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Liver Diseases in Dogs- A Prospective Study

Pooja Dixit[1], J. P. Varshney[2], A. K. Dixit[3] and P. C. Shukla[4]
Division of Medicine
Indian Veterinary Research Institute
Izatnagar
Bareilly -243 122 (Uttar Pradesh)

Abstract
One hundred forty dogs with hepatopathies, diagnosed employing a battery of tests, were investigated for clinico-epidemiological variants. Of these 82 dogs were having primary and 58 were having secondary hepatopathies. Primary hepatopathies were differentiated as hepatitis/ hepatosis, cirrhosis/fibrosis or intrahepatic portosystemic shunt and extra-hepatic diseases causing hepatic reaction and responses were blood protozoan and rickettsial diseases, haemorrhagic gastroenteritis simulating to parvo, epilepsy, pyometra and hydronephrosis. Clinical signs were vague and varying from decreased appetite, anorexia, nausea/vomiting, ascites, weakness, weight loss, pale mucosa, epigastric pain, pyrexia, bilateral hind limb odema, constipation, diarrhoea, melena, icterus, encephalopathy, polyuria/polydipsia to depression in different combinations. Melena with ascites and bilateral hindlimb odema were most commonly associated with cirrhosis or intrahepatic portosystemic shunt. It was also interesting to note that the growth was stunted in cases of intrahepatic portosystemic shunt. Nervous signs *viz.* ataxia, hypersalivation, head pressing, seizure, behavioural changes were associated with cirrhosis or intrahepatic portosystemic shunt. Target cell, spherocytes, poikilocytes and acanthocytes were seen in advanced cases of cirrhosis or intrahepatic portosystemic shunt. The mean median age of the dogs with hepatic diseases, was higher than that of dogs showing hepatic reaction and responses to extrahepatic diseases. The mean age of dogs with intrahepatic PSS was lower. Hepatitis and cirrhosis were more prevalent in females and intrahepatic PSS in males. Amongst breeds, Pomeranians were over represented for primary or secondary hepatopathies.

Introduction

The number of canine patients is increasing day by day in city clinics owing to growing concern of the owners for alleviating the sufferings of their beloved pets. In an attempt for better health care, many a times there is an overzealous medication by the owner himself or by the practitioners. Many drugs have been found to adversely affect the functioning of the liver leading to signs of hepatopathy (Johnson,1994). A variety of etiologies *viz.* viral infections, protozoal or ehrlichial infections, chronic drug therapy, copper accumulation, steroids can cause hepatopathies. Even extrahepatic diseases may cause hepatic reactions and responses (Meyer and Twedt, 2000). Indifferent appetite /anorexia, nausea/ vomiting, diarrhoea/constipation, polyuria, polydipsia are most common presenting signs of both primary or secondary hepatic diseases that make differentiation of even different hepatic disorders difficult. Some of the breeds such as Bedlington terrier West Highland white terrier, Doberman pinscher, American and English cocker spaniel, Skye terrier, Labrador retriever and Standard poodle have been reported at increased risk for chronic hepatitis (Anderson and Sevelius 1991). Some sex differences have been noticed in Doberman pinschers, Labrador retriever and Cocker spaniel with respect to chronic hepatitis. Such demographic studies have not been conducted in India. Therefore, the

1. Department of Veterinary Medicine, College of Veterinary Science & A. H., MPPCVV, Rewa
2. Consultant (Medicine), Nandini Veterinary Hospital, Ghod-Dod Road, Surat-395007.
3. Department of Veterinary Parasitology, College of Veterinary Science and A.H.,MPPCVV, Rewa
4. Department of Veterinary Medicine, College of Veterinary Science and A.H., Jabalpur

present study was undertaken to investigate demographic and clinical variants in dogs with hepatic diseases.

Materials and Methods

One hundred fourty ailing dogs, diagnosed with hepatopathies employing a battery of tests from clinico-biochemical observations, radiography to ultrasonography were investigated for clinico-epidemiological variants. Of these, 82 were having primary and 58 secondary hepatopathy associated with extra-hepatic diseases. Dogs with primary hepatopathy were further differentiated into 3 categories i.e.hepatitis/ hepatosis (n=47), cirrhosis/fibrosis (n=21) and intrahepatic portosystmic shunts (n=14). In 58 other dogs, hepatic changes were associated with babesiosis (16), mixed infection of Babesia and Ehrlichia (21), Ehrlichiosis (3), haemorrhagic gastroenteritis simulating to parvo (6), epilepsy (10), pyometra (1) and hydronephrosis (1). Clinical variants were recorded in detail and population data were analyzed.

Results and Discussion

One hundred and fourty dogs with presenting signs of variable appetite to anorexia, nausea/ vomiting, diarrhoea/constipation, polyuria and polydipsia for 7-14 days duration were confirmed as cases of hepatopathies on the basis of clinico-haematological, serum biochemical, enzymological, urological, ragiographic and ultrasonographic investigations. Of these 82 ailing dogs were found to have primary hepatic disorders and 58 were having liver reaction and responses to blood protozoan and rickettsial infections, haemorrhagic gastroenteritis simulating to parvo, epilepsy, pyometra and hydronephrosis. Hess and Bunch (2000) mentioned that a number of diseases originating outside hepatobilliary system affect liver secondarily. Primary liver diseases were subgrouped as hepatitis/hepatic congestion, cirrhosis/fibrosis and intrahepatic portosystemic shunt on the basis of detailed investigations mentioned earlier. Liver diseases have been classified into various categories on the basis of detailed investigations including hepatic biopsy by other workers (Jarrett and O'Neil, 1985; Reed, 1995). Many systemic infections such as rickettsial, protozoal and viral infections and pyometra trigger hepatic response eliciting an increase in liver enzyme profile (Center,1994) and changed echo- texture of the liver (Varshney *et al.,* 2003).

Clinical symptoms with respect to hepatopathies in dogs were variable appetite to anorexia (65.85%) followed by nausea/vomiting (62.19%), ascites (47.5%), weakness (41.46%), weight loss (36.58%), pale mucosa (35.36%), epigastric pain (31.7%), pyrexia (24.39%), bilateral limb odema (24,39%), constipation (21.95%), diarrhoea (18.29%), melena (18.29%), icterus (18.29%), encephalopathy (7.3%), polyuria/polydipsia (6.09%) and depression (2.43%) in decreasing order. The onset of clinical signs was insidious and decreased appetite/anorexia and vomiting/ nausea were the most common presenting signs as well as history. The present observations are in line with the observations of Strombeck and Gribble (1978) and Anderson and Sevelius (1991). Melena with ascites and bilateral hindlimb odema (Fig.1) were most commonly associated with cirrhosis (Obwolo and French, 1988; Lucena *et al.,* 2001) and also in cases of intrahepatic portosystemic shunt. It was also interesting to note that the growth was stunted in 50% cases of intrahepatic portosystemic shunt (Barrett *et al.,* 1976; Rutgers, 1993). Nervous signs viz. ataxia, hypersalivation, head pressing, seizure, behavioural changes were seen only in six cases suffering from either cirrhosis or intrahepatic portosystemic shunt. These signs, suggestive of encephalopathy, were erratic (wax and wane) in nature (Taboda, 1991). Bilateral hind limb odema with ascites was observed in 24.39% cases of intrahepatic portosystemic shunt and appears to be an important clinical finding owing to chronic portal hypertension (Bolton and Ettinger, 1989) provided right ventricular hypertrophy (Kittleson, 1990) and caudal venacava obstruction (Owens, 1985) are ruled out. Changes in erythrocyte morphology

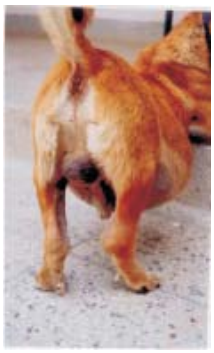

Fig.1: A dog with hepatic cirrhosis showing ascites with bilateral hind limb edema .

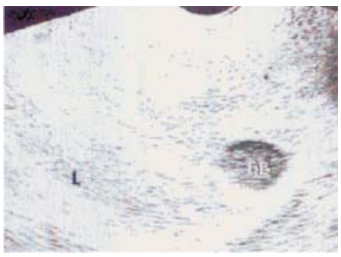

Fig. 2: USG showing cirrhosis/ fibrosis - hyperechoic areas as indicative of fibrosis

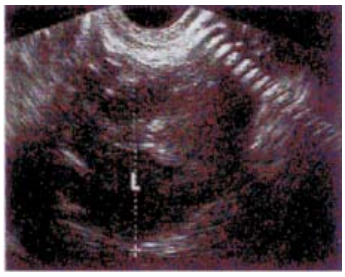

Fig. 3: USG showing hepatitis / congestion- hypoechoic areas as indicative of hepatic congestion

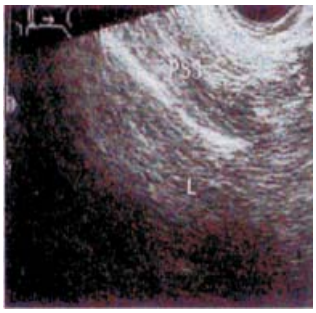

Fig. 4: USG showing intrahepatic PSS

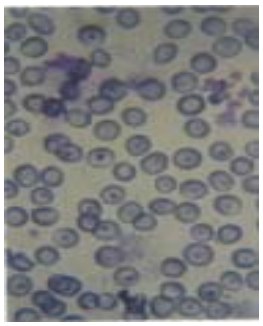

Fig. 5: Microphotograph of blood smear of a dog suffering from hepatitis showing target cells

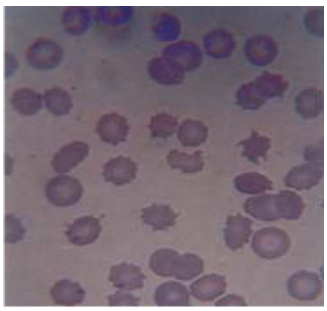

Fig. 6: Microphotograph of blood smear of a dog suffering from hepatitis showing burr cells (acanthocytes)

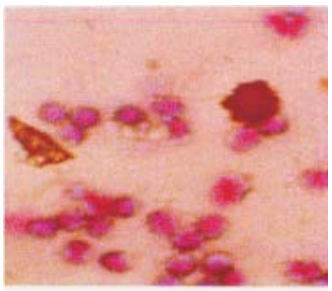

Fig. **7**: Microphotograph of urine sample of a dog suffering from cirrhosis showing showing golden brown thorny apple shaped crystals of ammonium biuret

revealed target cell, spherocytes (Fig. 5), poikilocytes and acanthocytes (Fig. 6) in some cases of primary hepatic diseases (advanced cases of cirrhosis or intrahepatic portosystemic shunt with focal or diffuse cirrhosis) as also reported in humans, dogs and cats and have been ascribed to splenic dysfunction or to altered lipoprotein metabolism (Center,1994). Urological examination revealed the preponderance of golden brown thorny apple shaped crystals of variable size resembling with crystals of ammonium biuret (Fig. 7) in 70% of dogs with intrahepatic portosystemic shunt or cirrhosis (Marretta *et al.,* 1981; Centre, 1994; Varshney and Hoque, 2002).The presence of the crystals in the urine of the dogs other than Dalmatians appears to be a good indicator of hepatic vascular anomalies/cirrhosis (Cornelius and Bjorling, 1992). The formation of these crystals in the urine sediment of dogs with hepatic encephalopathy could be attributed to hyperammonaemia (Fraser and Arief, 1985) and its reaction with excess uric acid owing to diminished hepatic conversion to allantoin and thus favouring precipitation of the crystals, especially in alkaline urine (Nelson and Couto, 1998).

Clinical signs *in hepa*topathies were extremely variable, vague and non specific related to gastrointestinal and neurological symptoms (Holt et al., 1995; Varshney and Hoque, 2002). Nevertheless, a combination of prolonged anorexia, vomiting/retching, melena, ascites and icterus was highly suggestive of chronic hepatic disease. In advanced cases of cirrhosis and/or intrahepatic portosystemic shunt, signs referable to nervous system involvement became evident.

The mean and median age of the dogs having hepatic diseases, was higher (51.9±4.99 months, median age 60 months) than that of dogs having extrahepatic disorders (39.62±10.7 months, median age 24 months) and there appeared much difference among hepatic and extrahepatic diseases *as far* as age of predisposition is concerned. Among hepatic diseases, the mean age of the dogs diagnosed with hepatitis, cirrhosis and intrahepatic PSS was 50.21±6.27 months (median 60 months), 61.86±10.4 months (median 48 months) and 35.63±10.4 montnhs (median 27 months) respectively. It appears that mean age of dogs diagnosed with cirrhosis was comparatively high but varied from four month to 1 year. This finding in respect to age of dogs diagnosed with hepatitis is not very much d fferent from that of Anderson and Sevelius (1991) who found that the average age of dogs at presentation was 5-7 years in histologically confirmed chronic (active / progressive) hepatitis. Thornburg et al. (1983) found a wide variation in the age of dogs, diagnosed with cirrhosis ranging from eight months t 10 years. Strombeck and Gribble (1978) ave reported mean age of all dogs with Chronic Active Hepatitis (CAH) as 5.3 years. The mean age of dogs diagnosed with intrahepatic PSS was lowest with a mean of 35.63±10.4 months (median 27 months). Johnson et al. (1987) have reported the mean age as 12.8 months with the median of eight months in cases of congenital PSS was almost similar in Maltese (Range 3 months to 8.5 years, median 12 months) and in both breed of dogs most cases were detect*ed at* or before 12 months of age. Johnson (1994) was of the opinion that a congenital PSS should still be a diagnostic consideration in middle aged or older dogs owing to subtle signs and some dogs may go undiagnosed until as late as 10 years of age. The sex ratio (male: female) was 5:1, 0.9:1, 1.07:1 in healthy dogs, and dogs with hepatic and extrahepatic d*isease*s. An overall sex ratio in the total dog population under study was 1.03.In hepatic diseases, sex ratio was 0.906 agreeing with the findings of Rutgers and Haywood (1988) and Mondelli *et al.*(1988) who documented increased proportion of females as compared to males for CAH in dogs and CAH and PSS in human respectively. In one study of CAH, the sex ratio was 0.37 (Strombeck and Gribble, 1978). Among different hepatic diseases, the sex ratio was 0.67 in hepatitis, 0.91 in cirrhosis and 2.5 in intrahepatic PSS. In hepatitis and cirrhosis, females predominated and in cases of intrahepatic PSS, males over represented the scenario. The sex predisposition in cases of hepatitis and cirrhosis agreed with the findings of other workers (Strombeck and Gribble, 1978; Anderson and Sevelius, 1991). Male predominance in intrahepatic PSS has also been reported by Tisdall et al. (1994) while Johnson *et al.* (1987) found female predominance in cases of congenital PSS in dogs. On the contrary,

Rutgers (1993) reported no obvious sex predisposition in cases of inteahepatic PSS. The difference in the observations of these workers with respect to sex predisposition in cases of intrahepatic PSS could be ascribed to a small sample size and variable diagnostic criteria adopted.

The population of ailing dogs was highly heterogenous and Pomeranians were predisposed (37%) for both hepatic and extrahepatic diseases followed by nondescript crossbreds (20.71%), GSD (19.28%), D*oberma*nn (7.14%), Spitz (7.14%) *an*d Golden retriever (4.28%). Other breeds such as Labrador, Bhutia, Dalmation, Dechshund and Greatdane accounted for one or two case each. Among different hepatic diseases also, Pomeranians accounted for higher number of cases of cirrhosis and intrahepatic PSS while GSD showed higher number of cases of hepatosis. Anderson and Sevelius (1991) reported American cocker spaniel and West Highland white terrier had high prevalence (55.56%) of cirrhosis and Labrador retriever (57.14%) of hepatitis in Sweeden. In the present study, only two Labradors (2/140) contributed to the population of 140 ailing dogs and only one had cirrhosis/fibrosis. Pomeranians also accounted for higher number of cases (12/14) of intrahepatic PSS. In the present study, this finding is contradictory to the finding of Komtebedde *et al.* (1991) and Maddision (1988) who found that the large breed were more susceptibe to the inteahepatic PSS and small breed to extrahepatic PSS. Rutgers (1993) stated that congenital PSS may occur in any breed of dog but Yorkshire terrier, Miniature Schanauzere, old English sheep dogs and Irish Wolfhunds had higher prevalence of congenital PSS. Meyer *et al.* (1995) have also reported an increasing incidence of hereditary intrahepatic PSS in Irish Wolfhunds in Netherlands while in Australia, Maltese and American cattle dogs were over represented among cases of congenital PSS (Tisdall *et al.,* 1994), Congenital PSS is the most commonly recognized form of PSS and is usually as a single intrahepatic or extrahepatic shunt. Through, genetic basis for congenital PSS is still unknown, affected lines have been recognized in Miniature Schnauzers, Irish wolfhound, Old English sheep dogs and Carin terriers (Johnson *et al.,* 1987; Center *et al;* 1990, Schermerhorn *et al.,* 1996). The higher prevalence of intrahepatic PSS in Pomeranians in the present study, does not have a relevant data to compare this interesting finding, but it could be ascribed to its higher population of this breed in and around Bareilly, as Pomeranians are most preferred and common pet dog in this area. Anderson and Sevelius (1991) recorded over representation of Labrador reteiever, American cocker spaniel, Golden retriever, West Highland white terrier breeds in cases of chronic liver diseases and liver cirrhosis and suggested hereditary factors in the development of these hepatic disease. Subsequent studies by Sevelius and Anderson (1995) further confirmed that American and English cocker spaniel, West Highland terriers and Dobermann pinscher were most commonly affected breeds as far as chronic liver diseases were concerned.

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