

RESEARCH PAPER

Haemato-Biochemical Studies of Open Pyometra Affected Bitches During Treatment Therapy with Cloprostenol and Mifepristone

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ABSTRACT

The aim of this study was to assess the haemato-biochemical parameters of open pyometra affected bitches during treatment therapy with cloprostenol and mifepristone. The study was conducted on 18 numbers of bitches irrespective of age, sex and parity. Four milliliter of blood sample was collected aseptically from each bitch and the haemato-biochemical parameters were evaluated. The BUN (Blood urea nitrogen) (mean $\pm$ SE) level in bitches affected with pyometra at 0th, 5th and 10th day of therapy was 41.16 ± 3.51 mg/dl, 35 ± 3.66 mg/dl and 24.33 ± 2.56 mg/dl, respectively and serum creatinine (mean $\pm$ SE) level estimated 1.36 ± 0.19 mg/dl, 1.16 ± 1.23 mg/dl and 1.03 ± 0.15 mg/dl, respectively and also serum ALT (Alanine aminotransferase) (Mean $\pm$ SE) level in bitches affected with pyometra was 76.45 ± 18.34 U/L, 76.0 ± 15.07 U/L and 58.33 ± 15.11 U/L, respectively at 0th, 5th and 10th day of therapy. The mean $\pm$ SE value of haemoglobin at 0th, 5th and 10th day of therapy were 11.8 ± 0.23 g/dl, 11.93 ± 0.43 g/dl and 11.91 ± 0.18 g/dl, respectively. The mean $\pm$ SE value of total leucocytes count at 0th, 5th and 10th day of therapy were found to be $33 \pm 5.71 \times 10^3/\text{mm}^3$, $25.53 \pm 3.5271 \times 10^3/\text{mm}^3$ and $18.75 \pm 3.2010^3/\text{mm}^3$, respectively. There was no significant difference ($P > 0.05$) of total leucocytes count between 0th, 5th and 10th day of therapy. The mean $\pm$ SE values total lymphocytes at 0th, 5th and 10th day of therapy were $0.45 \pm 0.0410^3/\text{mm}^3$, $0.75 \pm 0.0410^3/\text{mm}^3$ and $1.23 \pm 0.0310^3/\text{mm}^3$, respectively. In conclusion, the level of haemato-biochemical parameters of pyometra affected bitches varied at different time during therapy with cloprostenol and mifepristone.

HIGHLIGHTS

- ① Canine pyometra is a disease condition that affects adult intact bitches and results in a range of clinical and pathologic genital and systemic changes.
- ② Role of mifepristone against pyometra is that mifepristone removes progesterone block as it is a progesterone receptor blocker in turn reduces endometrial thickness.
- ③ Role of cloprostenol against pyometra is that cloprostenol causes myometrial contractions to facilitate drainage of pus from uterus.

Keywords: Pyometra, bitches, haemato-biochemical, cloprostenol, mifepristone

Mizoram, one of the eight states in the north-eastern region, has seen an increase in pet domestication, especially of companion animals such as dogs. As a result, canine-related health issues are given top priority (Chutia *et al.* 2016). Canine pyometra is one of the most common problems among Mizoram pet owners (Talukdar *et al.* 2022a).

Canine pyometra is a disease condition that affects

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adult intact bitches and results in a range of clinical and pathologic genital and systemic symptoms (Haji *et al.* 2021; Talukdar *et al.* 2022a). The premise behind cystic endometrial hyperplasia (CEH)–pyometra is that hormonal fluctuations produce CEH, which then exposes the uterus to secondary infection, resulting in pyometra (Haji *et al.* 2017). CEH and pyometra should be differentiated from the standard CEH–pyometra complex definition, according to a new proposal. CEH can predispose to pyometra in some circumstances; however pyometra can also occur without CEH. Pyometra appears to be a distinct entity from CEH, having a hormonal component in the pathophysiology but bacterial infection as the primary cause (Haji *et al.* 2017). Role of mifepristone and cloprostenol against pyometra is that mifepristone removes progesterone block as it is a progesterone receptor blocker in turn reduces endometrial thickness and cloprostenol causes myometrial contractions to facilitate drainage of pus from uterus (Talukdar *et al.* 2022a). Keeping in above mention fact, the present study was designed to study the efficacy of mifepristone and cloprostenol for therapeutic management of open pyometra in bitches.

MATERIALS AND METHODS

The study was conducted on pyometra affected bitches of Aizawl district in where 18 numbers of bitches were diagnosed positive for pyometra by different diagnostic methods. The plan of experiment was approved by Institutional Animal Ethics committee. The bitches were divided into three groups depending on duration of therapy *viz.*, 0th, 5th and 10th day of therapy. The bitches were presented to TVCC, College of Veterinary Sciences and Animal Husbandry, CAU, Selesih, Aizawl, Mizoram with suspicion of pyometra and concomitant clinical signs. Four milliliter of blood samples were collected from each bitch at different stages, 2ml of which were transferred to sterilized test tube containing EDTA for haematological study *viz.* Total Leucocytes Count, Total Lymphocytes Count and haemoglobin. The remaining 2 ml blood were transferred to 15ml glass centrifuged tube to be centrifuged at 3000 rpm for 15 minutes, the supernatant (serum) of which were utilized for different biochemical test *viz.* serum BUN, creatinine and ALT.

Data obtained were analyzed statistically as per procedure suggested by Snedecor and Cochran (1994) and significance of difference by Duncan's Multiple Range Test using SPSS 20.0 version.

RESULTS AND DISCUSSION

In the present study, the mean $\pm$ SE value of haemoglobin at 0th, 5th and 10th day of therapy were 11.8 ± 0.23 g/dl, 11.93 ± 0.43 g/dl and 11.91 ± 0.18 g/dl, respectively. The mean haemoglobin level in the pyometra-affected bitches decreased, indicating anaemia, which is consistent with the report of Mudasir *et al.* (2011); Talukdar *et al.* (2022b). Anaemia in pyometra-affected bitches may be induced by toxic effects on the bone marrow, decreased erythrocyte viability, and erythrocyte loss to the uterine lumen (Haji *et al.* 2017). The reticulo-endothelial system's enhanced iron affinity and decreased total iron binding capacity are linked to acute and chronic inflammatory disorders, as well as iron shortage and resultant anaemia (Hagman *et al.* 2009; Talukdar *et al.* 2019). The hemoglobin level at different duration of therapy and presented in Table 3. The Total leukocyte count of pyometra affected bitches at different duration of therapy are presented in Table 3. The mean $\pm$ SE value of total leucocytes count at 0th, 5th and 10th day of therapy were found to be $33 \pm 5.71 \times 10^3/\text{mm}^3$, $25.53 \pm 3.5271 \times 10^3/\text{mm}^3$ and $18.75 \pm 3.2010^3/\text{mm}^3$, respectively. There was no significant difference ($P > 0.05$) of total leucocytes count between 0th, 5th and 10th day of therapy. Before treatment, leucocytosis was the most common finding of current study among pyometra-affected bitches which was in accordance with findings of Verstegen *et al.* (2008); Nath *et al.* (2009); Talukdar *et al.* (2022a). As described by Dabhi *et al.* (2009) and Haji *et al.* (2018) different degrees of leucocytosis were seen in bitches with pyometra. This could be related to the intensity of the inflammation changing between animals. The bitches from closed pyometra are commonly seen at a later stage of the disease, when endotoxins absorbed from the uterine lumen have already resulted in a widespread sickness, according to Agarwal *et al.* (2016). Although all of the groups experienced a decrease in total leukocytes after treatment, there was no statistically significant difference between the groups before and after therapy (Mohan *et al.* 2014; Talukdar *et al.* 2022b). The mean $\pm$ SE values

total lymphocytes at 0th, 5th and 10th day of therapy were $0.45 \pm 0.0410^3/\text{mm}^3$, $0.75 \pm 0.04 \ 10^3/\text{mm}^3$ and $1.23 \pm 0.0310^3/\text{mm}^3$, respectively (Table 3). There was highly significant difference ($P < 0.01$) among the values at different duration of therapy. According to Mohan *et al.* (2014), neutrophilia with a regenerative shift to the left might be caused by the retention of purulent exudates in the uterus, which have a chemotactic impact on neutrophils, resulting in rapid granulopoiesis and lymphopenia. Findings of current study are in corroboration with Nath *et al.* (2009); Yu *et al.* (2012).

The BUN (Blood urea nitrogen) (mean $\pm$ SE) level in bitches affected with pyometra at 0th, 5th and 10th day of therapy was 41.16 ± 3.51 mg/dl, 35 ± 3.66 mg/dl and 24.33 ± 2.56 mg/dl, respectively (Table 1).

Table 1: The mean $\pm$ SE value of BUN(mg/dl) level of Pyometra affected bitches at different duration of therapy

Experimental Group	Duration of therapy (in days)	BUN (mg/dl)
Pyometra affected bitches	0 th	41.16 ± 3.51^b
	5 th	35.0 ± 3.66^b
	10 th	24.33 ± 2.56^a

Means with different superscripts are significantly ($P < 0.05$) different from each other.

There was highly significant difference ($P < 0.01$) among the values at different duration of therapy. The mean $\pm$ SE levels of serum creatinine estimated 1.36 ± 0.19 mg/dl, 1.16 ± 1.23 mg/dl and 1.03 ± 0.15 mg/dl at 0th, 5th and 10th day of therapy, respectively (Table 2).

Table 2: The mean $\pm$ SE value of serum creatinine level of pyometra affected bitches at different duration of therapy

Experimental Group	Duration of therapy (in days)	Creatinine (mg/dl)
Pyometra affected bitches	0 th	1.36 ± 0.19
	5 th	1.16 ± 1.23
	10 th	1.03 ± 0.15

The mean BUN and creatinine levels in serum were elevated in all groups of bitches affected with pyometra before treatment, which was in agreement with Bigliardi *et al.* (2004); Kuplulu *et al.* (2009). Toxaemia may cause elevated BUN and creatinine

levels, which can lead to body protein degradation as a result of the suppurative process, as well as impaired renal perfusion and dehydration, resulting in immune complex deposition in the glomeruli leading to proximal tubular injury and glomerulonephritis in turn leads to renal failure which is controlled by level of toxaemia and dehydration done by pyometra as cited by Nath *et al.* (2009); Talukdar *et al.* (2022a). The mean $\pm$ SE levels of serum ALT (Alanine aminotransferase) (mean $\pm$ SE) level in bitches affected with pyometra was 76.45 ± 18.34 U/L, 76.0 ± 15.07 U/L and 58.33 ± 15.11 U/L at 0th, 5th and 10th day of therapy respectively (Table 3).

Table 3: The mean $\pm$ SE value of serum ALT level of Pyometra affected bitches at different duration of therapy

Experimental Group	Duration of therapy (in days)	ALT (U/l)
Pyometra affected bitches	0 th	105.41 ± 10.74
	5 th	93.68 ± 7.40
	10 th	84.83 ± 8.34

The increase in ALT levels seen in pyometra cases was attributed to hepatocellular damage caused by septicemia, reduced hepatic circulation, and cellular hypoxia in dehydrated bitches, according to the Nelson and Feldman (1986); Johnson (1992) and Verstegen *et al.* (2008). Bigliardi *et al.* (2004) found a substantial increase in ALT related to the presence of *Escherichia coli* cytotoxin necrotizing factor (CNF) + in the uterus. There was no significant difference ($P < 0.05$) among the values at different duration of therapy.

Table 4: The mean $\pm$ SE value of the TLC, Hb and Lymphocytes of Pyometra affected bitches at different duration of therapy

Experimental Group	Duration of therapy	TLC ($10^3/\text{mm}^3$)	Hb (gm/dl)	Lymphocytes ($10^3/\text{mm}^3$)
Pyometra affected bitches	0 th	33.0 ± 5.71	11.8 ± 0.23	0.45 ± 0.04^a
	5 th	25.53 ± 3.52	11.93 ± 0.43	0.75 ± 0.04^a
	10 th	18.75 ± 3.20	11.91 ± 0.18	1.23 ± 0.03^b

Means with different superscripts are significantly ($P < 0.01$) different from each other.



CONCLUSION

In conclusion, the level of haemato-biochemical parameters of pyometra affected bitches varied at different duration of therapy. These will help veterinarians to access treatment efficacy and also monitor improving trends in haemato-biochemical picture of affected bitch.

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