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A Preliminary Study on Prevalence of Hepatic Disorders in Dogs in Indore District (M.P.)

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Abstract

A study was carried out on 1082 dogs presented to department of Veterinary Medicine, Teaching Veterinary Clinical Complex (T.V.C.C.) college of Veterinary Science & A.H. Mhow .The dogs were examined clinically and haemato-biochemically in order to assess the hepatic disorders. The prevalence of hepatic disorders among screened dogs was found to be 3.51%. The highest (36.84%) prevalence was observed between 4 to 8 years of age. Sex wise prevalence showed that females were more (57.89%) susceptible than males (42.11%) among all breeds. The most affected breed was Labrador Retriever (21.06%) followed by Pomeranian, Non-descript, German Shepherd, Crossbreed, Rottweiler, Great Dane, Saint Bernard and Golden retriever.

Key words: Dog, Hepatic disorders, Prevalence, Alanine Aminotransferase, Aspartate Aminotransferase

Introduction

Liver is the most important vital organ and the largest parenchymal gland of the body with vast reserves of function. Liver diseases are considered often to remain underdiagnosed. Clinical signs can be absent for a long time until the disease has progressed to a severe stage. Therefore laboratory findings, such as elevated liver enzymes and adverse changes in haematology lead to suspect a liver disease more often than clinical signs. Enzymes used in small animal veterinary practice are alanine transaminase (ALT), aspartate transaminase (AST), alkaline phosphatase (ALP) present in high concentrations in cytosol of hepatocytes and thus released when there is hepatocyte damage. The estimated frequency of canine hepatitis varied with the investigated population and accounted for 1-2% (Poldervaart *et al.,* 2009), and up to 12% in general population (Watson *et al*., 2010). There are scanty literatures on prevalence of hepatic disorders in dogs particularly in Indore region of M.P., hence the present study was undertaken to record the prevalence of hepatic disorders in dogs.

Materials and Methods

The study was carried out at department of Veterinary Medicine, Teaching Veterinary Clinical Complex (T.V.C.C.), different units of State Veterinary Hospital, Private Veterinary Clinics, and private owners nearby at Veterinary College Mhow, Indore (M.P.). A total of 1082 dogs were included in

the study during December 2016 to May 2017. Out of 1082 dogs presented, 38 dogs were suffering from various ailments such as pyrexia, jaundice, inappetence/anorexia, vomiting/regurgitation, abdominal distension, hind leg edema etc. Haemato-biochemical parameters such as Hb, PCV, TLC, Neutrophils, Lymphocytes, Monocytes,Eosinophils, Basophils and biochemical parameters ALT, AST, Bilirubin (Direct and Total) were estimated following standard methods in use and the prevalence of hepatic disorders was calculated on the basis of total number of dogs having hepatic disorders based on clinical and haemato-biochemical findings(Table 1).

Table 1: Mean values of Haematological and Biochemical Parameters of dogs suffered from hepatic disorders

Haematological Parameters		Biochemical Parameters	
Haemoglobin	10.60±0.64 g/dl	ALT	167.97±20.11 IU/L
Packed Cell Volume	31.53±1.75 %		
Total Leucocyte Count	15.10±2.60 10^3/µl	AST	102.55±11.83 IU/L
Neutrophils	74.62±2.03 %		
Lymphocytes	21.37±1.89 %	Bilirubin (Total)	2.06±0.22 mg/dl
Monocytes	1.95±0.35 %		
Eosinophils	1.50±0.28 %	Bilirubin (Direct)	1.02±0.10 mg/dl
Basophils	0.12±0.06 %		

Results and Discussion

Total out of a 1082 dogs screened, 124 dogs were suspected for hepatic disorders. Clinical observations and haemato-biochemical examinations was carried out of the suspected 124 dogs which revealed 38 dogs positive for hepatic disorders. Prevalence of hepatic disorders was found to be 3.51 % (38/1082). Similar observations were made by Vijaykumar *et.al.* (2003). On the other hand Boomkens *et. al.* (2004), Halstead (2007) and Tarafder and Samad (2010) reported 1%, 2% and 1.72% hepatic disorders respectively. The variations in the findings might be due to the geographical and environmental conditions.

In the present study the decrease in Hb and PCV as compared to healthy dogs may be attributed to decreased nutrient uptake, the increased level of ALT and AST may be due to altered hepatocellular membrane permeability, hepatocellular necrosis and inflammation.

The age of dogs suffered from liver diseases varied from 8 months to 15 years. Among the positive cases the highest prevalence was recorded between 4 to 8 years (36.84%) followed by below 4 years (34.22%) and above 8 years (28.94%). Similar observations were also made by Mandigers *et al.* (2004) where they reported liver disease is usually present between four to six years while Shih *et al.* (2007) reported hepatopathy in middle to old age dogs and Ranjith Kumar (2007) recorded higher incidence in 5-8 years.

Sex wise prevalence showed that females were more (57.89%) susceptible than males (42.11%) among all breeds. Female predispositions in liver disorders were also reported by Poldervaart*et al.* (2009) and Bexfield *et al.* (2011) while male predisposition was reported by Ranjith Kumar (2007). In the present findings female predisposition might be due to more stress on females as compared to males. Breed wise distribution of hepatic disorders revealed that Labrador Retriever constituted the maximum proportion (8/38, 21.06 %) followed by Pomeranian (7/38, 18.42), Non-descript (7/

38, 18.42%), German Shepherd (4/38,10.52%), Crossbreed (4/38,10.52%), Rottweiler (3/38, 7.90%), Great Dane (3/38, 7.90%), Saint Bernard(1/38, 2.63%) and Golden Retriever (1/38, 2.63%). These findings are also in agreement with findings of Shih *et al.* (2007). However, higher ratio in Labrador Retriever in the present study is attributed to the higher population in and around Mhow. On the other hand Strombeck *et al.* (1988) reported higher incidence in Doberman pinschers.

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Association between Somatic Cell Count, Electric Conductivity and pH in Diagnosis of Subclinical Mastitis in Crossbred Cows

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Abstract

The objective of the present study was to determine the relation between somatic cell count (SCC), Electrical conductivity (EC) and pH of milk for diagnosis of subclinical (SCM) and clinical mastitis (CM). For this a total of 120 samples were collected from crossbred cows of organised and norganised dairy farms for determination of EC, SCC and pH. On the basis of SCC, the cows were categorized as healthy(SCC below 2×10^5 per ml), subclinical mastitis (SCC in the range 2×10^5 - 3×10^5 per ml)and mastitis(SCC more than 3×10^5 per ml).The values of milk SCC and EC were significantly ($P<0.05$) higher in crossbred cows having subclinical and clinical mastitis. Milk pH ranged from 6.48 to 6.62 in healthy and subclinical cases,whereas pH 7.03 was observed in clinical mastitis cases. There was a significant positive correlation ($P <0.05$) between SCC, EC and milk pH.

Key words: Milk somatic cell count, Electrical conductivity, pH, subclinical mastitis.

Introduction

With the improvement in the quality of germplasm through extensive crossbreeding programs, the susceptibility of these animals to various diseases, especially production diseases like Mastitis has increased, which is characterized by physical, chemical and bacteriological changes in the milk and pathological changes in the glandular tissue of the udder. Both acute as well as chronic mastitis give rise to substantial increase in somatic cell count in milk (Burton and Erskine, 2003). SCC is inevitable for specifying the reduction of the milk yield. A rise in sodium and chloride content of milk drawn from a infected udder results in increased electrical conductivity in the milk. The early detection of mastitis is very important, not only because of the economic impact due to yield losses, but also because of the negative effects on the animal's welfare (De Mol and Woldt, 2001). Hence the present study was designed to determine the effectiveness of SCC, electrical conductivity together with pH measurement method on the diagnosis of subclinical and clinical mastitis.

Materials and Methods

The study was performed on 120 crossbred cattle of organised (Cows maintained at Veterinary College Dairy Farm, Mhow, Military Dairy Farms Mhow and Ahilyamata Goshala, Indore) and

unorganised (cows reared at private farms around Mhow) dairy farm over a period of 6 month covering two seasons viz. Winter - December to February and Summer – March to May. A total of 120 milk samples were collected . Milk sample(about 10 ml) pooled from all the four quarters from each cow collected separately and carried in ice box at 4^0C to the laboratory. All the samples were analyzed in duplicate.Somatic Cell Counts (SCC) in milk was determined using direct microscopy method (Shukla, 1980). Cows having milk SCC below 2×10^5 per ml were categorised as healthy cows, whereas those with SCC in the range 2×10^5 - 3×10^5 per ml were considered to be subclinical mastitis animals. The cows with milk SCC more than 3×10^5 per ml were placed in clinical mastitis category .The conductivity of the milk gets altered during the mastitis due to increased ion influx. Which was measured in mili-siemens/cm unit (ms/cm). Both conductivity and pH of milk were measured using a pH-Conductivity Benchtop (Orion 4 star, Thermo Electron Corporation, USA).

The means and standard errors were computed for different parameters using two ways ANOVA with interactions(Snedecor and Cochran, 1994). Somatic cell count values were transformed to log 10 values as they are not distributed normally and the range of the values were high. Pearson's correlation was performed to find correlation between pH, electrical conductivity and somatic cell counts within normal, subclinical mastitis and clinical mastitis group.

Results and Discussion

The Mean± SE values of milk SCC, electric conductivity, and pH measurement in normal, subclinical and clinical mastitis is presented in Table 1.

Table 1: Mean ± SE of Somatic Cell Counts, Electrical Conductivity and pH in normal, subclinical and clinical mastitis of crossbred cows.

Traits	Normal	Subclinical	Clinical
SCC(10^5/cm)	$1.44^{c}\pm0.05$	$2.55^{b}\pm0.11$	$5.45^{a}\pm1.79$
EC(mS/cm)	$4.79^{c}\pm0.06$	$5.47^{b}\pm0.09$	$7.15^{a}\pm0.43$
pH	$6.65^{b}\pm0.05$	$6.84^{b}\pm0.02$	$7.11^{a}\pm0.12$

Means bearing the different superscripts within rows differ significantly from each other ($P < 0.05$)

Influence of mastitis on SCC, EC and pH

Table 1 indicates that the mean ± S.E values of SCC were found to be 1.44 ± 0.05, 2.55 ± 0.11 and 5.45 ± 1.79 x 10^5 in healthy, subclinical and clinical mastitis crossbred cows respectively. The subclinical and clinical cases showed significant ($P < 0.05$) higher values of milk SCC as compared to normal cases, indicative of normal cellular defence against udder infections. Similar threshold value of SCC for healthy cows (200, 000 cells/m) has been reported by Skrzypek *et al*. (2004). A higher milk SCC in subclinical mastitis compared to normal cows has been reported by Sharif *et al*.(2007).

The electric conductivity of milk has been a reliable indicator trait for mastitis. A significant ($P<0.05$) variation among the electric conductivity values of subclinical and clinical mastitis as compared to normal milk in crossbred cows was observed. The healthy cows showed EC value of 4.79 ± 0.06 mS/ cm which increased to 5.47 ± 0.09 mS/cm in subclinical cases and subsequently to 7.15 ± 0.43 mS/cm in cases of clinical mastitis. This change in EC may be due to altered concentration of Na+, K+, and Cl- in mastitic milk causes the rise in electrical conductivity of milk (Luck and Smith, 1975). When mastitis is present, the potassium concentration in the milk decreases while the concentration of sodium and chloride ions increase , leading to increased EC. Increased EC is directly proportional to increased udder inflammation and increased SCC.

Mean ± S.E of milk pH was found to be 6.65 ± 0.05 in healthy, 6.84 ± 0.02 in subclinical cases and 7.11±0.12 in clinical mastitis cases. Results obtained in present study were in consonance with the findings reported by Shahid*et al.* (2011).

Correlation between parameters

The Coefficients Of Correlation between Somatic Cell Counts, Electrical Conductivity and pH of milk of crossbred cows have been presented in Table 2. In the present study, statistically significant correlation was observed between SCC and EC (r=0.223). A moderate (r=0.118) but significant correlation was observed between EC and pH. These findings are in accordance with the reports of Sharma *et al.* (2016), who reported a significant positive correlation (r = 0.574) between SCC and EC of milk (p< 0.01). Panchal *et al*., (2016) observed a highly positive correlation of SCC with EC (r= 0.749).This study also indicates that association between pH and SCC was found to be low (r=0.075). Panchal *et al.* (2016) also reported a moderate correlation between milk pH and SCC, which is in resemblance to our study.

Table 2: Pearson correlation between Somatic Cell Counts(SCC), Electrical Conductivity(EC), and pH in normal, subclinical and clinical mastitis of crossbred cows.

Characteristics	SCC	EC	pH
SCC	1	0.223*	0.075
EC	0.223*	1	0.118*
pH	0.075	0.118*	1

*Correlation is significant at the level of P < 0.05

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