



ISSN (E): 2277-7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2023; 12(5): 659-662

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www.thepharmajournal.com

Received: 14-02-2023

Accepted: 24-04-2023

Bhoopendra Singh Mahor

Department of Veterinary Medicine,
College of Veterinary Science and
Animal Husbandry, Jabalpur,
NDVSU, Jabalpur, Madhya Pradesh,
India

Amita Tiwari

Department of Veterinary Medicine,
College of Veterinary Science and
Animal Husbandry, Jabalpur,
NDVSU, Jabalpur, Madhya Pradesh,
India

Aditya Pratap

Department of Veterinary Medicine,
College of Veterinary Science and
Animal Husbandry, Jabalpur,
NDVSU, Jabalpur, Madhya Pradesh,
India

Salil Kumar Pathak

Department of Veterinary Medicine,
College of Veterinary Science and
Animal Husbandry, Jabalpur,
NDVSU, Jabalpur, Madhya Pradesh,
India

Brejesh Singh

Department of Veterinary Medicine,
College of Veterinary Science and
Animal Husbandry, Jabalpur,
NDVSU, Jabalpur, Madhya Pradesh,
India

Ranbir Singh Jatav

Department of Veterinary Medicine,
College of Veterinary Science and
Animal Husbandry, Jabalpur,
NDVSU, Jabalpur, Madhya Pradesh,
India

Saindla Rakesh

Department of Veterinary Medicine,
College of Veterinary Science and
Animal Husbandry, Jabalpur,
NDVSU, Jabalpur, Madhya Pradesh,
India

Srashty Singh

Department of Veterinary Medicine,
College of Veterinary Science and
Animal Husbandry, Jabalpur,
NDVSU, Jabalpur, Madhya Pradesh,
India

Corresponding Author:

Bhoopendra Singh Mahor

Department of Veterinary Medicine,
College of Veterinary Science and
Animal Husbandry, Jabalpur,
NDVSU, Jabalpur, Madhya Pradesh,
India

Epidemiology and clinical abnormalities of hepatitis in dogs

Bhoopendra Singh Mahor, Amita Tiwari, Aditya Pratap, Salil Kumar Pathak, Brejesh Singh, Ranbir Singh Jatav, Saindla Rakesh and Srashty Singh

Abstract

The liver is the largest parenchymal organ in the body, performing a number of diverse biochemical processes necessary to maintain the body's normal homeostasis. Hepatitis is one of the most frequent hepatic diseases in dogs which go undetected in early stage. Clinical signs of hepatitis can be variable depending on the severity. A total of 5132 dogs presented at V.C.C., College of Veterinary Science and Animal Husbandry, Jabalpur, from February-2021 to September-2021 were screened for the study. Among them, 374 dogs demonstrated clinical signs pertaining to liver disorders out of which 54 dogs were found suffering from hepatitis. The overall occurrence of hepatitis in adult dogs was recorded as 1.05% and 14.4% among the suspected dogs. Significantly higher occurrence (1.40%) was observed in dogs of 4-8 years of age group followed by dogs of age group more than 8 years of age i.e. 1.31%. A non-significant difference was observed among gender wise occurrence. Amongst different breeds, Golden Retriever had the highest occurrence (5.88%). The most prevalent clinical abnormalities observed in hepatitis was inappetence/anorexia (100%), followed by vomiting (62.96%), ascites (55.55%), weight loss (51.85%), diarrhoea (38.88%), lethargy (35.18%), melena (33.33%), polyuria (18.51%), polydipsia (18.51%), abdominal pain (14.81%) and icterus (12.96%).

Keywords: hepatitis, adult dogs, clinical signs, occurrence

Introduction

The liver is the largest parenchymal organ in the body, performing a number of diverse biochemical processes necessary to maintain the body's normal homeostasis. It helps in the synthesis of plasma proteins, lipids, various clotting factors; metabolism of carbohydrates, fats and amino acids, storage of glycogen as an energy source, secretion of bile for ideal digestion and detoxification and/or excretion of drugs and toxins; and also helps the immune system to fight diseases. For its diverse metabolic activity, liver regulates the functioning of most of the other vital organs of the body, thus playing a central role in maintaining the body's internal environment. Liver has a great compensatory and regenerative capacity to maintain its various functions even during the pathological process.

Hepatitis is one of the most frequent hepatic diseases in dogs which goes undetected in early stage. Hepatitis may be defined as inflammation that encompasses a diverse group of liver diseases characterized by a mixed inflammation infiltrate within the hepatic parenchyma. It is most common cause of unintentional death in dogs. Although there is evidence for infectious, metabolic, toxic and immune causes of hepatitis, but unfortunately, most cases of hepatitis do not have an underlying etiology that can be readily diagnosed. Such cases of hepatitis are classified as idiopathic (Webster *et al.*, 2019) [21].

The causes of hepatitis in dogs are likely to be multifactorial but sometimes include infectious causes *i.e.* *Leptospirosis spp.*, *Bacillus piliformis*, *Helicobacter canis* and *Bartonella spp.* Breeds predisposed to hepatitis include *Doberman pinschers*, *Cocker spaniels*, *Labrador retrievers* and *Standard poodles* (Favier *et al.*, 2013) [13].

Clinical signs of hepatitis can be variable depending on the severity but most commonly include polyuria, polydipsia, weight loss, anorexia, lethargy, vomiting, diarrhea, icterus, ascites, melena, abdominal pain, coagulopathies or hepatic encephalopathy (Honeckman, 2003) [6]. A high incidence of ascites, icterus and abdominal pain is commonly seen in majority of dogs (Webster *et al.*, 2019) [21].

A definitive diagnosis of hepatitis requires fulfilment of several criteria, including clinical or biochemical evidence of the disease. Abdominal radiography often reveals alteration in liver suggestive of hepatitis (Rutgers and Haywood, 1988). Moreover, Ultrasonography is an excellent non-invasive way to evaluate liver parenchyma. It is particularly useful in differentiating focal from diffuse disease. Indications for hepatic ultrasound usually include elevated liver enzymes and presence of free abdominal effusion (Kumar *et al.*, 2012)^[9]. Hence, keeping in view the above facts, present study was aimed to study the occurrence of hepatitis in adult dogs at Jabalpur and to evaluate the ultrasonographic and clinical abnormalities pertaining to hepatitis in adult dogs.

Materials and Methods

Location and place of work

The proposed work was conducted in the Department of Veterinary Medicine, College of Veterinary Science and Animal Husbandry, Nanaji Deshmukh Veterinary Science University, Jabalpur, Madhya Pradesh for a period of eight months i.e. from February- 2021 to September- 2021.

Selection of animals

For occurrence study, a total of 5132 dogs of above one year age which were brought to Veterinary Clinical Complex, College of Veterinary Science & A.H., Jabalpur (M.P.) were screened for a period of eight months i.e. from February-2021 to September- 2021. The dogs were screened for the presence of various clinical symptoms *viz.* polyuria, polydipsia, weight loss, anorexia/inappetence, vomiting, diarrhoea/ loose faeces, icterus, ascites, melena, abdominal pain, lethargy for at least one months or longer periods. Suspected dogs were further proceeded for confirmation on the basis of haemato-biochemical and ultrasonographical examinations.

Statistical Analysis

The collected data were statistically analyzed by using chi square test as per the standard procedure given by Snedecor and Cochran (1994)^[16].

Results and Discussion

An epidemiological study was conducted on dogs to know the occurrence of hepatitis in adult dogs at VCC, Jabalpur during a period of eight months i.e. from February- 2021 to September- 2021. The overall occurrence of hepatitis in dog population was 1.05 percent and among the suspected dogs, the occurrence was 14.4 percent (Table 01).

Table 1: Overall occurrence of hepatitis in adult dogs at VCC, Jabalpur

Particulars	No. screened	No. affected	Occurrence (%)
Total adult Dogs	5132	54	1.05
Dogs suspected for hepatic disorders	374	54	14.4

The result of the present study correlates well with the findings of Sameeksha (2021)^[14] and Meyer and Rothuizen (2013)^[12] who reported 1.06 percent and 1.00 percent of hepatic disorders in dogs respectively. The findings are in partial agreement with Kumbhkar 2017^[17] *et al.* who reported a prevalence of 3.51 percent in demographic study associated with hepatic disorders in dogs. However Poldevaart *et al.*

(2009)^[13] and sumathi (2012)^[17] documented 0.50 percent and 0.15 percent of prevalence of liver disease in dogs respectively.

Age wise occurrence of hepatitis in adult dogs at VCC, Jabalpur

To know the age wise occurrence of hepatitis in adult dogs of varying ages included in the study were classified into three categories. Age wise occurrence was highest in age group between 4 to 8 years i.e. 1.40 percent (29 out of 2064). Significant difference was observed in age wise occurrence of hepatitis in adult dogs at VCC, Jabalpur (Figure 01).

The result of present study is in accordance with the result of Vijayakumar *et al.* (2003)^[20] who observed highest rates of hepatic illness in dogs between the ages of 4 to 6 years. Similarly, Sumathi (2012)^[17] also reported that the age-related incidence of liver disease in dogs is higher in the 4 to 8 years of age group. While Jeena (2019)^[7] and Sameeksha (2021)^[14] reported that the highest prevalence of liver disorders in dogs was found in the age group of above 8 years.

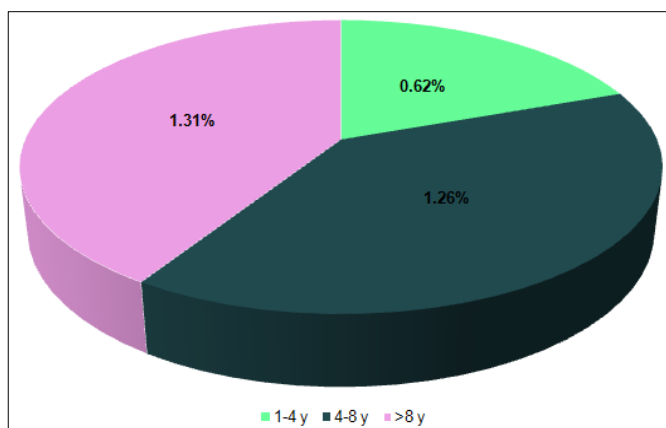


Fig 1: Age-wise occurrence of hepatitis in adult dogs at VCC, Jabalpur

The results of present study of hepatitis in adult dogs showed varying rates of occurrence of hepatitis in different age groups but the dogs of age group of 4-8 years of age were affected more. As hepatitis may take period of months to years to develop and is one of the major cause of morbidity and mortality in dogs. Several studies on liver indicated that aging leads to marked change in liver structure and function and moreover, aging decrease the regenerative ability of liver also.

Gender wise occurrence of hepatitis in adult dogs at VCC, Jabalpur

Out of total screened dogs, 3158 were males and 1974 were females. 36 male dogs i.e. 1.14 percent (36 out of 3158) and 18 female dogs i.e. 0.91 percent (18 out of 1974) were found affected with hepatitis. No significant difference was observed in gender wise occurrence of hepatitis in adult dogs at VCC, Jabalpur (Table 02).

Table 2: Gender wise occurrence of hepatitis in adult dogs at VCC, Jabalpur

Sex	No. screened	No. affected	Occurrence (%)
Male	3158	36	1.14
Female	1974	18	0.91
$\chi^2 = 0.607$ p - value = 0.436 Non significant at $p < 0.05$			

The results of the present study correlates well with the studies conducted by Sumathi (2012) [17], Hiblu (2015), Telagar (2017) [19], Lakshmi (2017) [11] and Jeena (2019) [7]. However, Sameeksha (2021) [14] observed that in comparison to females, the male dogs were more vulnerable to hepatitis and liver failure while Poldervaart *et al.* (2009) [13] and Kumbhkar *et al.*, (2017) [10] observed that the occurrence of hepatitis was more in females as compared to males. In the present study, no significant difference was observed in gender wise occurrence of hepatitis in adult dogs. Although male dogs had more occurrence of hepatitis which might be attributed to the wandering behavior of male dogs and thus they are more vulnerable for various types of infectious and toxic hazards. Moreover, higher population of male dogs could also be one of the reasons for higher occurrence of hepatitis in adult dogs.

Breed wise occurrence of hepatitis in adult dogs at VCC, Jabalpur

The occurrence of hepatitis was studied in various breeds of dogs at VCC, Jabalpur. The highest occurrence was recorded in Golden retriever i.e. 5.88 percent (4 out of 68). Significantly difference was observed in the breed wise occurrence of hepatitis in adult dogs at VCC, Jabalpur (Figure 02).

Similar study of breed wise occurrence of hepatitis in adult dogs were carried out by Vijayakumar *et al.* (2003) [20], Sumathi (2012) [17], Hiblu (2015) [5], Kumbhkar *et al.*, (2017) [10], Telagar (2017) [19], Lakshmi (2017) [11], Jeena (2019) [7] and Sameeksha (2021) [14] who reported varying rates of occurrence of hepatitis in different breeds. Results of present study revealed highest occurrence in Golden Retriever breed of dogs followed by Saint Bernard and Spitz. However, Sameeksha (2021) [14] reported higher occurrence in Labrador and German Shepherd. Although there is variation in the breed wise occurrence of hepatitis in dogs which might be attributed to the variation in the number of dogs of different breeds presented at VCC, Jabalpur. However, dog breeds at risk for developing hepatitis may change with time, geographical location, feeding and managerial practices.

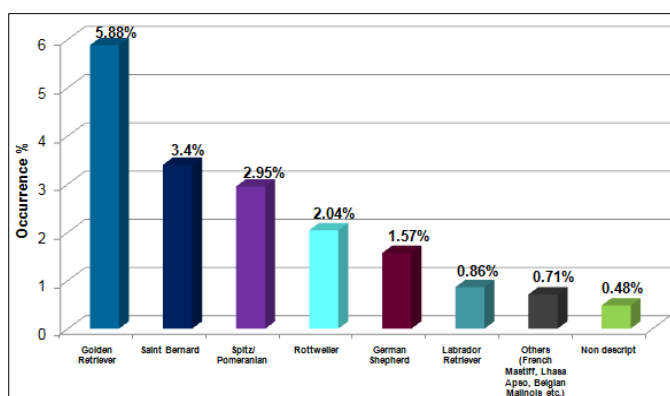


Fig 2: Breed wise occurrence of hepatitis in adult dogs at VCC, Jabalpur

Clinical abnormalities in hepatitis affected adult dogs

During the study of hepatitis in dogs, various clinical

abnormalities were observed among the affected dogs. All the affected dogs have shown signs of anorexia/inappetance i.e. 100 percent dogs i.e. (54 out of 54) followed by vomition in 62.96 percent dogs i.e. (34 out of 54), ascites in 55.55 percent dogs i.e. (30 out of 54), weight loss in 51.85 percent dogs i.e. (28 out of 54), diarrhoea/loose faeces in 38.88 percent dogs i.e. (21 out of 54), lethargy in 35.18 percent dogs i.e. (19 out of 54), melena in 33.33 percent dogs i.e. (18 out of 54), polyuria in 18.51 percent dogs i.e. (10 out of 54), polydipsia in 18.51 percent dogs (10 out of 54), abdominal pain in 14.81 percent dogs i.e. (8 out of 54) and icterus in 12.96 percent dogs i.e. (7 out of 54) (Figure 03).

The observations recorded in the present study are similar with the earlier reports of Dixit *et al.* (2010) [2], Tantary *et al.* (2014) [18], Elhiblu *et al.* (2015) [3]. However, Ettinger (2010) [4] observed that the more distinctive indications of liver illness was icterus while other symptoms like vomiting, diarrhoea, anorexia, lethargy and abdominal discomfort were nonspecific. Bexfield *et al.* (2011) [1] and Saravanan *et al.* (2014) [15] reported that Lethargy and decreased appetite were seen in most of the case of hepatitis in dogs.

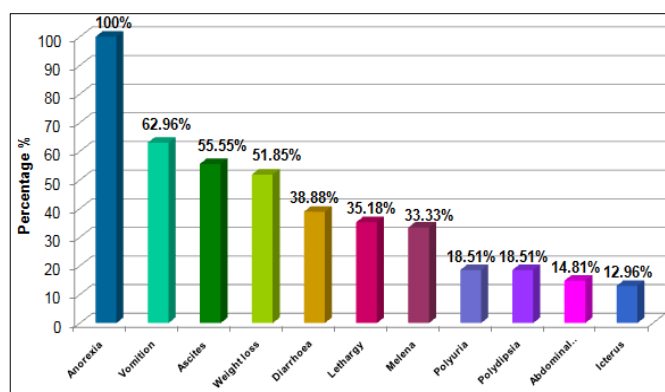


Fig 3: Clinical abnormalities in hepatitis affected adult dogs (n=54)

Hepatitis is one of the most common liver disease in dogs. Dogs with hepatitis are often presented with non-specific clinical manifestation. However, the disease advances, the clinical signs become more specific. The clinical signs and severity of hepatic pathology reflect the degree of compromise of liver's vital functions, including blood glucose, fat metabolism, production of clotting factors, albumin, fibrinogen, non-essential amino acids and plasma proteins, bile formation and excretion, bilirubin and cholesterol metabolism, conversion of ammonia to urea, polypeptide and steroid hormone metabolism, synthesis of 25-hydroxycholecalciferol and metabolism and detoxification of many drugs and toxins.

Melena and hematochezia observed has been ascribed to the gastrointestinal ulceration or coagulopathies, which may be due to hyperfibrinolysis, where the patients with advanced hepatocellular liver disease and cirrhosis produce decreased thrombin activatable fibrinolysis inhibitor. The coagulation abnormalities were observed in this study and seem to be the most probable explanation for melena.



Fig 4: Clinical abnormalities in hepatitis affected adult dogs

Weight loss could be due to the inadequate nutrient intake as a result of inappetence and enhanced tissue catabolism and abdominal distension was ascribed to ascites. The signs of icterus, polyuria, polydipsia and dehydration observed in this study have been earlier reported in hepatic disorders, but these signs have not been specifically documented for liver cirrhosis of dogs. Jaundice and icterus are hallmark of hepatic disorders and clinically hepatic dysfunction may be manifested by signs of diarrhea, polyuria, polydipsia and dehydration. Polyuria and polydipsia have been attributed to impaired adrenal steroid metabolism, altered portal vein osmoreceptor, loss of renal medullary concentration gradient and encephalopathy.

Conclusion

The overall occurrence of hepatitis in adult dogs at VCC, Jabalpur was 1.05%. However, 14.4% occurrence was observed among dogs suspected for hepatitis. Age wise occurrence was significantly higher in dogs of 4-8 years of age group (1.40%), breed wise occurrence was significantly higher in Golden Retriever breed (5.88%) while no significant difference was noted in gender wise occurrence of hepatitis in adult dogs. Mixed echotexture of liver, irregular margins and anechoic peritoneal fluid were the main ultrasonographic findings in hepatitis in adult dogs.

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