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## Serum ascites albumin gradient (SAAG): Diagnostic tool for evaluation of ascites

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### Abstract

The aim of the study was to evaluate Serum Ascites Albumin Gradient (SAAG) in ascitic dogs. This Study was conducted at veterinary clinical complex, College of Veterinary Science & A.H., Jabalpur. After confirmation of ascitic fluid in abdomen by ultrasonography fluid was aspirated. On the basis of Serum ascitic albumin gradient (SAAG) more number of ascites cases was of low gradient as compare to high gradient. The predominance of low gradient ascites was more in male, while in female equal Distribution of low and high gradient ascites was found.

**Keywords:** SAAG, ascitic fluid, ultrasonography, gradient

### 1. Introduction

Earlier ascites was classified as transudative and exudative based on the total protein concentration of the ascitic fluid. Ascites is now being classified as high gradient and low gradient based on the serum ascites albumin gradient (SAAG). The difference between serum and ascitic fluid albumin concentration correlates directly with portal pressure. Difference between serum albumin and ascitic fluid albumin is  $> 1.1\text{g/dL}$ , is called high gradient ascites, whereas if the difference is  $< 1.1\text{g/dL}$ , is termed as low gradient ascites (Burgess, 2004) [3]. SAAG is based on oncotic hydrostatic balance. Portal hypertension results in an abnormally high hydrostatic pressure gradient between the portal bed and the ascitic fluid. There must be a similarly large difference between ascitic fluid and intravascular oncotic pressure than other proteins. The difference between serum and ascitic fluid albumin concentration serum and ascitic fluid albumin concentration correlates directly with portal pressure (Saravanan, 2013) [8].

### 2. Materials and Methods

#### 2.1 Location and Place of Work

The proposed work was conducted in the Department of Veterinary Medicine, College of Veterinary Science & Animal Husbandry, Nanaji Deshmukh Veterinary Science University, Jabalpur, Madhya Pradesh, India.

#### 2.2 Duration of Work

The study was conducted for a period of six months i.e. from September 2019 to March 2020. A total of 174 dogs brought to veterinary clinical complex (VCC), College of Veterinary Science & A.H., Jabalpur with the complaint of abdominal distension were screened for ascites and were subjected to detail study. Out of 174 dogs 30 cases of ascites were confirmed by ultrasonographical examination.

SAAG was calculated by subtracting the albumin concentration of the ascitic fluid from the albumin concentration of a serum specimen obtained on the same day (Burgess, 2004) [3].

$\text{SAAG} = \text{Albumin concentration serum} - \text{Albumin concentration of ascitic fluid.}$

### 2.3 Statistical Analysis

The recorded experimental data were analysed and mean was compared as per the standard procedure outlined by Snedecor and Cochran (1994) [9].

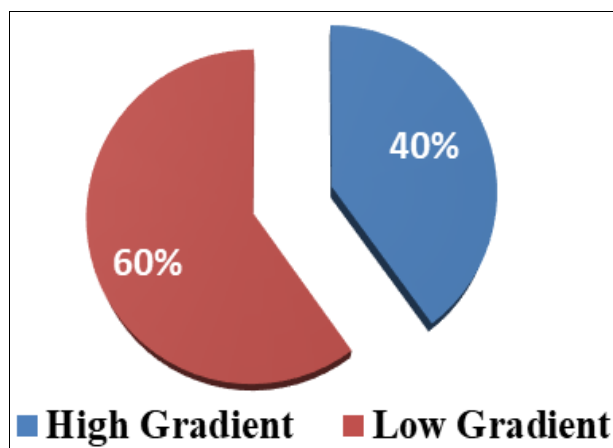
### 3. Results and Discussion

#### 3.1 Distribution of SAAG

SAAG was calculated in all the ascites cases. In 18 cases low gradient ascites was recorded and in 12 cases high gradient ascites was recorded. Result is shown in table 01 and fig. 01.

**Table 1:** Distribution of SAAG in ascitic dogs

SAAG Gradient	Values (g/dL)	Mean ± S E	Number	Percentage (%)
High	>1.1	1.62±0.09	12	40
Low	<1.1	0.53±0.07	18	60



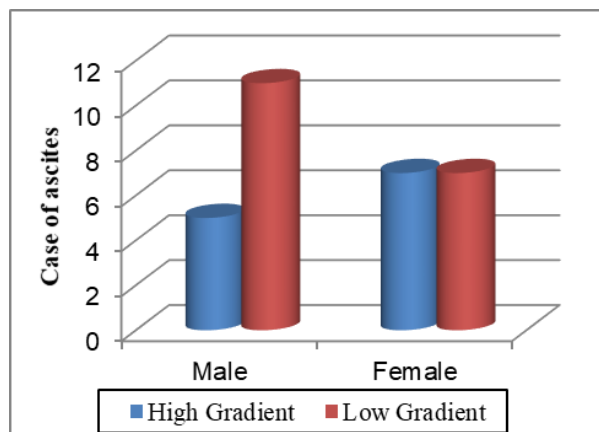
**Fig 1:** Distribution of SAAG (Serum Ascitic Albumin Gradient) in ascitic dogs

#### 3.2 Gender wise distribution of SAAG

The gender wise distribution was more in low gradient i.e. 11 cases and 5 cases were of high gradient and equal distribution of low and high gradient in female dogs. Result is shown in table 02 and fig 02.

**Table 2:** Gender wise distribution of SAAG in ascitic dogs

SAAG Gradient	Male	Female
High	05	07
Low	11	07



**Fig 2:** Gender wise distribution of SAAG in ascitic dogs

Our findings are in agreement with observations made by Beg *et al.* (2001) [1] and Burgess (2004) [3]. Similarly, another research by Uddin *et al.* (2013) [11] found SAAG to be 97%

accurate in identifying the cause of ascites.

Serum ascites albumin gradient (SAAG) can be used as a screening test in ascites due to chronic liver disease. SAAG, a parameter of oncotic pressure gradient reflect presence or absence of portal hypertension and can be used in differential diagnosis of ascites (Pare, 1983) [5]. High SAAG were noticed in cirrhotic liver, cardiac failure, portal-vein thrombosis and hepatic failure Das *et al.* (1998) [4]. The SAAG value of > 1.1 g/dL is suggestive of the presence of portal hypertension, it could be due to chronic liver disease (Kumar and Srikala, 2014; Bhadesiya *et al.* 2015) [12, 2] and also these findings were correlated with ultrasonography of hyper echoic/cirrhotic liver in ascites dog.

According to starling hypothesis, the fluid movement across a capillary membrane is controlled by a balance of hydrostatic and colloid osmotic forces (Starling, 1996) [10]. The SAAG value less than 1.1 g/dL that suggests low gradient ascites. Similar result was obtained by Phom *et al.* (2019) [6]. The SAAG portal pressure typically associated with disorders of vascular leakage and inflammation. Low gradient SAAG was seen in bacterial infection, peritoneal tuberculosis, pancreatic ascites, parasitic disease, ancylostomosis, nephrotic syndrome, trauma and rupture of lymphatic and blood vessels, rupture of the urinary bladder, left-sided heart failure, right-sided heart failure and congestive heart failure. Ascites from cardiac origin produces greater SAAG as compared to cases of cirrhosis (Samad, 2019) [7].

On the basis of SAAG more number of ascites cases was of low gradient (60%) as compare to high gradient (40%). However, the predominance of low gradient ascites was more in male, while in female equal distribution of low and high gradient ascites was seen.

### 4. Conclusion

On the basis of Serum ascitic albumin gradient (SAAG) more number of ascites cases was of low gradient as compare to high gradient. The predominance of low gradient ascites was more in male, while in female equal distribution of low and high gradient ascites was found.

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