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## Hematological and biochemical analysis of benign prostatic hyperplasia treatment in dogs: Finasteride vs. Castration

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### Abstract

Canine prostatic disorders, which are mainly benign prostatic hyperplasia (BPH), significantly impact old male dogs. This study investigated hematological and biochemical changes in 24 intact male dogs with BPH and compared the effects of finasteride (Group I, n = 12) and castration (Group II, n = 12) over a period of 45 days. Before and after treatment, Hematological parameters (hemoglobin, PCV, TEC, TLC, DLC), biochemical markers (BUN, creatinine, ALP, SGPT, SGOT), and the serum biomarker DHT were evaluated. In the pre-treatment group, dogs showed reduced hemoglobin and PCV levels, with elevated BUN, creatinine, and ALP levels, which indicates renal and hepatic stress. Neutrophilia was noticed in BPH cases. After treatment, these parameters showed significantly normal ( $p \leq 0.05$ ) in both groups, with castration demonstrating slightly greater improvement in biochemical markers.

**Keywords:** Benign prostatic hyperplasia, hematological analysis, biochemical analysis, finasteride, castration

### Introduction

Benign prostatic hyperplasia (BPH) is common in uncastrated male dogs. BPH affects more than 80% of dogs older than 5 years (Johnston *et al.*, 2000) [9]. Urinary and digestive complications resulting from prostate enlargement and compression of adjacent structures (Alonge *et al.*, 2018) [2] are the primary symptoms. Hematological, biochemical, and serum biomarker analyses, including dihydrotestosterone (DHT), are necessary for evaluating systemic health, detecting internal complications, and monitoring treatment efficacy. When the blood biochemical parameters, such as blood urea nitrogen (BUN), creatinine, and alkaline phosphatase (ALP) are elevated, it indicates renal or hepatic stress, while hematological changes, such as reduction in hemoglobin or neutrophilia, may indicate chronic blood loss or infection (Das *et al.*, 2017) [5]. This study evaluates hematological and biochemical changes in dogs with BPH and compares outcomes of medical (finasteride, Group I) and surgical (castration, Group II) interventions.

### Materials and Methods

**Study Population:** Twenty-four intact male dogs, above 5 years of age and exhibiting clinical signs of prostatic disorders (e.g., hematuria, dysuria, tenesmus), were selected at the Department of Veterinary Gynaecology and Obstetrics, West Bengal University of Animal and Fishery Sciences, from March 2023 to December 2023. After taking the owners' concerns into account, the affected dogs were divided into two groups. Group I and Group II, with 12 dogs in each. Group I received finasteride (0.5 mg/kg/day, orally) for 45 days, and Group II underwent open castration under general anesthesia (Fossum, 2018) [6].

**Diagnostic and analytical procedures:** For Hematological Analysis, blood samples were collected in EDTA tubes on day 0 (before treatment) and day 45 (after treatment). Hemoglobin (g/dL), PCV (%), TEC ( $\times 10^6/\mu\text{L}$ ), TLC ( $\times 10^3/\mu\text{L}$ ), and DLC (neutrophils, lymphocytes, monocytes, eosinophils, and basophils) were measured and summarized in

Table 1. For Biochemical Analysis, serum samples collected before treatment (day 0) and after treatment (day 45) were analyzed for BUN (mg/dL), creatinine (mg/dL), ALP (IU/L), SGPT (IU/L), and SGOT (IU/L). Results are presented in Table 2. Serum DHT levels were measured using a 96-well ELISA kit. For Data Analysis, parameter data were compiled, and standard statistical methods described by Snedecor and Cochran (1967) [13] were used to evaluate the results.

## Results

**Hematological Findings:** Hemoglobin levels were low in both groups of dogs before treatment. Group I had 11.8 grams per deciliter (g/dL), and Group II had 11.6 g/dL, both below the normal range of 12-18 g/dL. The packed cell volume (PCV) was also low. PCV for Group I was 35.2%, and for Group II was 34.8%, while the normal range is 37-

55%. This was due to blood in their urine. The total erythrocyte count (TEC) was slightly low, with Group I at 5.1 million cells per microliter and Group II at 5.0 x10<sup>6</sup>/μL (normal is 5.5-8.5 x10<sup>6</sup>/μL). The total leucocyte count (TLC) was normal in both groups, with Group I at 10.2 x10<sup>3</sup>/μL and Group II at 10.4 x10<sup>3</sup>/μL (normal is 6-17 x10<sup>3</sup>/μL). However, in dogs with BPH, the neutrophil count was elevated: 75.6% in Group I and 76.1% in Group II (normal, 60-70%).

After treatment, hemoglobin levels improved to 14.2 g/dL in Group I and 14.5 g/dL in Group II, both within the normal range. The PCV also normalized, at 41.3% in Group I and 42.1% in Group II. Neutrophil counts decreased to 65.4% in Group I and 64.8% in Group II among dogs with prostatitis. No significant differences were observed between the two groups after treatment.

**Table 1:** Hematological values (Mean ± SE) of both groups. means with different superscripts row wise under each character differ significantly at  $p \leq 0.05$ .

| Blood parameters           | Groups   | Day 0                 | Day 45                | Normal Range |
|----------------------------|----------|-----------------------|-----------------------|--------------|
| Hemoglobin (g%)            | Group I  | 11.8±1.2 <sup>x</sup> | 14.2±0.9 <sup>y</sup> | 12-18        |
|                            | Group II | 11.6±1.3 <sup>x</sup> | 14.5±0.8 <sup>y</sup> |              |
| PCV (%)                    | Group I  | 35.2±3.4 <sup>x</sup> | 41.3±2.8 <sup>y</sup> | 37-55        |
|                            | Group II | 34.8±3.6 <sup>x</sup> | 42.1±2.6 <sup>y</sup> |              |
| TLC (x10 <sup>6</sup> /mL) | Group I  | 10.2±1.8              | 15.2±0.8              | 6-17         |
|                            | Group II | 10.4±1.9              | 13.5±0.6              |              |
| TEC(x10 <sup>3</sup> /mL)  | Group I  | 5.1±0.6               | 7.16±0.22             | 5.5-8.5      |
|                            | Group II | 5.0±0.7               | 6.74±0.21             |              |
| Neutrophils (%)            | Group I  | 75.6±4.2              | 65.4±3.1              | 60-70        |
|                            | Group II | 76.1±4.5              | 64.8±3.0              |              |
| Lymphocytes (%)            | Group I  | 18.7±3.3              | 19.5±2.9              | 8-21         |
|                            | Group II | 15±1.6                | 18±2.4                |              |
| Eosinophil (%)             | Group I  | 5.20±0.6              | 6.5±2.6               | 0-9          |
|                            | Group II | 5.5±1.3               | 5.4±2.7               |              |

## Biochemical Findings

Before treatment, levels of BUN (blood urea nitrogen), creatinine, and alkaline phosphatase (ALP) were higher than normal. In Group I, BUN was 32.4±4.5 mg/dL, creatinine was 1.8±0.3 mg/dL, and ALP was 180±25 IU/L. In Group II, BUN was 33.1±4.7 mg/dL, creatinine was 1.9±0.4 mg/dL, and ALP was 185±27 IU/L (Table 2). This suggests kidney and liver stress, as these results were statistically significant ( $p \leq 0.05$ ). Levels of serum glutamic-pyruvic transaminase (SGPT) and serum glutamic-oxaloacetic transaminase (SGOT) were normal and within limits in both groups.

After treatment, BUN levels decreased to 18.2±2.1 mg/dL in Group I and 17.5±1.9 mg/dL in Group II. Creatinine dropped to 1.1±0.2 mg/dL in Group I and 1.0±0.2 mg/dL in Group II. ALP also improved to 110±15 IU/L in Group I and 105±14 IU/L in Group II. Both groups showed greater improvement in BUN, creatinine, and ALP ( $p \leq 0.05$ ). SGPT and SGOT levels remained stable.

Before treatment, DHT (dihydrotestosterone) levels were high. After treatment, DHT decreased significantly by 76.82% in Group I, from 10.13±0.91 to 2.39±0.27 nmol/L. In Group II, DHT decreased by 77.8%, from 8.29±0.92 to 1.84±0.204 nmol/L, which is closer to the normal range of 0.45-2.65 nmol/L.

**Table 2:** Serum biochemical & hormonal parameters (Mean ± SE) of both the groups. means with different superscripts row-wise under each character differ significantly at  $p \leq 0.05$ .

| Serum biochemical & serum biomarker DHT parameters | Groups   | Day 0                   | Day 45                  | Normal Range |
|----------------------------------------------------|----------|-------------------------|-------------------------|--------------|
| Blood urea nitrogen (mg/dL)                        | Group I  | 32.4±4.5 <sup>x</sup>   | 18.2±2.1 <sup>y</sup>   | 8-28         |
|                                                    | Group II | 33.1±4.7 <sup>x</sup>   | 17.5±1.9 <sup>y</sup>   |              |
| Serum creatinine (mg/dL)                           | Group I  | 1.8±0.3 <sup>x</sup>    | 1.1±0.2 <sup>y</sup>    | 0.5-1.5      |
|                                                    | Group II | 1.9±0.4 <sup>x</sup>    | 1.0±0.2 <sup>y</sup>    |              |
| Alkaline phosphatase (IU/L)                        | Group I  | 180±25 <sup>x</sup>     | 110±15 <sup>y</sup>     | 20-150       |
|                                                    | Group II | 185±27 <sup>x</sup>     | 105±14 <sup>y</sup>     |              |
| Serum Calcium (mg/dL)                              | Group I  | 11.2±0.7                | 10.1±0.2                | 9.1-11.7     |
|                                                    | Group II | 10±0.2                  | 9.5±0.2                 |              |
| SGPT (IU/L)                                        | Group I  | 42±6                    | 41±3                    | 10-50        |
|                                                    | Group II | 44±7                    | 45±7                    |              |
| SGOT (IU/L)                                        | Group I  | 38±5                    | 35±5                    | 10-50        |
|                                                    | Group II | 39±6                    | 40±4                    |              |
| Serum Phosphorus (mg/dL)                           | Group I  | 4.5±0.3                 | 3.67±0.098              | 2.9-5.3      |
|                                                    | Group II | 4±0.2                   | 4±0.1                   |              |
| Canine DHT (nmol/L)                                | Group I  | 10.13±0.91 <sup>x</sup> | 2.39±0.27 <sup>y</sup>  |              |
|                                                    | Group II | 8.29±0.92 <sup>x</sup>  | 1.84±0.204 <sup>y</sup> |              |

## Discussion

Before treatment, reductions in hemoglobin and PCV were observed in 25% of dogs, mainly due to hematuria from prostatic enlargement (Das *et al.*, 2017) <sup>[5]</sup>. Corrada *et al.* (2004) <sup>[4]</sup> and Barsanti (2008) <sup>[3]</sup> reported similar findings; they also reported neutrophilia in BPH cases, indicating an inflammatory response and infection (Akram *et al.*, 2025) <sup>[1]</sup>. Normalization of these parameters after treatment reflects resolution of hematuria and infection, which may be due to reduced prostate size and elimination of androgen-driven hyperplasia in dogs, achieved through finasteride treatment and castration (Sirinarumitr *et al.*, 2001) <sup>[12]</sup>. Before treatment, elevated BUN and creatinine levels suggest renal stress from urethral obstruction; the same finding was reported by Mahendran *et al.* (2013) <sup>[10]</sup>. Both finasteride and castration effectively managed canine prostatic disorders and normalized hematological, biochemical, and DHT levels. The significant reduction in DHT in both groups supports the role of androgens in BPH, as noted by Gloyna *et al.* (1970) <sup>[7]</sup> and Isaacs & Coffey (1981) <sup>[8]</sup>. Castration may more effectively reduce DHT and prostatic size by completely removing testicular androgens, whereas finasteride inhibits DHT production through 5 $\alpha$ -reductase inhibition. The normalization of biochemical parameters indicates improvement of renal and hepatic stress. The improved results of castration are similar to findings by Corrada *et al.* (2004) <sup>[4]</sup> and Barsanti (2008) <sup>[3]</sup>. Finasteride is a better option for dogs at risk of anesthesia, as supported by Menon *et al.* (2011) <sup>[11]</sup>.

Hematological and biochemical tests are necessary for diagnosing and monitoring canine prostatic diseases. Dogs with BPH exhibited decreased hemoglobin and PCV, along with increased BUN, creatinine, and ALP, indicating systemic problems. Normalization in Post-treatment dogs confirm the effectiveness of both finasteride and castration. Castration showed slightly better laboratory results. Both treatments are effective, while with castration showed greater reductions in prostatic size and DHT levels. Finasteride serves as a good non-surgical alternative for high-risk patients. Continuous assessment of blood, biochemical, and biomarker parameters is necessary to evaluate treatment success and ensure the overall health of the patient.

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