

Case Report

Studies on Haemto-biochemical and Physiological Parameters in Canine Pyometra

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ABSTRACT

Canine pyometra is an acute or chronic polysystemic diestral disorder mainly of mature nulliparous bitches. In this retrospective study, an attempt was made to analyse the physiological and haemato-biochemical parameters of a total of 22 affected bitches attended at Sneh Vet lab and Clinic Bhadra, Bhiwani, (Haryana). The findings revealed pyrexia and tachycardia with normal respiration rate in most of the pyometra affected bitches. Amongst the haemato-biochemical parameters, there were reduced levels of haemoglobin, packed cell volume and total erythrocyte count, along with severe leucocytosis, neutrophilia with shift to left, lymphopenia, eosinophilia and elevated BUN and serum creatinine in the bitches affected with pyometra suggesting bone marrow and renal damage. However, the mean values of mean corpuscular volume, mean corpuscular haemoglobin as well as serum ALT and AST were within the normal range, confirming normocytic normochromic anaemia without liver dysfunction.

Keywords: Bitch, Haematology, Pyometra, Retrospective study, Serum biochemistry

Pyometra, caused by a hormonal imbalance resulting in cystic endometrial hyperplasia pyometra complex (CEHPC), an acute or chronic polysystemic diestral disorder, has been linked to a high mortality rate in bitches if left untreated (Singh *et al.* 2010). It is the primary issue in countries where spaying is not widely practiced (Coggan *et al.* 2008). Clinical signs include purulent vaginal discharge and stomach pain, as well as more systemic consequences such as fatigue, depression, anorexia, polyuria, polydipsia, and vomiting (Dabhi and Dhama, 2007). Several laboratory markers represent the systemic consequences of pyometra. Leukocytosis, anaemia, increased serum urea and creatinine and alterations in liver enzymes can all be caused by an infectious disease (Srinivas *et al.* 2018; Hadiya *et al.* 2020). Furthermore, significant problems such as endotoxemia and septicemia might arise,

necessitating immediate treatment (Hagman and Kuhn, 2002). In pyometra-affected bitches, a low haemoglobin, together with a low packed cell volume and a low total erythrocyte count, indicate normocytic normochromic anaemia (Dabhi *et al.* 2009). However, mean corpuscular volume (MCV) and mean corpuscular haemoglobin concentration (MCHC) in pyometra-affected dogs stay within normal limits (Bigliardi *et al.* 2004), while absolute neutrophilia characterizes leucocytosis (Verstegen *et al.* 2008; Hadiya *et al.* 2020). The aim of this study was to show the haemato-biochemical alterations in CEHPC that are deemed significant in determining

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the severity and type of illness early in bitches so as to save its breeding life.

MATERIALS AND METHODS

A retrospective study of records of twenty two bitches of different breeds, diagnosed with pyometra, with age ranging from 11 months to 12 years, and eight bitches was taken as control (healthy bitches) was carried out during the year 2021 at Sneh Vet lab and Clinic Bhadra, Bhiwani, Haryana (India).

The data were captured in individual data capture forms pertaining to breed, age, weight, medication use, previous diseases, and chief complaint, heart and respiratory rates, temperature, color of the mucosa, capillary refill time, hydration, pulse and body condition etc recorded including observations on haemato-biochemical parameters (Jain 1993) and were analyzed to express as Means \pm SEs. The findings of ultrasonography made for confirmation of pyometra in certain cases were also screened and the severity of pyometra was assessed.

RESULTS AND DISCUSSION

The average age of the affected 22 bitches of different breeds presented with pyometra at VCC was 8 years. The occurrence of pyometra was more frequent in animals with 9-10 years of age. Among the total cases, 14 bitches had open cervix pyometra and 8 had closed cervix. The mean rectal temperature, heart rate and respiration rate were

102.45 \pm 1.12 °F, 115.36 \pm 4.35/min and 28.23 \pm 0.26/min, respectively. Rectal temperature was higher in 55% of all cases with slightly increased heart beat and respiration rate. The affected animals' average age was consistent with earlier reports showing that older bitches tend to be more afflicted by the illness than younger ones (Feldman and Nelson, 2004). A common sign of uterine inflammation and subsequent bacterial infection is fever (Nelson and Feldman, 1986). Some reports on pyometra however mentioned hypothermia. According to a recent study, chronic cases of pyometra were having normal rectal temperature. Some animals with elevated heart rates also have septicemia (Nath *et al.* 2009). In a study, all the bitches having pyometra were associated with tachycardia (Mojzisoava *et al.*, 2000).

The mean values of various haemato-biochemical parameters noted in bitches affected with pyometra are shown in Table 1. The mean values of Hb, PCV and TEC were quite low when compared with normal reference values suggesting anaemia in affected dogs. These observations concurred with Hadiya *et al.* (2020). Further, in-depth analysis revealed that the anaemia was observed in 75% of the bitches, and 70% of these presented normocytic normochromic anaemia. Similarly, there was severe leucocytosis, neutrophilia, lymphopenia, and monocytosis with normal eosinophil count in affected bitches (Table 1). Similar were the observations of Dabhi *et al.* (2009) and Hadiya *et al.*

Table 1: Haemato-biochemical parameters in bitches affected with pyometra

Sl. No.	Parameter	Pyometra affected bitches (Mean \pm SE)	Healthy bitches (Mean \pm SE)	Normal range	Reference
1	Hb (gm%)	10.40 \pm 2.25	13.85 \pm 3.62	12 - 18	Shah <i>et al.</i> 2017
2	PCV (%)	28.55 \pm 3.41	42.36 \pm 4.56	37 - 55	Shah <i>et al.</i> 2017
3	TEC ($\times 10^6/\mu$ l)	4.90 \pm 0.20	6.87 \pm 1.02	5.5 - 8.8	Shah <i>et al.</i> 2017
4	MCV (fl)	60.70 \pm 1.90	65.34 \pm 2.65	60 - 77	Shah <i>et al.</i> 2017
5	MCH (pg)	20.18 \pm 0.88	23.34 \pm 2.02	19.5 - 24.5	Shah <i>et al.</i> 2017
6	TLC ($\times 10^3/\mu$ l)	32.26 \pm 0.55	7.45 \pm 1.32	6 - 17	Shah <i>et al.</i> 2017
7	Neutrophil (%)	85.88 \pm 2.45	62 \pm 3.65	60-70	Shah <i>et al.</i> 2017
8	Lymphocyte (%)	6.18 \pm 1.50	32 \pm 3.54	30-40	Shah <i>et al.</i> 2017
9	Monocyte (%)	10.24 \pm 0.35	2.35 \pm 0.24	2-3	Dos Anjos <i>et al.</i> 2021
10	Eosinophil (%)	5.36 \pm 0.12	3.65 \pm 0.32	3-8	Dos Anjos <i>et al.</i> 2021
11	ALT (IU/L)	46.75 \pm 3.56	54 \pm 4.35	10 - 94	Shah <i>et al.</i> 2017
12	AST (IU/L)	56.32 \pm 2.24	50.12 \pm 3.24	10 - 62	Shah <i>et al.</i> 2017
13	BUN (mg/dl)	65.45 \pm 1.25	9.23 \pm 2.35	7 - 32	Shah <i>et al.</i> 2017
14	Creatinine (mg/dl)	3.08 \pm 0.11	1.35 \pm 0.35	0.5 - 1.4	Shah <i>et al.</i> 2017



(2020). Leukocytosis also appeared with a frequency higher than 72%. Left shift was found in 80% of all cases. The leucocytosis with neutrophilia and lymphopenia was more marked in closed cases of pyometra complex in comparison to open cases. The averages of leukocytes in the different age groups and types of pyometra were quite above the reference values for the species.

The leucocytosis observed in closed pyometra cases was more pronounced because the closed cervix prevents pus draining from the uterus (Mojziso *et al.* 2000). In a prior investigation, anaemia was also discovered in pyometra (Dabhi *et al.* 2009). The anaemia in cases of pyometra is thought to be caused by reduced erythropoiesis, also known as anaemia of chronic illness, and by erythrocyte loss into the uterine lumen (Nath *et al.* 2009), in addition to decreased feed intake in severely affected cases (Dabhi *et al.* 2009). Anaemia in pyometra-affected animals may also be induced by the effect of endotoxins on the bone marrow and decreased erythrocyte viability. Low PCV is linked with pyometra (Nelson and Feldman, 1986), however, a normal range can also be detected, which is owing to concurrent dehydration (Verstegen *et al.* 2008). The current study found that the mean values of mean corpuscular volume (MCV) and mean corpuscular haemoglobin (MCH) were within the normal range, confirming normocytic normochromic anaemia. These findings were consistent with prior publication (Bigliardi *et al.* 2004).

The degree of leucocytosis detected in bitches with pyometra could be attributed to the intensity of the inflammation that varied between animals (Verstegen *et al.* 2008). Normal leucograms with mild to moderate normocytic cells may be related to the disease's chronic nature and toxic suppression of the bone marrow (Dabhi *et al.* 2009). The most consistent result among the bitches with pyometra in the present study was absolute neutrophilia with shift to the left, lymphopenia, and monocytosis with normal eosinophil count. Similar were the observations of Hadiya *et al.* (2020). Lymphopenia could be caused by severe stress, while an elevated monocyte count could be caused by the chronicity of the suppurative process (Singh *et al.* 2010). Pyometra, a serious bacterial infection, induces bone marrow to release an increased number of immature neutrophils into the peripheral circulation in an

attempt to treat the infection, resulting in marked neutrophilic leukocytosis with a shift to the left (Mojziso *et al.* 2000).

In the present study, the mean BUN and serum creatinine were found to be elevated in bitches with pyometra (Table 1). These elevations were noted in approx 78 % of bitches, whereas ALT and AST were almost in normal range in all the animals, except 3 bitches wherein these were found elevated. Hadiya *et al.* (2020), however, recorded increased levels of BUN, creatinine, AST and ALT in bitches affected with pyometra, which came to normal or near to normal in 15 days after ovario hysterectomy. Increased values of BUN in pyometric bitches indicate that the efficiency of kidneys to remove nitrogenous waste from the circulation is affected (Gayakwad *et al.* 1999). ALT and AST are the two hepatic enzymes used in clinical evaluation and when their activity is increased, it may be suggestive of liver damage, because they spill into the bloodstream during hepatopathy (Verstegen *et al.*, 2008). However in the present study, ALT and AST levels were within normal range.

CONCLUSION

The findings of retrospective study on clinico-haemato-biochemical parameters of 22 bitches affected with pyometra revealed pyrexia and tachycardia with reduced levels of haemoglobin, PCV and TEC, along with severe leucocytosis, neutrophilia with shift to left, lymphopenia, eosinophilia and elevated BUN and serum creatinine suggesting that the haemato-biochemical parameters can be used as essential tool for early diagnosis of canine pyometra.

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