Indian J. Vet. Med. Vol. 45, No. 2, 2025 pp. 12-15

Clinico Pathological and Ultrasonographic Evaluation of Dogs with Ascites

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Abstract

Ascites is a common clinical manifestation of underlying hepatic pathology in dogs, often resulting from portal hypertension, cirrhosis, or hypoalbuminemia. The study was aimed to evaluate haematological, biochemical, electrolyte, ascitic fluid, and ultrasonographic alterations in 15 dogs with ascites. Haematologically mean values of Hb, PCV and TEC were significantly reduced while total leukocyte with neutrophil count were significantly increased. Biochemically, mean values of total protein and albumin were significantly reduced while mean values of ALT, AST, ALP, and BUN were significantly increased. On sonography increased parenchymal echogenicity, irregular liver margins, rounding of liver margins and diffuse nodular changes were noticed.

Keywords: Ascites, Portal hypertension, SAAG, Sonography

Introduction

Ascites, defined as the abnormal accumulation of fluid within the peritoneal cavity. A wide variety of aetiologies can contribute to the development of ascites, including hepatic disorders, cardiac dysfunction, renal impairment, neoplastic processes, inflammatory and infectious conditions, or combinations. The present study was undertaken to characterize haemato-biochemical alterations, ascitic fluid biochemistry, and imaging features in dogs with ascites.

Materials and Methods

The present study was conducted on 34 dogs presented to the Department of Veterinary Medicine, DGCN-COVAS, Palampur, Himachal Pradesh, exhibiting signs of abdominal distension. A detailed clinical history was recorded for each case, including age, breed, sex, and duration of illness. Peripheral blood samples were collected aseptically from the cephalic or saphenous veins. For haematological analysis, samples were drawn into sterile K_3EDTA vials, while plain sterile vials were used for biochemical and electrolyte profiling. Abdominocentesis was performed under aseptic conditions at a site located approximately 2–3 cm caudal to the umbilicus and 1 cm lateral to the ventral midline (either left or right side). Ascitic fluid was collected into sterile containers and subjected to biochemical analysis, including total protein and albumin concentration. Based on clinical findings, haematobiochemical parameters, effusion analysis, and imaging studies, 15 dogs with ascites were selected and included in this study.

Results and Discussion

Out of the 15 dogs diagnosed with ascites, the majority (53.3%) were within the 1 to 3-year age group, followed by 4 to 8 years (33.3%) and less than 1 year of age (13.3%). Regarding sex wise distribution, 66.6% of the affected dogs were male (n = 10), while 33.3% (n = 5) were female indicating higher incidence in male dogs. Breed-wise, Golden Retrievers constituted the highest proportion (26.6%), followed by non-descript and Labrador Retrievers (20% each), German Shepherds (13.3%), and Shih Tzu, Pomeranian, and American Bully breeds (6.6% each). Clinical signs included inappetence (60%), lethargy (40%), and pale mucous membranes (40%). Less frequently, dogs presented with tarry faeces (melena) in 20% of cases, enlarged lymph nodes (13.3%), and vomiting or icteric mucous membranes, each in 6.6% of cases. These findings were consistent with that of James *et al.* (2009), and Sarvanan *et al.* (2014),

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https://doi.org/10.56093/ijvm.v45i2.168197

Table 1: Mean SE values of haematological parameters in hepatic origin ascitic dogs

S.No.	Parameters	Healthy Control (n=10)	Diseased (n=15)
1.	Hb (g/dl)	12.87 ± 0.42	8.272*** ± 0.60
2.	PCV (%)	39.05 ± 0.96	22.272*** ± 1.54
3.	TEC ($\times 10^{12}$/L)	6.81 ± 0.25	4.116*** ± 0.33
4.	TLC (10^9/L)	10.69 ± 0.56	14.796* ± 1.32
5.	N (%)	79.68±0.85	82.436*** ± 1.21
6.	L (%)	17.08 ± 2.11	12.545 ± 1.26
7.	M (%)	3.94 ± 0.29	6.054* ±0.73
8.	E (%)	1.35±0.18	0.881 ± 0.73
9.	MCV (fl)	58.38 ± 0.87	55.354* ± 0.87
10.	MCH (pg)	19.02 ± 0.49	19.536 ± 0.47
11.	MCHC (g/dl)	31.63 ± 0.39	37.01 ± 4.15
12.	Platelets (10^9/L)	253.00 ± 20.57	181.363 ± 25.72

*Significant at 5% (P<0.05); **Significant at 1% (P<0.01);***Significant at 0.1% (P<0.001)

The mean values of Hb, PCV, MCV, and TEC were significantly reduced, while TLC and neutrophil counts were significantly increased (table. 1). These findings are in accordance with earlier studies by Tantary *et al*. (2014), and Singh *et al*. (2019). Significant increase in TLC might be due to ongoing inflammation. Neutrophilic leucocytosis might be due to acute inflammatory conditions in hepatitis (Phom *et al.,* 2019).

Table 2: Mean values of biochemical parameters in hepatic origin ascitic dogs

S.No.	Parameters	Healthy	Diseased (n=15)
1	Total Protein (g/dl)	6.68 ± 0.12	4.78** ± 0.44
2	Albumin (g/dl)	3.71 ± 0.17	1.766*** ± 0.10
3	ALT (U/L)	36.12 ± 4.29	91.58* ± 16.38
4	AST (U/L)	31.27 ± 4.32	75.48** ± 10.29
5	ALP (U/L)	57.26 ± 8.23	161.45** ± 22.01
6	Total Bilirubin (mg/dl)	0.25 ± 0.04	0.707 ± 0.22
7	Glucose (mg/dl)	108.15 ± 2.82	105.89 ± 6.62
8	BUN (mg/dl)	14.47 ± 1.22	63.28* ± 17.01
9	Creatinine (mg/dl)	1.03 ± 0.15	1.39 ± 0.28

* Significant at 5% (P<0.05); ** Significant at 1% (P<0.01); *** Significant at 0.1% (P<0.001)

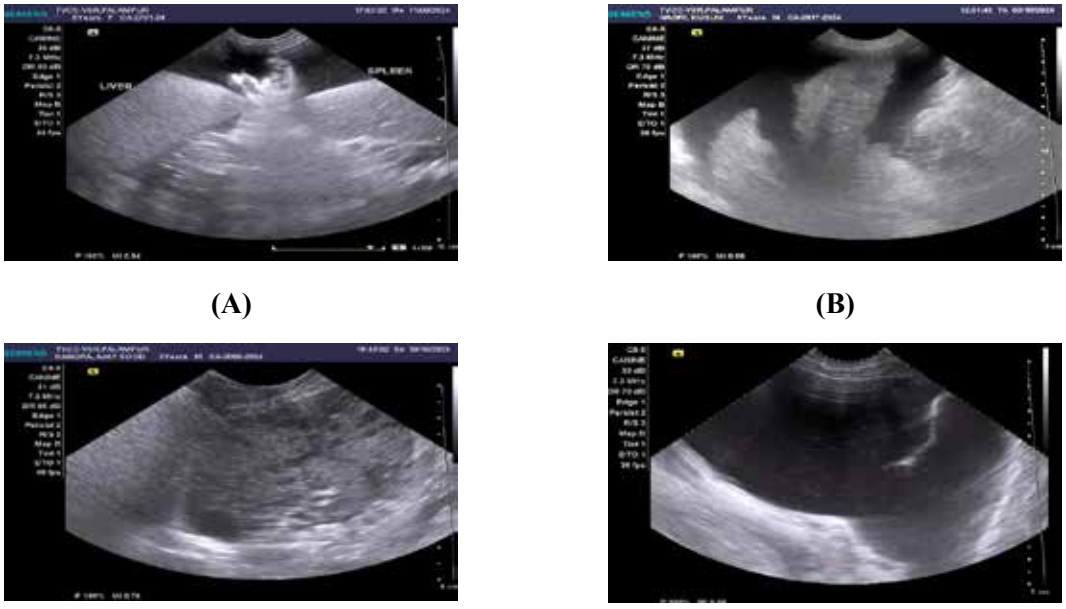
Mean values of ALT, AST, ALP, and BUN were significantly increased while total protein and albumin were significantly reduced compared to healthy group (table.2). These findings were in accordance with Pratibha *et al* (2022) and Patowary *et al.* (2024). Tantary (2014) stated that elevations of plasma transaminases such as ALT and AST were indicative of altered hepatocellular membrane permeability, hepatocellular necrosis, and inflammation with degree proportional to number of injured hepatocytes. The

observed hypoproteinaemia and hypoalbuminemia may result from the liver's central role in synthesizing most plasma proteins. Liver dysfunction impairs both protein synthesis and degradation pathways. The decline in plasma oncotic pressure increases fluid accumulation and worsens ascites (Saravanan, 2014).

Table 3: Mean values of serum electrolytes in hepatic origin ascitic dog

S.No.	Parameters	Healthy	Diseased (n=15)
1	Sodium (mmol/L)	141.7 ± 1.45	139.86 ± 2.17
2	Potassium (mmol/L)	4.42 ± 0.21	4.529 ± 0.25
3	Chloride (mmol/L)	104.2 ± 1.18	106.03 ± 1.95
4	Calcium (mg/dl)	10.41 ± 0.89	10.398 ± 0.10

In the present study, serum electrolyte levels including sodium, potassium, chloride, and calcium did not show statistically significant alterations and remained similar to normal healthy group (table.3). Abdominal ultrasonography revealed the presence of anechoic ascitic fluid in all cases (100%). Three dogs (20%) presented with a small-sized liver, irregular margins, and marked hyper echogenicity, suggesting chronic liver pathology such as cirrhosis or advanced fibrosis. Rounding of the liver margins was observed in nearly half (46.66%) of the cases in this study. Similar findings have been described by Elhiblu et al. (2015) and Tantary et al. (2014), linking margin irregularity and loss of lobulation with chronic parenchymal remodelling and fibrosis. Mean value of ascitic fluid total protein, and albumin stated in the above table 4 indicate that the fluid was transudative. The present study highlighted the diagnostic significance of integrated haematological, biochemical, ascitic fluid, and ultrasonographic assessments in dogs with ascites of hepatic origin.



(A) **(B)**

(C) **(D)**

(A) rounding of liver margins with increased echogenicity; (B) irregular liver margins surrounded by anechoic ascitic fluid; (C) anechoic diffuse nodules in liver parenchyma; (D) large amount of free fluid containing echogenic debris and fibrin threads.

Table 4: Mean value of ascitic fluid total protein, albumin and SAAG

Sample	Total protein (g/dl)	Albumin (g/dl)	SAAG
Ascitic Fluid	0.59 ± 0.14	0.16 ± 0.04	1.39 ± 0.42

Acknowledgments

Authors are thankful to the facilities provided by CSKHPKV Palampur to the department of Veterinary Medicine which helped in completing above study.

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Received : 24.06.2025 **Accepted : 09.12.2025** **Published : 15.12.2025**