

# STUDIES ON CERTAIN CLINICAL, HAEMATOLOGICAL AND BIOCHEMICAL PARAMETERS IN PYOMETRA OF BITCHES

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Pyometra is a potentially life threatening condition which requires an early diagnosis to conserve the life of the animal. The evaluation of the clinical status of the animal affected helps in predicting the prognosis. A study was conducted with female dogs diagnosed with pyometra forming the affected group (n=35) and female dogs presented for ovariohysterectomy forming the control group (n=12). The clinical, haematological and biochemical, characteristics of the animals were assessed. Clinically an oedematous vulva, purulent discharge and higher body temperature were noted. Haematological values showed leucocytosis, neutrophilia, lymphopenia and values indicative of anaemia. Biochemical studies revealed elevated BUN and Creatinine. The analysis of various parameters helps in the assessment of the clinical status of the bitches and in prediction of the prognosis. The clinical status of the animal as evident from the study helps in deciding whether to perform a surgery or to initiate the medical management, thus increasing the survival chance of the patient.

**Key Words:** biochemical, canine, clinical, cystic endometrial hyperplasia, haematological, pyometra.

## Introduction

Reproductive diseases play an important role in deciding the profitability of the canine breeding ventures and evidently uterine diseases are the most common cause of failure to conceive. Pyometra is a common diestral disease of intact adult bitches (Dow, 1958). It is characterised by uterine bacterial infection with pus accumulating in the uterus and systemic illness (Børrenson, 1975). The disease is associated with a variety of clinical symptoms and is life-threatening in severe cases. The main clinical features of the disease include anorexia, vomiting, polyuria, polydipsia, distension of uterus with or without vaginal discharge and aplastic anaemia. The evaluation of the clinical status of the animal affected with pyometra always helps in predicting the prognosis. Keeping this in view, the present study was undertaken with the following objectives, (i) To evaluate the clinical status of the animal affected with pyometra. (ii) To estimate certain haematological parameters in pyometra. (iii) To estimate certain biochemical parameters in pyometra.

## Materials and Methods

The data relating to the present investigation has been generated from clinical cases of pyometra in dogs (n=35), presented to the Department of Veterinary Gynaecology and Obstetrics, Veterinary College, Hebbal,

Bangalore during the period of October 2012 to March 2013. Twelve female dogs presented for ovariohysterectomy during the same period constituted the control group. A tentative diagnosis of pyometra was made in 35 female dogs out of fifty dogs presented on the basis of medical history, clinical examination and haematological studies and the condition was confirmed with the help of ultrasonographic studies.

The medical history suggestive of pyometra included clinical signs such as anorexia, polyuria, polydipsia, vomiting and diarrhoea, presence of vaginal discharges. A detailed clinical examination which comprised of recording of rectal temperature, pulse and respiratory rate, visual examination of vulval lips for presence or absence of vulval oedema and aspiration of vaginal discharge was carried out.

Blood samples for biochemical and hematological analysis were obtained from the distal cephalic vein prior to surgery in both the groups and collected into EDTA and non-additive vacutainer tubes (AccuVet, Quantum Biologicals Pvt Ltd, Chennai, nVac Tube, Peerless Biotech Pvt Ltd). The haematological and biochemical parameters were recorded using SYSMEX model pocH -100i and BIOSYSTEMS A15 respectively. The haematological parameters studied were Haemoglobin (Hb), (g/dl), Packed cell volume (PCV), (%), Total leukocyte count (TLC)

(Cells/cmm), Differential leukocyte count (DLC), Red blood cell count (Cells/cmm) and Platelet count (lakhs/cmm).

The blood biochemical parameters studied were Blood Urea Nitrogen (BUN), (mg/dl), Serum creatinine (mg/dl), Alanine Amino Transferase (ALT)/ (SGPT), (IU/l) and Aspartate Amino Transferase (AST)/ (SGOT), (IU/l).

The data generated from the clinical trials was tabulated and the values were compared by students' t' test as per techniques of Snedor and Cochran (1980). Comparisons were considered significantly different at P <0.05.

## Results

The most common complaint reported by owners was the presence of vaginal

discharge (91.4%), followed by anorexia (88.5%), vomiting (60%), polydipsia (48.5%), polyuria (25.7%) and diarrhoea in 20% of the animals. Examination of the vulva revealed an oedematous appearance in 62.9% of the animals, normal appearance in 31.4% of the animals and a shrunken appearance in 5.7% of the animals. The vaginal discharge on aspiration was purulent in 43.8% of the animals, haemorrhagic in 40.6% of the animals and serosanguinous in 15.6% of the animals.

The mean temperature in the affected group (103.7± 0.35°F) was found to be higher than the normal physiological range (101-102.5°F). The mean pulse rate (72.42± 0.88 per minute) and the mean respiratory rate (22.3±0.76 per minute) were found to be well within the normal physiological ranges. (Table I)

Table I: Mean temperature, respiration and pulse recorded in bitches with pyometra (n=35)

Physiological parameter	Mean ±SE
Temperature (°F)	103.70± 0.35
Pulse (per minute)	72.42± 0.88
Respiration (per minute)	22.30±0.76

In the affected group, the mean TEC was considerably decreased and the mean TLC was considerably increased. In the affected group the Differential leukocyte count (DLC) revealed an increased mean neutrophil count, a normal mean eosinophilic count, an increased mean monocyte count and a decreased mean lymphocyte count. A low mean haemoglobin level, a normal mean PCV value and a decreased mean platelet count were observed. All the differences were statistically significant (P < 0.05).

The biochemical studies revealed a significant (P < 0.05) increase in the mean BUN, creatinine and SGOT concentrations and no significant differences (P < 0.05) in the mean SGPT concentrations (Table II).

## Discussion

The presence of vaginal discharge in 91.4% of animals is in accordance with the study of Renton et al. (1993) who reported that open pyometra are encountered much frequently than close pyometra. The vaginal discharge on aspiration was purulent in 43.8% of the animals, which is similar to the observations of Igna et al. (2009) and Hagman et al. (2006a). The presence of vaginal discharge is dependent on the patency of the cervix.

Vulval oedema was exhibited by 62.9% of the animals with both open and closed pyometra, but the cause for the same is not clear. The presence of vaginal discharge in 91.4% of the animals was closely followed by anorexia (88.5%) which is in line with the observations of Vestergren et al. (2008) and Renton et al. (1993).

Other clinical signs reported in the present study were vomiting (60%), polydipsia (48.5%), polyuria (25.7%) and diarrhoea in 20% of the animals. These results are similar to what has previously been reported in the disease and reflect a local uterine as well as generalised disease. The presence of vomiting and diarrhoea can be due to the adverse effects of higher endotoxic doses as opined by Hardie and Kruse- Elliot (1990) and etiopathogenesis of renal involvement is thought to be associated with immune mediated glomerulonephritis of primary or secondary nature (Hardy and Osborne, 1974).

The higher mean body temperature in the affected group reported in the study is in accordance with previous observations and can be correlated that with the presence of Systemic Inflammatory Response Syndrome (SIRS), uterine inflammation and secondary bacterial infection as well as septicaemia or bacteremia (Nelson and Feldman, 1986a and Fransson, 2003). The systemic

manifestations of pyometra can be attributed to the effects of endotoxins released by the

circulating bacteria (Goodwin and Schaer, 1989).

**Table II : Mean Haematological and biochemical values recorded in control and affected (pyometra) groups.**

PARAMETER	Control (n=12)		Affected (n=35)	
	Mean ±SE	Range	Mean ±SE	Range
Total Erythrocyte Count (TEC) ( $10^6 / \text{mm}^3$ ) *	7.26±0.18 <sup>a</sup>	6.50 – 8.20	5.26±0.21 <sup>b</sup>	2.20 – 8.50
Haemoglobin (Hb) (g%)*	11.88± 0.28 <sup>a</sup>	10.30 – 13.60	9.38± 0.35 <sup>b</sup>	5.90 –13.20
Packed Cell Volume (PCV) (%)*	36.33 ± 0.97 <sup>a</sup>	32.90 – 42.20	32.91± 0.45 <sup>b</sup>	28.10 -40.20
Platelet Count ( $10^5 / \text{mm}^3$ ) *	4.35± 0.44 <sup>a</sup>	2.10 – 7.80	1.969± 0.18 <sup>b</sup>	0.23 – 5.10
Total Leukocyte Count (TLC) ( $10^3 / \text{mm}^3$ ) *	11.92± 0.52 <sup>a</sup>	9.80 – 14.40	27.77±2.52 <sup>b</sup>	4.30 – 5.90
Neutrophil count(%)*	67.00±1.27 <sup>a</sup>	63.00– 75.00	84.34± 0.71 <sup>b</sup>	76.00- 92.00
Eosinophil (%)*	1.41± 0.14 <sup>a</sup>	1.00- 2.00	2.54± 0.17 <sup>b</sup>	1.00– 4.00
Lymphocyte *	18.08 ± 0.93 <sup>a</sup>	12.00– 22.00	9.54± 0.20 <sup>b</sup>	6.00– 12.00
Monocyte *	1.67± 0.22 <sup>a</sup>	1.00– 3.00	3.91± 0.26 <sup>b</sup>	1.00– 7.00
Blood Urea Nitrogen values(BUN) (mg/dl)*	26.92±0.85 <sup>a</sup>	23.60-32.00	56.60 ±2.83 <sup>b</sup>	36.00-1.00
Creatinine values (mg/dl)*	0.79±0.04 <sup>a</sup>	0.50 – 1.00	1.49±0.17 <sup>b</sup>	0.60 – 4.80
Aspartate amino Transferase(AST)(IU/l)*	19.25± 1.12 <sup>a</sup>	12.00-25.00	40.23± 1.83 <sup>b</sup>	19.00-58.00
Alanine amino Transferase(ALT)(IU/l)**	23.25± 0.43 <sup>b</sup>	20.00-5.80	23.44±0.38 <sup>a</sup>	20.10-31.00

\* (P < 0.05) Significant \*\* (P < 0.05) Not Significant

The mean TEC and haemoglobin values were lower than the normal physiological levels suggestive of the existence of anaemia in the pyometra affected animals and this has been described by several authors (Hagman *et al.*, 2006a and Greene, 2006). Anaemia in pyometra is caused by a variety of disorders including chronic inflammation (in which acute phase proteins mediate an iron sequestration in the bone marrow, causing iron deficiency), suppression of bone marrow by the circulating endotoxins and loss of red cells into the uterine lumen (Nelson and Couto, 1998 and Okano *et al.*, 1993).

As both dehydration and anaemia may be present concurrently in pyometra, along

with TEC, Haemoglobin and PCV values the hydration status of the animal should be assessed.

Thrombocytopenia as seen in the present study was also reported by Memon and Mickelsen (1993) and Fransson (2003) and may be attributed to the adverse effect of endotoxins on the bone marrow interfering in the synthesis of platelets.

Leucocytosis has been considered as a classical sign of pyometra in the bitch. Mean TLC values similar to the values recorded in the present study were reported by Hagman *et al.* (2006b) and Melih *et al.* (2012).

The mean neutrophil count recorded in the affected group was indicative of

neutrophilia and it can be concluded that the leucocytosis which is a predominant finding in the study is due to neutrophilia exhibited by >90% of the animals. The cause may be attributed to the defense mechanism of the uterus in response to the invading microorganisms and has also been recorded by Cox and Joshua (1979) and Hagman et al. (2009).

The lymphopenia reported in the present study, have been well documented in bitches with pyometra and may either be due to absolute increase in neutrophil count as a result of severe suppurative inflammation of the uterus or due to toxic suppression of lymphocyte activity (Schalm et al., 1991 and Kashinath et al., 2009).

The monocytosis in the affected group is in accordance with the studies of Hagman (2009) and Kasinath et al. (2009) and may be attributed to the chronicity of the condition in some animals.

Elevated BUN levels as seen in the present study was also reported by Hagman et al. (2006b) and Heine et al. (2001) may be a result of pre-renal uraemia as there was a lowered incidence of elevated creatinine levels in the present study. The slightly elevated mean AST concentration in the affected group is in accordance with the study of De Schepper et al. (1986) and Colombo et al. (1988). This moderate increase in the levels is more likely to be derived from muscle breakdown than hepatocellular insult. This suggestion is based on the observation that there is a decreased activity of ALT indicating that no hepatic damage has occurred (Borrenson, 1980). Similar to the present study, Hagman et al. (2009) and Melih et al. (2012) also found that no significant difference existed between the affected and control groups with reference to the ALT levels.

The analysis of various parameters helps in the assessment of the clinical status of the bitches and in prediction of the prognosis. The clinical status of the animal as evident from the study helps in deciding whether to perform a surgery or to initiate the medical management, thus increasing the survival chance of the patient.

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