

# Clinical Studies on Haemato-Biochemical Attributes in Pyometra Affected Dogs

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**Abstract:** In the present study attempt was made to assess the haemato-biochemical changes in normal healthy (n=9) and pyometra (n=15) dogs belongs to six different breeds. The presumptive clinical diagnosis of pyometra was made based on clinical history, signs and ultrasonographic examination. The diagnosis was further confirmed by gross examination of pus-filled uterus after the ovariohysterectomy. The study revealed alterations in the total erythrocyte count, haemoglobin and packed cell volume with normocytic and normochromic anaemia in pyometra cases. The leucogram revealed leucocytosis, predominant absolute neutrophilia, lymphopenia. No significant changes were noticed in serum creatinine and alanine aminotransferase levels.

**Keywords:** Haematology, Biochemistry, Dog, Pyometra

## 1. Introduction

Pyometra is a hormonally mediated acute or chronic polystemic diestral disorder [1] and fatal in bitch if not treated [2]. The condition is common in countries where routine spaying of young dogs is not in vogue. The severity of the condition was assessed based on haemato-biochemical changes [3]. In canine pyometra a mild normocytic, normochromic, non-regenerative anaemia is most frequently seen, which progresses to a microcytic, hypochromic anaemia [4] and characterized by leucocytosis with neutrophilia and lymphopenia [5]. The aim of present study was to assess the changes in haematological attributes of dogs affected with pyometra.

## 2. Materials and Methods

The study was carried out in 15 clinical cases of canine pyometra presented for treatment at Department of Veterinary Gynaecology and Obstetrics, Veterinary College, Bengaluru. Further, nine healthy non pregnant dogs presented for routine ovariohysterectomy were considered for comparison of haematological attributes. After retrieval of history and sonographic evaluation 2 ml of blood was collected from each affected and healthy animals. About 1ml of blood was poured into a sterile vial containing anticoagulant EDTA (2 mg/ml) for haematological studies. Remaining blood was collected in a test tube and was allowed for clotting, serum was separated out by centrifugation and supernatant was then collected in sterile vials. Total erythrocyte count (TEC), haemoglobin (Hb), packed cell volume (PCV), mean corpuscular haematocrit (MCH), mean corpuscular volume (MCV), mean corpuscular haematocrit concentration (MCHC), total leucocyte count (TLC), differential leucocyte count (DLC), serum creatinine and alanine aminotransferase (ALT) were carried out as per the procedure described by Jain [6]. The data obtained was subjected to statistical analysis using "t" test [7].

## 3. Results

There was significant decrease ( $P > 0.05$ ) in the, TEC, PCV, Hb and TLC in pyometra affected female dogs as compared to healthy group. In the present study although, neutrophilia with regenerative shift to left, and lymphocytopenia was noticed in pyometra affected dogs, however, the difference was not significant. The mean percentages of neutrophils, lymphocytes, monocytes and eosinophils in pyometric dogs were  $80.81 \pm 1.99$ ,  $15.00 \pm 1.90$ ,  $3.50 \pm 0.40$  and  $0.34 \pm 0.23$ , respectively. The corresponding values in normal healthy dogs were  $71.54 \pm 6.23$ ,  $24.00 \pm 6.0$ ,  $4.10 \pm 0.40$  and  $0.78 \pm 0.57$ , respectively. The mean serum creatinine (mg/dl) was increased in pyometra affected dogs as compared to healthy dogs ( $1.37 \pm 0.26$  vs  $0.74 \pm 0.05$ ).

**Table 1:** Haematobiochemical values of these parameters are illustrated in

Parameter	Healthy	Pyometra
TEC ( $\times 10^5$ cells/cmm)	$6.60 \pm 0.25^a$	$5.30 \pm 0.32^b$
PCV (%)	$44.00 \pm 2.50^a$	$33.00 \pm 2.10^b$
Hb (g%)	$16.00 \pm 0.77^a$	$12.00 \pm 0.86^b$
MCH (pg)	$24.00 \pm 0.73$	$23.00 \pm 0.94$
MCV (fL)	$66.00 \pm 2.70$	$63.00 \pm 1.70$
MCHC (%)	$37.00 \pm 2.700$	$37.00 \pm 1.20$
TLC ( $\times 10^3$ cells/cmm)	$15.00 \pm 2.30^a$	$40.00 \pm 7.20^b$
Neutrophils (%)	$71.54 \pm 6.23$	$80.81 \pm 1.99$
Lymphocytes (%)	$24.00 \pm 6.00$	$15.00 \pm 1.90$
Monocytes (%)	$4.10 \pm 0.40$	$3.50 \pm 0.40$
Eosinophils (%)	$0.78 \pm 0.57$	$0.34 \pm 0.23$
Platelets ( $\times 10^3/\mu\text{L}$ )	$270.00 \pm 26.00$	$210.00 \pm 46.00$
Creatinine (mg/dL)	$0.74 \pm 0.05$	$1.37 \pm 0.26$
ALT (U/L)	$26.00 \pm 3.60$	$38.00 \pm 7.70$

\*Values bearing different superscripts are significantly different

## 4. Discussion

### Influence of pyometra on total erythrocyte count

In the present study, the mean total erythrocyte count was significantly decreased in the pyometra dogs indicating anaemia [5], [8] which might be due to loss of erythrocytes

into the lumen of uterus coupled with toxic depression of bone marrow ([8]).

#### **Influence of pyometra on haemoglobin (Hb)**

A significant decrease in mean haemoglobin level was observed in pyometra dogs indicating anaemia in the present study. The findings of the present study are in concordance with the previous reports [3], [5], [8]. This might be due to loss of red blood cells by diapedesis into uterine lumen apart from depressed feed intake and impaired erythropoiesis under toxæmic condition in severely affected cases [8]. Anaemia might also be due to toxic effects on the bone marrow, decreased erythrocyte viability and loss of erythrocytes to the uterine lumen in dogs affected with pyometra [4].

#### **Influence of pyometra on packed cell volume**

In the present study, a significant decrease in the mean PCV level with no change in MCV, MCH and MCHC was observed in dogs affected with pyometra indicating a mild normocytic, normochromic and regenerative type of anaemia. This finding is in accordance with the previous reports [4], which might be due to concomitant dehydration [4].

#### **Influence of pyometra on total leukocyte count**

The most consistent finding in the present study was leucocytosis among the dogs affected with pyometra, which is in agreement with the previous reports [5], [8]. Leucocytosis is associated with the ongoing systemic infection and to the increased stress on the defence mechanism [4], which in turn produced increased leucocytes to combat the infection [5]. Different degree of leucocytosis was also observed in pyometra dogs which might be due to varied severity of the inflammation [8].

#### **Influence of pyometra on differential leukocyte count**

In the present study, neutrophilia with shift to left, lymphopenia with normal eosinophil count was observed in pyometra dogs. Neutrophilia and lymphopenia were common in pyometra [9], [4]. Neutrophilia with regenerative shift to the left might be due to uterine infection, which exerts a chemotactic effect on neutrophils resulting into accelerated granulopoiesis and lymphopenia might be due to severe stress. Neutrophilia is a typical feature in haematology of bitches affected with pyometra [10] which might be due to influence of toxins in pyometra and their degenerative effect on the neutrophils [11]. Affected dogs also show a decreased haemoglobin, PCV, TEC and lymphocyte count, indicating a normocytic, normochromic anaemia, which reflects the chronic nature of the condition and the toxic suppression on the bone marrow ([12], [4]). In the present study, monocytes and eosinophils count did not vary significantly and found within normal physiological range. The values obtained in the present study in the dogs with pyometra are in close conformity with those reported by Dave [13].

#### **Influence of pyometra on Serum Creatinine and ALT**

In the present study, the mean serum creatinine (mg/dL) of pyometra dogs was  $1.37 \pm 0.26$ , while it was  $0.74 \pm 0.05$  in healthy dogs. Impaired renal function has been reported as a common feature of canine pyometra. As a consequence of

dehydration, pre-renal azotemia will occur. This condition is reflected in the increased concentrations of serum creatinine. Stone *et al.* [14] found azotemia in 26 per cent of pyometra dogs (serum creatinine value greater than 1.2 mg/dl). Chojong and Kimhyesod [15] and Sharma [16] have also reported high serum creatinine concentration in dogs with pyometra.

The respective mean activities of serum alanine aminotransferase (ALT) enzymes in pyometric and healthy dogs were  $38.00 \pm 7.70$  and  $26.00 \pm 3.60$  U/L. These alterations reflect the function of the liver, including hepatocellular damage due to toxæmia or the impaired hepatic circulation due to dehydration [11]. In the present study, also an increase ALT was noticed in dogs with pyometra. The serum ALT values in both healthy and pyometric dogs were well within normal physiological limits prescribed for dogs. However, Hagman [17] also noticed that serum ALT values were within normal range even in pyometric dogs.

## **5. Conclusion**

Haemato-biochemical evaluation revealed decreased Hb, PCV, TEC and lymphocyte count indicating normocytic and normochromic anaemia in the dogs affected with pyometra. Leucocytosis with a predominant absolute neutrophilia and lymphopenia were consistently found in canine pyometra.

## **References**

- [1] Singh, P. and Singh, H. N. 2010 Diagnostic and therapeutic management of pyometra in bitches. *Intas Polivet.*, **11**: 86-87
- [2] Coggan, J. A., Melville, P. A., Oliveira, C. M., Faustino, M., Moreno, A. M. and Benites, N. R. 2008. Microbiological and histopathological aspects of canine pyometra. *Brazilian J. Microbiol.*, **39**: 477-483
- [3] Singh, S., Dadhich, H. and Sharma, G. D. 2006. Haemato- biochemical studies in cystic endometrial hyperplasia pyometra complex in canine. *Indian J. Vet. Pathol.*, **30**: 46-48
- [4] Jena, B., Rao, K.S., Reddy, K.C.S. and Raghavender, K.B.P. 2013. Physiological and haematological parameters of bitches affected with pyometra. *Vet. World*, **6**(7): 409-412
- [5] Nath, K., Tiwari, S. K. and Kalim, O. 2009. Physiological and haematological changes in bitches with pyometra. *Indian Vet. J.*, **86**: 734-736
- [6] Jain, N. C. 1986. Schalm's Veterinary Hematology. 4th ed. Lea and Febiger, 600. Washington square, Philadelphia, USA.
- [7] Snedecor, G.W. and Cochran, W.G. 1980. Statistical Methods. The Iowa State University Press, Ames, IA, USA.
- [8] Dabhi, D. M., Dharmi, A. J., Parikh, P. V. and Patil, D. B. 2009. Comparative evaluation of haematological parameters in healthy and pyometra affected bitches. *Indian J. Anim. Reprod.*, **30**: 70-72
- [9] Leib, M. S. and Monnie, W. E. 1997. Pyometra and cystic endometrial hyperplasia, *In*: Practical Small Animal Internal Medicine. 1 Edn. W B Saunders Company, Philadelphia, London. pp. 422

- [10] Pande, N., Prabhakar, S., Gandotra, V. K., Honparkhe, M. And Nanda, A. S. 2006. Efficacy of different techniques for diagnosis of pyometra in female dogs, *Indian J. Anim. Reprod.*, **27**: 31-33
- [11] Hagman, R., Kindahl, H. and Lagerstedt, A. S. 2006. Pyometra in Bitches Induces Elevated Plasma Endotoxin and Prostaglandin-F2 $\alpha$  Metabolite Levels. *Acta Veterinaria Scandinavica.*, **47**: 55-68.
- [12] Verstegen, J, Dhaliwal, G. and Verstegen-Onclin, K. 2008. Mucometra, cystic endometrial hyperplasia, and pyometra in the bitch: advances in treatment and assessment of future reproductive success. *Theriogenology*, **70**(3): 364-74
- [13] Dave, J.R. (2002). Pathological Study of Canine Pyometra. M.V.Sc. Thesis, Gujarat Agricultural University, Anand, India.
- [14] Stone, E.A., Littman, M.P., Robertson, J.L. and Bovee, K.C. 1988. Renal dysfunction in dogs with pyometra. *J. Am. Vet. Med. Assoc.*, **193**: 457-464
- [15] Chojong, K. and Kimhyesod. 2000. Haematological and biochemical findings in pyometric bitches. *Korean J. Vet. Clin. Med.*, **17**(1): 219-224
- [16] Sharma, S. 2004. A Comparative Study on the Diagnosis and Treatment of Canine Pyometra with Special Reference to Ultrasonography. M.V.Sc. & A.H. Thesis, JNKVV, Jabalpur, India.
- [17] Hagman, R. 2004. New Aspects of Canine Pyometra. Studies on Epidemiology and Pathogenesis. Doctoral thesis, Swedish University of Agricultural Sciences, Uppsala, Sweden.