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Prostate affections in dogs: Incidence and clinical analysis

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Abstract

The present study was conducted in two parts, Study I and Study II. The part I study was conducted on 26 apparently healthy categorized on the basis of age into group A (0.5 to 4 yrs.), B (4 to 9 yrs.) and C (>9 yrs.). The routine physical examination, hematology and urinalysis were done and temperature, respiratory rate and pulse rate was found within normal range between the groups. The digital rectal examination of prostate gland was done in standing position and the prostate was found unapproachable. The study II was conducted on 19 animals that were presented to Referral Veterinary Polyclinic and Teaching Veterinary Clinical Complex with history of dysuria, haematuria, dyschezia, constipation etc. suggesting the involvement of prostate gland. The overall hospital occurrence for all prostate affections was 0.8% in male dog population while higher incidence was found in dogs above 4 years of age. Labrador Retriever (32%) was found most affected breed, followed by German Shepherd (16%) and Spitz (16%). Most of animals showed lower urinary tract disease symptoms (58%) followed by GIT (53%) and systemic illness (26%). The temperature, respiratory rate and pulse rate were higher in clinical group. The digital rectal examination revealed symmetrically enlarged prostate, pain and discomfort on gentle manipulation of the gland.

Keywords: prostate, digital rectal palpation, hematology, urinalysis, dysuria, hematuria

Introduction

The prostate gland is an accessory male sex gland having a spherical and bilobed structure which encircles the proximal urethra of male dogs. Prostatic disorders are frequently reported in older intact dogs. The most common clinical condition associated with prostate is benign prostatic hyperplasia (BPH) (Bauzaitė and Aničiūtė, 2003) [1] followed by squamous metaplasia, bacterial prostatitis, prostatic abscesses, cysts and prostatic neoplasia, of which adenocarcinoma of the gland is most frequently encountered neoplasia (Pacliková *et al.*, 2006) [2].

Dhivya *et al* (2012) [3] reported the incidence of BPH as age and breed related and depends on age related alterations in testosterone and estrogen ratios with the increasing estrogen concentrations regulating the expansion of androgen receptors on prostatic cells. There is no breed predisposition for BPH and it may occur in any intact male dog. Virtually all non-neutered males >7 years of age were affected by BPH, with the process initiating between sexual maturity and 4 years of age (Leav *et al.* 2001a) [4].

Wilson (2011) [5] found that pathological conditions affecting the prostate are common in dogs and their incidence increases with age. Non-neutered dogs were over presented than the neutered ones. Poliska *et al* (2016) [6] studied the epidemiological features and investigate the incidence of prostatic disorders in a retrospective study of 72,300 adult male dogs and concluded that large dogs were found significantly affected by prostatic disorders except prostate neoplasia. The mean age reported for occurrence of prostatic disorders was 8.6 ± 3.2 years.

The rectal examination provides information about the size, shape, symmetry of two lobes, contour, consistency of the gland as well as its surface, temperature and pain on palpation of the gland (Dorfman and Barsanti, 1995b, Memon (2007) [7, 8].

Mukaratirwa and Chitura (2007) [9] conducted the experiment on histological prevalence of subclinical prostatic diseases in a canine mixed breed population and the reliability of the digital rectal examination as a screening test for the same. It has been concluded that digital rectal examination had high specificity (75%) and a positive predictive value (87%), but a low

sensitivity (53%) and a negative predictive (34%) value affirming the digital rectal examination is a good preliminary screening test for diagnosing prostatic diseases. However, rectal palpation of the prostate is feasible in small to medium-sized dogs and not in giant-dogs. Hence, specific examination, including imaging techniques and laboratory findings should follow the rectal examination (Debiak and Balicki, 2009)^[10].

The prostatic growth and its secretion are under the control of dihydrotestosterone (DHT), which originates from testosterone (T) due to the action of 5- α reductase (Berry *et al.*, 1986)^[11]. The hematological parameters are important in animals in which the prostate disorders lead to systemic symptoms. Leucocytosis and neutrophilia with a shift to the left are characteristics of acute prostatitis while blood count may remain within the normal range in cases of chronic prostatitis. The blood biochemistry may reveal uraemia in case of prostatic neoplasia due to obstruction of urethra or ureters (Barsanti and Finco, 1989)^[12]. The urinalysis may show the presence of blood, pus, bacteria, changes in pH due to infection, leukocytes in acute as well as chronic inflammation of prostate (Dorfman and Barsanti 1995a)^[13]. A study on prostate cancer in 24 dogs showed pyuria and hematuria in 62% and 66%, respectively (Bell *et al.* 1991)^[14]. With this introduction, the objectives of the present study were

1. To study the hospital occurrence of different prostatic conditions (BPH, prostatitis, prostatic neoplasia, and prostatic cyst) in dogs at Referral Veterinary Polyclinic and Teaching Veterinary Clinical Complex, Indian Veterinary Research Institute, Izatnagar, Bareilly, UP.
2. Analysis of the digital rectal examination as a screening test for prostate enlargement.
3. Clinical observations in prostate affection

Materials and Methods

The present study was conducted in client owned on sexually intact male dogs in age ranging between 6 months and 13 years and weighing between 8kg and 50kg, presented to Referral Veterinary Polyclinic cum Teaching Veterinary Clinical Complex, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, from November 2016 to April 2017. The study was conducted in two parts:

Study- I: Study on healthy dogs

Study- II: Study on dogs with prostatic affections

Study on healthy dogs

The part I of study was conducted on apparently healthy, intact male dogs presented to institute polyclinic.

Table 1: Group wise distribution of healthy animals

Group	Age (years)	No. of animals
A	0.5	08
B	4-9	12
C	>9	06
Total		26

A total of 26 intact dogs were presented to RVP and TVCC with minor injuries or for vaccination were included in the part I study. The animals were grouped in different categories according to their age as presented in the Table 1.

Study on dogs with prostatic affections (Clinical group)

This study was conducted on 19 sexually intact male dogs,

aged 2 to 14 years, weighing 10 to 45 kg, presented with a history of difficulty in urination and defaecation, bleeding while urination, long standing constipation and other signs related to prostate affections, at Referral Veterinary Polyclinic cum Teaching Veterinary Clinical Complex, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh (243122), from a period of November 2016 to April 2017.

All the animals involved in the present study were categorized according to their age, breed and systemic involvement.

Table 2: Age wise distribution of animals affected with prostatic conditions

Group	Age (years)	No. of animals
A	2-4	4
B	4-9	10
C	>9	5
Total		19

Clinical examination

The routine clinical examination was carried out on the day presented to polyclinic, in healthy as well as in diseased dogs. Clinical examination included recording of rectal temperature, respiration rate, pulse rate and rectal palpation before the radiographic and sonographic examination.

The rectal temperature ($^{\circ}$ F) was recorded with the help of clinical thermometer. The pulse rate was recorded from femoral artery located on the medial aspect of thigh (pulse/minute). The respiratory rate was recorded either from the movement of chest with every expiration or inspiration (in breath/minute), or by putting the back of palm in front of nostrils and counting the number of time the animal exhaled in a minute.

The Prostate gland was examined with gloved hand in standing animal through per rectal digital examination. The caudo-dorsal abdominal pressure was applied using one hand, and when the neck of the bladder and prostate gland shifted to pelvic inlet, simultaneously finger tips of other hand were used to perform digital examination of the caudal aspect of prostate. The gland was assessed for the size, symmetry of the right and left lobe of the gland, consistency of the gland, surface texture, temperature and occurrence of pain on palpation.

Hematological examination

Two milliliters (2ml) of blood was collected in tubes containing EDTA for evaluation of hematological parameters on the day of examination. The hemoglobin concentration (gm %), packed cell volume (%), total leucocyte count (TLC in 1000/ml of blood) and differential leucocyte count (DLC in %) was estimated by auto analyzer.

Urinalysis

The urine samples were collected aseptically in sterile containers through catheterization of urinary bladder, at the time of presentation of animal before radiographic and sonographic examination. The urine samples were analyzed on the same day for physical, microscopic and cytological findings. The physical examination included the recording of colour, odour, pH and specific gravity. Microscopically, urine was examined for the presence of cast, crystals, bacteria, pus cells and different types of cells like erythrocytes and leucocytes. The culture sensitivity test was also performed.

Results and Discussion

All the animals involved in the study were categorized according to the age, breed and systemic involvement. The prostate disorders are one of the most common complications in middle to old-aged dogs. In the present study, prostatic affections were mostly observed in middle to old age. All the dogs having prostatic affections were sexually intact and 15 out of 19 dogs were more than 4 years of age, indicating the progressive increase in the incidence of prostatic affections as the age of the animal increases. Collectively, about 78% of animals (more than 4 years of age) having prostatic affections. Maximum incidence was observed in dogs aging between 4 and 9 years among which most of the animals were between 6.5 to 10 years of age. This finding was in accordance with Olsen *et al.* (1987) [15], who reported that occurrence of prostate diseases were most common in middle to old-aged dogs. However, median age of incidence observed for occurrence of prostatic affection was 7.5 years in present study. This finding supported the study of Krawiec and Heflin (1992) [16] and Poliska *et al.* (2016) [6], in which the mean age at onset of prostate affection was 8.9 years and 8.2 years respectively. It was emphasized that prostate diseases had greater frequency in older animals.

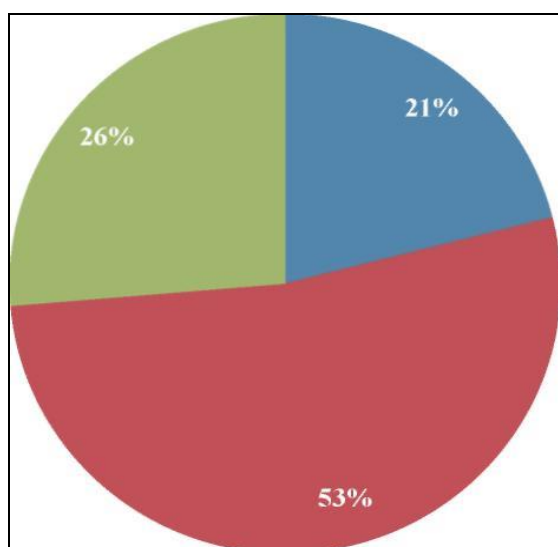


Fig 1: Age wise distribution of animals affected with prostatic conditions (Group A- 26%, Group B- 53%, group C- 26%)

Table 3: Mean±SD values of rectal temperature, respiratory rate and pulse rate at the time of presentation in animals affected with prostatic conditions

	Group	Temperature (of)	Respiration Rate (Breaths/min)	Respiration Rate (Breaths/min)
Healthy Group	A	101.4±0.10	31±0.11	81±3.49
	B	100.8±0.12	29±0.21	78±4.21
	C	101.1±0.11	28±0.17	77±5.21
Clinical Group		102.4±0.27	35±0.24	86±6.24

Rectal palpation of the prostate gland

In present study, digital rectal examination of prostate gland with animal in standing position was tried but it was found that prostate was not approachable through per rectal route in any of the apparently healthy animal.

In clinical group the rectal palpation of the prostate was much easier in small to medium sized breeds as compared to large and giant breeds. Similar results were obtained by Debiak and Balicki (2009) [10], who reported that digital rectal examination was a good preliminary screening test for the diagnosis of prostate diseases especially in small to medium

The total population studied in present study was 2% of the canine population recorded during 6 months of study period. Out of this, the hospital occurrence of different prostatic affection was found 0.8% in total population of 2,330 dogs in the present study. Poliska *et al.* (2016) [6] also reported the incidence of prostatic disorders 0.7% in their study. However, in this 0.8% population the prostatomegaly was an incidental finding most of the times. Hence, the actual incidence of prostatic affections was calculated in those animals referred to ultrasonographic examination for any other systemic involvement during 6 months period. The actual incidence of prostatic affections was found 9.6% in total 198 sonographic examinations in present study.

Further breed wise distribution of prostatic affection showed that Labrador retriever dogs had highest hospital occurrence of prostate diseases accounting for approximately 31.5% of the total cases, followed by German shepherd and Indian Spitz dogs, with 15.7% cases each. Other breeds showed sporadic incidence with either 1 or 2 cases during the course of study. This finding was contrary to the report of Krawiec and Heflin (1992) [16], in which Doberman Pinscher was the most commonly affected breed. This difference might be due to larger population of Labrador retriever, German shepherd and Indian Spitz dogs in Bareilly city and adjoining areas as compared to the other breeds. Poliska *et al.* (2016) [6] also found large dogs significantly affected by prostate disorders.

Physical examination

The mean± SD of rectal temperature, pulse rate and respiratory rate recorded at the time of examination of animals is shown in Table 3. The values of physiological parameters were within normal limits. The mean rectal temperature, respiratory rate and pulse rate in animals having prostatic affections were found within the normal range. However, in some animals having prostatic affections, there was an elevated rectal temperature, heart rate and respiratory rate. This might be due to systemic involvement of the ongoing inflammatory and infectious process. However, in most of the animals, more than one of the above mentioned clinical symptoms was observed. Johnston *et al.* (2001a) [17] and Maurey-Guenec (2007) [18] reported that hyperthermia and progressive deterioration of the body condition were observed only in certain prostatic diseases like prostatic abscess, prostatic cyst.

sized dogs like Spitz, Labrador retriever and Dobermann. It was also reported that in large and giant breeds, digital rectal palpation of prostate was either not feasible or inconsistent in most instances. Further, in present study, the prostate gland was palpated as spherical to oval shaped structure having smooth surface with well-defined contours during digital rectal palpation as reported by Dorfman and Barsanti (1995b) [7]. Most of the animals in which the gland was palpable evinced pain and discomfort during per rectal examination in some animals which showed systemic involvement.

Hematological examination

The blood sample was collected for evaluation of various hematological parameters on the day of examination. The mean \pm SD of hemoglobin (%), PCV (%), TLC ($10^3/\text{dl}$) and DLC (%) is presented in table 4. It is observed that all these physiological parameters had a mean \pm SD within the physiological normal range. Further, no significant variation was observed among the groups. Slight individual variation but statistically non significant ($p > 0.05$) was observed depending on the history, clinical sign and differences in the hydration status of the animal at the time of presentation. In present study most of the affected animals had a normal

hemogram. Some of the animals showed mild leucocytosis and neutrophilia with shift to left. However, contrary to present, Singh (2009) [19] and Mahajan (2007) [20], have reported anaemia as a major finding in dogs affected with prostate hyperplasia together with leucocytosis. Dorfman and Barsanti (1995a) [13] reported that leucocytosis with left shift along with neutrophilia which was indicative of acute inflammation of the gland. The blood count may remain in normal limits in chronic inflammation. Though, the hemogram of the animals was within the normal range, cell count was closer to the upper normal limit.

Table 4: Mean \pm SD values of haemoglobin, packed cell volume, total leucocyte count and differential leucocyte count comparison between clinically healthy and affected animals

Group	Hb	PCV		TLC	DLC	
	(gm%) (%)	($10^3/\text{dl}$)	N (%)	L (%)	M (%)	
Healthy Group	13.87 \pm 1.81	41.38 \pm 8.30	1.21 \pm 0.42	66.40 \pm 14.50	21.85 \pm 9.42	1.65 \pm 1.49
Clinical Group	13.87 \pm 2.49	41.32 \pm 7.38	1.28 \pm 0.29	71.26 \pm 5.14	23.20 \pm 4.16	1.53 \pm 1.51

Urinalysis

The analysis of urine samples was performed in all the animals of clinical group and it revealed slight variations in colour, odour, pH, specific gravity, protein, pus cells. The colour of urine varied from pale yellow to blood tinged in animals affected with enlarged prostate due to prostatitis, prostatic hyperplasia etc. The odour was normal to offensive while pH ranged from 6.5 to 7.5. The specific gravity of urine was normal (1.010 to 1.020) in animals of clinical group. However in some cases, mild to moderate proteinuria was observed.

The microscopic examination of urine revealed normal to mild increase in the number of erythrocytes in urine except for two samples that showed 7-8 and 30-40 erythrocytes per high power field (hpf). The number of epithelial cells ranged from 1-2 to 7-8 per hpf while pus cells ranged from 2-4 to 17-18 per hpf in most of the cases. In some cases a high pus cell count upto 60 to 70 per hpf was observed in urine. The urine culture examination revealed presence of *Pseudomonas aeruginosa* and *E. coli* in urine possibly due to ascending infection from lower urinary tract.

In present study the urinalysis in healthy animals revealed normal colour and odour of urine in all the dogs of different groups. The urinary protein and pus cells were within normal physiological range. The pH of urine ranged from 6.0 to 6.5 and specific gravity between 1.010 and 1.020. The urine pH and specific gravity were found within normal range in all the groups of healthy animals. The microscopic examination of urine revealed that erythrocytes, epithelial cells and pus cells were within the normal physiological range and values varied from 0 to 2-3 per high power field (hpf).

The urinalysis revealed normal physical appearance of the urine (colour, pH, specific gravity) in most of the animals. However, in some animals, blood-tinged, foul smelling urine was also observed. The cytological examination of urine revealed a varying number of epithelial cells, pus cells, RBCs with abnormally high count in some cases. The bacteria most commonly isolated from the urine include *Escherichia coli* and *Pseudomonas aeruginosa*. Barsanti and Finco (1979) [21] described hematuria to be associated to any mechanical obstruction like neoplasia, urolith, trauma or inflammation unrelated to infection. The foul odour of the urine might have occurred due to the bacterial degradation of the proteins present in the urine (Osborne and Lees, 1995b). Further,

Osborne and Lees (1995b) [22] also reported the presence of RBCs $>5/\text{HPF}$ and WBCs $>5/\text{HPF}$ with simultaneous presence of bacterial infection as an indicator of lower urinary tract infection.

Clinical manifestation of prostate affections

The most common clinical findings in present study were dysuria, hematuria, constipation, dyschezia, round or flattened stool, inappetance and progressive deterioration of the body condition. These findings are in accordance with Johnston *et al.* (2001a) [17] and Maurey-Guenec (2007) [18], who reported that the clinical signs commonly associated with prostatic diseases include, intermittent preputial discharge mixed with blood, hematuria towards the end of urination, dysuria, constipation, diarrhea, flattened stools and progressive deterioration of the body condition. The system wise involvements of prostate affections are shown below in Table no 5.

Table 5: Clinical manifestations observed in different animals affected with prostatic diseases

S. No.	Organ system involved	Number of cases
1	Systemic illness (including elevated RT, HR, RR)	5 out of 19 (26.3%)
2	Lower Urinary Tract (involvement with hematuria)	11 out of 19 (57.8%)
3	Gastro-intestinal disorders (Dyschezia and Constipation)	10 out of 19 (52.6%)
4	Locomotor Difficulty	1 out of 19 (5.2%)
5	Non-Specific	1 out of 19 (5.2%)

Conclusion

The overall hospital occurrence for all prostate affections was 0.8% in male dog population while higher incidence was found in dogs above 4 years of age. Labrador Retriever (32%) was found most affected breed, followed by German Shepherd (16%) and Spitz (16%). Most of animals showed lower urinary tract disease symptoms (58%) followed by GIT (53%) and systemic illness (26%). The temperature, respiratory rate and pulse rate were higher in clinical group. The digital rectal examination can be used for diagnosing prostatic diseases in small to medium-sized dogs the digital rectal examination revealed symmetrically enlarged prostate, pain and discomfort on gentle manipulation of the gland.

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