



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.03

TPI 2018; 7(2): 187-189

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www.thepharmajournal.com

Received: 25-12-2017

Accepted: 26-01-2018

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Hemato-biochemical changes in mammary tumors affected dogs

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Abstract

The objective of the present study was to evaluate and compare the hematobiochemical parameters of the dogs suffering with mammary tumors with the hemato biochemical parameters of the apparently healthy dogs. Dogs which were presented to the Veterinary Clinical Complex were screened for the presence of tumors. They were subjected to various diagnostic tests to confirm the tumor types. Upon confirmation of tumor their hematobiochemical parameters were studied. The dogs which were presented at the hospital for regular checkups and vaccination were randomly selected and their hemato biochemical parameters were obtained which were grouped as apparently healthy dogs. The hematobiochemical parameters of dogs which were diagnosed for mammary tumors were compared with the parameters of the apparently healthy dogs.

Keywords: Dogs, hematology, mammary tumors, serum biochemistry

Introduction

Cancer is one of the major causes of death in human beings and dogs. Neoplasms are of two types benign and malignant. Leukemias and lymphoma which account for approximately 8% of malignancies arise from the blood forming cells and from cells of the immune system. Despite the availability of wide range of diagnostic modalities for cancer no single modality is full proof for identification of cancer. Laboratory assessment for cancer with fine needle aspiration, histopathology etc is the main source of reliable diagnosis. Ultrasonography, radiography hemato biochemistry etc may be used for further confirmation of cancer and metastatic growths in the body^[1, 2].

Materials and Methods

The dogs presented to clinic and those referred from various hospitals in and around Hyderabad to Teaching Veterinary Clinical Complex, Bhoiguda formed the basis for the present study. Whole blood and serum samples of all the selected dogs formed the clinical material for laboratory examination. Clinical samples for hematology and biochemistry i.e., blood and sera samples were collected from all the dogs with malignancy for laboratory examination. In dogs with malignancy, blood and sera samples were collected before therapy. Blood and serum were also collected from apparently healthy dogs to establish normal values. Two ml of whole blood was withdrawn from cephalic or saphenous vein in vacutainer with K-EDTA for estimation of hematological parameters. For separation of serum, 5ml of blood was collected in a vacutainer containing clot accelerator. Serum was separated immediately after clotting by centrifugation at 3000 rpm for 5 minutes and collected in ependorff tubes. Care was taken during collection and processing of blood samples to avoid haemolysis. Serum samples were collected for the estimation of biochemical parameters. Estimation of all the hematological and biochemical parameters was carried out on the same day of collection. However, blood was also collected from apparently healthy dogs to establish normal values.

Hematology

Hematological parameters such as Hb, PCV, TEC, TLC and DLC were estimated as per the standard procedures. Hemoglobin was estimated by Sahli's comparator method and the concentration was expressed as g/dl. Packed cell volume was estimated by microhematocrit method and values were expressed as percent.

Total erythrocyte count was examined by haemocytometer and the results were expressed as number of erythrocytes $\times 10^6$ per microliter of blood. Total leucocyte count was examined by haemocytometer and the results were expressed as number of leucocytes $\times 10^3$ per microliter of blood. Blood smears were prepared on a clean grease free slide and stained by Leishman's stain for DLC. Cells were counted by battlement method and expressed as percentage.

Serum biochemistry

All the serum biochemical parameters were estimated by semi auto analyzer (Star 21 plus, supplied by M/s Rapid Diagnostics, New Delhi) employing the kits supplied by Span diagnostics Pvt. Ltd.

Alanine aminotransferase (ALT)

Serum ALT was estimated by kinetic assay method and the values were expressed as IU/L.

Aspartate Aminotransferase (AST)

Serum AST was estimated by kinetic assay method and the values were expressed as IU/L.

Alkaline phosphatase (ALP)

Serum ALP was estimated by kinetic assay method and the values were expressed as IU/L.

Total Protein

Total Protein was estimated by end point method (Modified Biuret) and the values were expressed as g/dl.

BUN

BUN was estimated by initial rate assay (NED-dye) and the

values were expressed in mg/dl.

Creatinine

Creatinine was estimated by initial rate assay (Modified Jaffe's reaction) and the values were expressed in mg/dl.

Results

Dogs that were suspected to be suffering from certain tumors were subjected to detailed evaluation, clinical examination and other special examination to confirm the type of tumor. However, dogs that were apparently healthy and presented for general check up, deworming and vaccination were also considered to establish normal values.

Hematological examination of apparently healthy dogs and mammary tumors affected dogs was depicted in Table No.1. In the present study, in dogs affected with mammary tumours an insignificant decrease of mean haemoglobin (13.01 ± 1.20 g/dl), PCV (38.96 ± 0.72 percent) and TEC ($6.46 \pm 0.12 \times 10^6/\mu\text{l}$) was noticed when compared to that of apparently healthy dogs (13.75 ± 0.51 g/dl, 41.60 ± 0.91 percent and $6.63 \pm 0.3 \times 10^6/\mu\text{l}$) respectively. The mean leukogram of mammary carcinoma cases revealed an insignificant elevation of total WBC count ($14.75 \pm 0.24 \times 10^3/\mu\text{l}$) and neutrophils (73.61 ± 0.52 percent); decrease in lymphocytes (21.86 ± 0.18 percent) and normal monocytes as well as eosinophils 138 (2.25 ± 0.09 percent and 2.30 ± 0.12 percent), when compared to that of apparently healthy dogs ($13.30 \pm 0.86 \times 10^3/\mu\text{l}$, 72.0 ± 0.32 percent, 24 ± 0.14 percent, 2.00 ± 0.36 percent and 2.00 ± 0.80 percent), respectively. Similarly, an insignificant decrease was noticed with respect to platelet levels ($2.92 \pm 0.36 \times 10^5/\text{dl}$) when compared to that of apparently healthy ones ($3.06 \pm 0.24 \times 10^5/\text{dl}$) (Table No. 1).

Table 1: Hematological parameters of dogs affected with mammary tumors compared to apparently healthy dogs

S. No.	Parameter	Apparently Healthy dogs (n=10)	Dogs affected with Mammary tumors (n=40)
1	Haemoglobin (g/dl)	13.75 ± 0.51	13.01 ± 1.20
2	PCV %	41.60 ± 0.91	38.96 ± 0.72
3	TEC ($\times 10^6/\mu\text{l}$)	6.63 ± 0.3	6.46 ± 0.12
4	TLC ($\times 10^3/\mu\text{l}$)	13.30 ± 0.86	14.75 ± 0.24
5	DLC (%)		
	Neutrophils (%)	72.0 ± 0.42	73.61 ± 0.52
	Lymphocytes (%)	24.0 ± 0.14	21.86 ± 0.18
	Monocytes (%)	2.00 ± 0.36	2.25 ± 0.09
	Eosinophils (%)	2.00 ± 0.80	2.3 ± 0.12
6	Platelets ($\times 10^5/\text{dl}$)	3.06 ± 0.24	2.92 ± 0.36

** : Significant at $P < 0.01$ when compared to apparently healthy dogs; * : Significant at $P < 0.05$ when compared to apparently healthy dogs

: Significant at $P < 0.01$ when compared to before therapy; # : Significant at $P < 0.05$ when compared to before therapy

Serum Biochemistry

Serum biochemical estimations in dogs with mammary tumours revealed an insignificant decrease in BUN values

while an insignificant increase in serum Creatinine, ALT, AST, ALP and total protein was observed as depicted in Table No. 2.

Table 2: Mean serum biochemistry values of dogs with mammary tumors and Apparently Healthy dogs

S. No.	Parameter	Apparently Healthy dogs (n=10)	Dogs affected with Mammary tumors (n=40)
1	BUN(mg/dl)	16.29 ± 0.44	14.82 ± 1.12
2	Creatinine(mg/dl)	0.95 ± 0.62	1.14 ± 0.09
3	ALT(IU/L)	30.47 ± 0.98	37.98 ± 2.04
4	AST(IU/L)	39.86 ± 0.36	40.49 ± 0.14
5	ALP(IU/L)	42.90 ± 0.80	46.55 ± 1.24
6	Total Protein(g/dl)	6.70 ± 0.14	7.07 ± 0.68

** : Significant at $P < 0.01$ when compared to apparently healthy dogs; * : Significant at $P < 0.05$ when compared to apparently healthy dogs

: Significant at $P < 0.01$ when compared to before therapy; # : Significant at $P < 0.05$ when compared to before therapy

Discussion

Dogs affected with mammary tumours in the present study showed an insignificant decrease of mean haemoglobin, PCV and TEC when compared to that of apparently healthy dogs. As explained similarly by Todarova ^[5] and Mohapatra ^[3] the leukogram of mammary carcinoma cases revealed insignificant elevation of total WBC count and neutrophils, which indicates inflammatory reaction and possible bacterial infection in the tumour affected dogs. Decrease in lymphocytes and platelets apart from normal monocytes and eosinophils were seen in the present study when compared to that of apparently healthy dogs. The haematological findings were in concurrence with the findings of Todarova ^[5] and Mohapatra ^[3] who stated that haematological parameters in mammary tumour cases did not show any deviations from the reference range and in partial agreement with that of Pankaj ^[4] who stated that the mean values of TLC and DLC were within normal physiological range while PCV and Hb were less than normal range in canine mammary neoplasia at the time of presentation.

Serum biochemical estimations in dogs affected with mammary tumours revealed an insignificant decrease in BUN values while insignificant increase in serum creatinine, ALT, AST, ALP and total protein was observed. Similar biochemical observations were also represented by Todarova ^[5] who stated that serum biochemical parameters in mammary tumour cases did not show any deviations from the reference range, Pankaj ^[4] who stated that the mean values of serum AST and ALT were within normal physiological range before treatment and Mohapatra ^[3] who opined that no significant difference was observed between the healthy control group and mammary tumour affected dogs with respect to serum biochemical parameters.

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