prostate volume.
First, the length and height of the prostate were measured in longitudinal section. The second measurement was made in transversal plane, determining the weight and height. The height used in the formula was the average of the two measured values, longitudinally and transversally.
The applied formula is the following:

$$V= [1/2.6 (L * W * H)] + 1.8$$

Where:
L – Length of the prostate (longitudinally);
W – Weight of the prostate (transversally);
H – Average between the longitudinally measured height and the transversally measured one.

After calculating the prostatic volume for each examined dog, a mean value, with standard deviation, was calculated for each group of ages to observe the evolution with age of this factor. Statistical differences between the averages were processed using the T (Student) test.

3. Results and discussions

The results obtained after examination of all dogs and calculation of the prostate volumes are presented in Table1, and described below.
The mean prostatic volume for the first group was 16.239 cm^3 with standard deviation of 5.972. The mean prostatic volume for the second group was 37.712 cm^3 with standard deviation of 14.479. For the group G3, the mean prostatic volume was 40.327 cm^3, with a standard deviation of 0.849.
For dogs comprised in group G1, between 2 and 5 years old, the value of the mean prostatic volume was lower than the mean prostatic volume of dogs from the group G2. The value of the mean prostatic volume for the elder dogs, comprised in the group G3 was also greater than the mean prostatic volume of dogs from G2.
The pathology of the prostate is composed by the following diseases: benign hyperplasia, prostatitis, cysts, squamous methaplasia, atrophy and neoplasm. All these diseases are translated in prostatic volume changes. These changes mean increasing of prostatic volume or decreasing of prostatic volume. If there would be an accepted standard interval for physiological values of prostatic volume, any value that overcome that interval, could be a sign of prostatic disease. [4, 5, 6, 7]
These results could be useful for the practitioner veterinarians in detecting pathological changes in the prostate of dogs.
The significance of differences:
Between G1 and G2 differences are ensured statistically ($p<0.05$); between G1 and G3 differences are ensured statistically ($p<0.05$), and between G2 and G3 differences are not ensured statistically ($p>0.05$).

Table 1. Mean prostatic volumes on groups of ages in German Shepherd dogs

GROUP	AGE OF DOGS (years)	NUMBER OF DOGS INCLUDED IN THE GROUP	PROSTATIC VOLUME (cmc)	
			$\bar{X}$	$\bar{X} \pm s$
G1	2 – 5	**11**	**16.239**	5.972
G2	6 – 10	**7**	**37.712**	14.479
3	> 10	**4**	**40.327**	0.849

a-b $p<0.05$; a-c $p<0.05$; b-c $p>0.05$

In Figure 1 we present graphically the evolution with age of the prostatic volume in German Shepherd dogs.

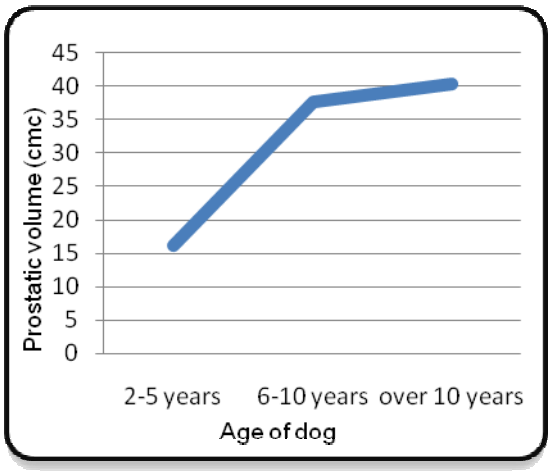

Figure 1. Evolution with age of the prostatic volume in German Shepherd dogs

4. Conclusions

Regarding these results, it can be affirmed that along with aging of German Shepherd dogs, their prostate volume is increasing, so that:

- prostate dimensions are significantly increasing in dogs between 6 and 10 years old, in comparison with those between 2 and 5 years old;
- Over 10 years of age, the growth of prostate dimensions in dogs is insignificant.

5. References

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