

Clinical evaluation of haemato-biochemical alteration with different therapeutic approaches to canine mammary tumours

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ABSTRACT

Aim: The study was carried out to evaluate haemato-biochemical alteration with various therapeutic approaches to canine mammary tumours at different intervals.

Method and Materials: Thirty six female dogs were registered for such evaluation under different combinations of Anti-angiogenic therapy, Chemotherapy and Surgery excision in six groups. Blood sample were collected and different haematological (Hb, PCV, TEC, TLC and DLC) and biochemical (CRTN, BUN, SGPT, SGOT) values were recorded.

Results: Alteration in haematological (Hb, PCV, TEC, TLC and DLC) and biochemical (CRTN, BUN, SGPT, SGOT) values were noticed at different interval according to therapeutic approaches.

Conclusion: It was concluded that chemo-therapeutic approaches altered haematological values significantly and biochemical values, nonsignificantly.

Keywords: Canine mammary tumour, haemato-biochemical values, therapeutic approaches.

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Introduction

Dogs are used for various purposes viz; hunting, herding, protection, assisting police and military, companionship and more recently, aiding the handicapped individuals. Cancer has gained considerable relevance in animals recently owing to the increased awareness among people. Canine mammary glands are frequent locations for the development of tumour and forms second most common neoplasm. Dog breeds are at risk for developing mammary gland tumour including German Shepherds, toy and miniature Poodles, Spaniels and Mongrels. The average age of dogs at diagnosis is 8-11 years. Appearance of mammary gland tumour in dogs can vary greatly (Moulton, 1999).

Occurrence of mammary tumors may be observed up to 52% of all tumors in the female dogs and therefore represents one of the most important type of neoplasia in the dogs (Moe, 2001; Rutteman et al, 2001, Von Bomhard, 2001 and Kumar and Parashar, 2020).

Out of these, 60% are benign and 40% malignant (Brearley, 1989). Mammary gland tumors occur in middle aged and old female dogs that may be sexually intact or spayed (Cassali et al, 2011 and Waldron, 2001). Adjuvant chemotherapy using different combinations of antineoplastic drugs have also been found effective in treatment of human breast cancer (Rivkin et al, 2003). Use of such drugs for treatment of canine neoplasms has also been suggested by Helfand (1990).

Therapeutic approaches have major concern about patient's physiological changes. A non-significant decrease in Hb and PCV values and increase in TLC at time of presentation was also reported by Bala (2005). Todorova et al (2005) reported significant decrease in leucocytes count after every cycle of doxorubicin and cyclophosphamide therapy when compared to the values. Growth hormone and serum concentrations matters with spontaneous mammary tumors before and after mastectomy in bitches (Corrada et al, 2003). Therefore, the present study was designed to study the efficacy of haemato-biochemical alterations with different therapeutic approaches to canine mammary tumours.

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Materials and Methods

Thirty six female dogs were enrolled for the study of haemato-biochemical alterations under different therapeutic approaches viz; Group I (Anti-angiogenic therapy), Group II (Chemotherapy), Group III (Surgery excision), Group IV (Surgical excision and Anti-angiogenic therapy) Group V (Surgical excision and Chemotherapy) and Group VI (Chemotherapy and Anti-angiogenic therapy). Blood sample were collected before treatment and after treatment at weekly interval for 3 weeks.

Hemato-biochemical study: Blood sample were collected in dry sterilized vials containing EDTA anticoagulant (Ethylenediaminetetraacetic acid) @ 1mg/ml. The haematological estimations such as haemoglobin concentration (Hb), total erythrocyte count (TEC), total leukocyte count (TLC) and differential leukocyte count (DLC) were carried out as per Jain (1986). Samples for biochemical evaluation were collected in plane dry sterilized vials and estimation of values like SGPT, SGOT, Creatinine, Blood Urea Nitrogen were carried out. Haemato-biochemical parameters were observed at different intervals.

Results and discussion

Physiological changes have major concern while approaching different treatments aspects. Efficacy of haemato-biochemical values were affected though it depends on the therapeutic approaches to mammary tumour.

Haemoglobin (Hb)

The haemoglobin values were recorded pre and post treatment with different intervals in all the animals. In Group I and II, there was non-significant decrease in haemoglobin in the first week of therapy and second week. Then, there was significant ($P < 0.05$) decrease in haemoglobin in third week as compared to the base values, but haemoglobin values remained within the normal range. In Group III, IV, V and VI animals, haemoglobin values were fluctuated non-significantly at different intervals of therapy but haemoglobin values remained within the normal range. These findings were in agreement with the previous studies on canine neoplasms by Manikandan (2007) and Khimta (2007). In their studies also, the haemoglobin values were within the normal range.

Packed cell volume (PCV):

The PCV values were recorded pre and post treatment with different intervals in all the

animals. In Group I, II, III, IV, V and VI, a gradual nonsignificant decrease ($P > 0.05$) PCV values was observed during all therapy. Though, PCV values were remained within the normal range. Karayannopoulou et al (2005) also reported normal range of PCV during different treatment modalities.

Total erythrocyte count (TEC)

In group I, there was nonsignificant decrease in total erythrocyte count (TEC) during first and second week of therapy followed by significant ($P < 0.05$) decrease in total erythrocyte count from the base values during third weeks of therapy. In group II, there was nonsignificant ($P > 0.05$) decrease in total erythrocyte count (TEC) up to first weeks of therapy and then there were significant ($P < 0.05$) decrease in total erythrocyte count from the base values during the second and third weeks of therapy. In groups III, there was nonsignificant decrease in total erythrocyte count (TEC) during first week of therapy and a significant ($P < 0.05$) increase was observed during second and third week. In Group IV, V and VI total erythrocyte count was fluctuated nonsignificantly at different intervals of therapy but remained within the normal range. The decrease in TEC may be due to drug induced therapy (Dranitsaris et al, 2005; Manikandan, 2007 and Khimta, 2007). The increase in TEC values were observed after 2nd week surgery in Group III. Similarly, Dileepkumar et al (2014) also observed increase in TEC values after surgery.

Total leukocyte count (TLC)

There was non-significant ($P > 0.05$) decrease in total leukocyte count (TLC) in group I, II, III, IV, V during the treatment. In group VI, there was nonsignificant ($P > 0.05$) decrease in total leukocyte count (TLC) during first and second week of therapy and then there was significant ($P < 0.05$) decrease in total leukocyte count from the base values during third week of therapy. Manikandan (2007) and Dileepkumar et al (2014) corroborated with the findings of present study.

Differential leukocyte count (DLC)

Neutrophil values in groups I, II, IV, V and VI decreased significantly from the base values. This may be due to myelosuppression (Di Maio et al, 2005; Manikandan, 2007 and Khimta, 2007). In surgical excision group (group III), 2nd and 3rd weeks were observed with increased neutrophil values from the base value and were coming to normalcy. Dileepkumar et al (2014) also reported increased neutrophil values after surgical therapy. The increase in the neutrophil count to the normal

value in surgical therapy group implies the improvement in the health status of the animals. Lymphocyte values in group I and II, increased significantly from the base values. This increase in lymphocyte count was the result of corresponding decrease in neutrophil count (Kumar et al, 2018 and Manikandan, 2007). The values of eosinophils increased significantly in group II, IV and VI. The values of monocyte found increased significantly in group IV and VI. Contrary, Dileepkumar *et al* (2014) favoured the normal range of monocyte, eosinophils and basophils values.

Creatinine

The creatinine values in different groups were fluctuated nonsignificantly during different treatments in comparison to base values. Karayannopoulou (2001) also studied the fluctuation of creatinine values in canine mammary tumour patients during different therapeutic approaches but remained within normal range. Gupta et al (2014) also reported no change in mean creatinine values in different therapeutic groups before and after surgery as well as chemotherapy.

Blood Urea nitrogen (BUN)

The blood urea nitrogen (BUN) values were increased nonsignificantly during different treatments in comparison to the base values. Gupta et al (2014) also reported no change in mean blood urea nitrogen pre and post treatment values in different therapeutic groups. Karayannopoulou et al (2001) and Khan et al (2017) also reported the fluctuation in blood urea nitrogen values within normal range in canine mammary tumour patients before and after different therapeutic approaches.

SGOT

The SGOT values in all groups were observed in different intervals. There was nonsignificant fluctuation in SGOT values from the base values at different intervals of therapy but it remained in normal range. Karayannopoulou et al (2001) and Khan et al (2017) also reported the fluctuation in SGOT values within normal range. Gupta et al (2014) also reported no change in mean serum values of SGOT.

SGPT

The SGPT values were observed with nonsignificant fluctuation from the base values at different intervals of different therapeutic approaches but it remained in normal range. Karayannopoulou et al (2001) and Khan et al (2017) also reported the fluctuation in SGPT values

within normal range. Whereas, Gupta et al (2014) also reported mean serum values of SGPT within normal physiological range before and after surgery in both the groups.

Conclusion

It was concluded that chemo-therapeutic approaches altered haematological values significantly and biochemical values, nonsignificantly.

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