

## Evaluation of Ascitic Fluid to Serum Bilirubin Ratio to Distinguish Transudates and Exudates

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### Abstract

**Background:** Many diseases are known to lead to the formation of free fluid within the peritoneal cavity. The evaluation of a patient with ascites requires that the cause of the ascites to be established. Diagnostic paracentesis (50-100ml) should be part of the routine evaluation of the patient, with ascites. The present study was conducted to evaluate the ascitic fluid to serum bilirubin ratio to distinguish between transudates and exudates.

**Material and Methods-** The present prospective observational study was conducted at Departments of General Medicine and Medical Gastroenterology at Vydehi Institute of Medical Sciences and Research centre. Demographic data, history, clinical examination and details of investigations were recorded in the case record form, patients were subjected to specific investigations to find out the underlying etiology. Diagnostic paracentesis was done. All the data was analysed using SPSS software. **Results-** The sensitivity and specificity of Ascitic Bilirubin/Sr. Bilirubin ratio was 16.7% and 17.4% respectively. The PPV and NPV was 26.92% and 10.25% respectively using SAAG criteria. The sensitivity and specificity of Ascitic Bilirubin/Sr. Bilirubin ratio was 50% and 62.74% respectively. The PPV and NPV was 26.92% and 10.25% respectively using Light's criteria. **Conclusion** – Our study concludes that diagnostic accuracy of Ascitic Bilirubin/Sr. Bilirubin ratio was very less when compared with SAAG criteria and better when compared with Light's criteria.

**Key words :** Ascites, fluid, bilirubin, diagnostic.

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### Introduction

The term ascites is derived from the greek word —ASKOS meaning bladder, belly, bag and is basically the presence of excessive fluid in the peritoneal cavity [1]. Many diseases are known to lead to the formation of free fluid within the peritoneal cavity. The evaluation of a patient with ascites requires that the cause of the ascites to be established. In most cases ascites appears as part of a well-recognized illness such as cirrhosis, congestive heart failure, nephrosis or disseminated carcinomatosis, in these situations the physician should determine that the development of ascites is indeed a consequence of the basic underlying disease and not due to the presence of a separate or related disease process. This distinction is necessary even when the cause of ascites seems obvious [2]. Diagnostic paracentesis (50-100ml) should be part of the routine evaluation of the patient, with ascites. Cytologic and cell block examination may disclose an otherwise unsuspected carcinoma [3]. A gradient < 1.1 gm/dl (Low gradient) suggests that the ascites is not due to portal hypertension with > 97 % accuracy and mandates a search for other causes such as peritoneal carcinomatosis, tuberculous peritonitis, pancreatitis, serositis, pyogenic peritonitis, and nephrotic syndrome[5]. The present study was conducted to evaluate the ascitic fluid to serum bilirubin ratio to distinguish between transudates and exudates.

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### Material and Methods

The present prospective observational study was conducted at Departments of General Medicine and Medical Gastroenterology at Vydehi Institute of Medical Sciences and Research centre. Patients who are above 18 years of age presenting with clinical or radiological evidence of ascites who are attending out-patient services and in-patient services were included in the study. All the subjects were informed about the study and a written consent was obtained from them in their vernacular language. The study was also approved by the institutional ethical board. Patients with hollow viscus perforation, spontaneous bacterial peritonitis, hepatic encephalopathy or any local infection were excluded from the study. Demographic data, history, clinical examination and details of investigations were recorded in the case record form, patients were subjected to specific investigations to find out the underlying etiology. Diagnostic paracentesis was done with the narrow gauze needle and subjected to relevant investigations. Data thus obtained was entered in MS excel sheet and analysed by using SPSS 24.0 version IBM USA. Qualitative data was expressed in terms of percentages and proportions. Quantitative data was expressed in terms of Mean and Standard deviation. A p value of <0.05 was considered as statistically significant whereas a p value <0.001 was considered as highly significant.

### Results

[Figure 1] show the gender and age distribution of the subjects. Out of 49 males, majority i.e. 22 (44.9%) were from 40-50 years age group, followed by 17(34.7%) from 30-40 years age group. Out of 16 females, majority i.e. 7(43.8%) each were from 30-40 and 40-50 years age group. [Table 1] shows comparison of ascitic fluid to serum bilirubin ratio with SAAG criteria. Out of 26 cases showing positive result with Ascitic Bilirubin/Sr. Bilirubin ration, 7 i.e 16.7% turned to be true positive i.e. transudate. So true transudate were 16.7%. Out of 39 cases showing

negative result with Ascitic Bilirubin/Sr. Bilirubin ratio, 4 i.e.17.4% turned to be true negative. So non transudate cases were 17.4% The sensitivity and specificity of Ascitic Bilirubin/Sr. Bilirubin ratio was 16.7% and 17.4% respectively. The PPV and NPV was 26.92% and 10.25% respectively.

[Table 2] shows the Comparison of ascitic fluid to serum bilirubin ratio with Lights criteria. Out of 26 cases showing positive result with Ascitic

Bilirubin/Sr. Bilirubin ratio, 7 i.e. 50% turned to be true positive i.e. transudate using Lights criteria. So true transudate, when compared with Lights criteria was 50%. Out of 39 cases showing negative result with Ascitic Bilirubin/Sr. Bilirubin ratio, 32 i.e. 62.7% turned to be true negative. So non-transudate cases were 62.7% The sensitivity and specificity of Ascitic Bilirubin/Sr. Bilirubin ratio was 50% and 62.74% respectively. The PPV and NPV was 26.92% and 10.25% respectively.

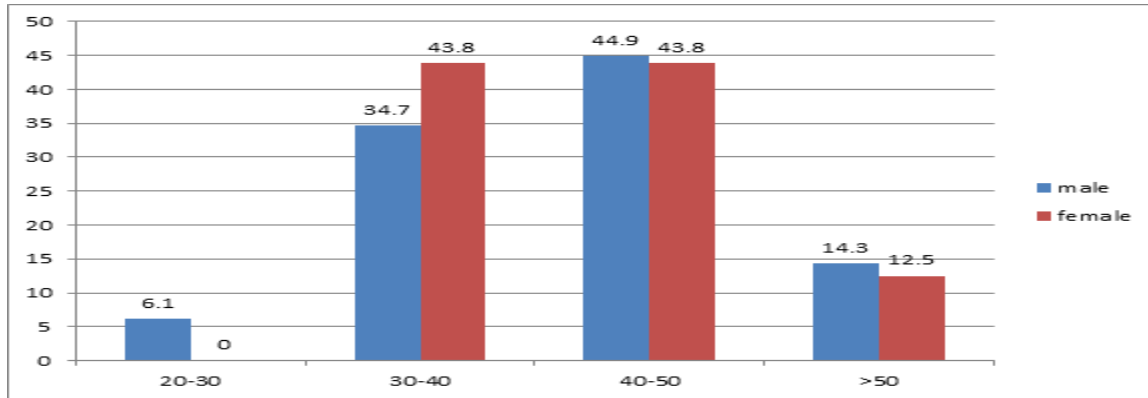


Figure 1: Distribution of subjects according to age and gender

Table 1: Comparison of ascitic fluid to serum bilirubin ratio with SAAG criteria (Here SAAG> 1.1 g/dl is Transudate).

		Positive		Negative		Total
		Number	Percentage	Number	Percentage	
Ascitic Bilirubin/Sr. Bilirubin ratio	Positive	7	16.7	19	82.6	26
	Negative	35	83.3	4	17.4	39
	Total	42	100	23	100	65

Table 2: Comparison of ascitic fluid to serum bilirubin ratio with Lights criteria (Here ascitic fluid LDH/serum LDH >0.6 is exudate)

		Positive		Negative		Total
		Number	Percentage	Number	Percentage	
Ascitic Bilirubin/Sr. Bilirubin ratio	Positive	7	50	19	37.3	26
	Negative	7	50	32	62.7	39
	Total	14	100	51	100	65

**Discussion**

Ascites is defined as the accumulation of excess fluid in the peritoneal cavity. Fluid accumulates when it enters the peritoneal cavity from the mesenteries, the peritoneum and hepatic surface at a rate greater than that can be returned to the circulation via the capillaries and lymphatics [4]. Starling’s law states that the rate of fluid movement across a capillary wall is proportional to the hydraulic permeability of the capillary, the transcapillary hydrostatic pressure difference, and the transcapillary oncotic pressure difference [5]. The liquids generally a transudate in patients with acute or chronic liver failure, massive liver metastases, hypoalbuminemia, or congestive heart failure, while in cases such as carcinomatosis, bacterial peritonitis, or pancreatitis, it is an exudate [6]. Traditionally, the exudate-transudate concept was based on the protein concentration of ascitic fluid (AF) for classifying peritoneal exudates. Different levels of protein in the AF have been suggested as cut-offs for identifying exudates, ranging from 25 to 30 g/L. The use of this single biochemical parameter erroneously classifies many exudates originating in infectious or tumours as transudates, while some transudates in cirrhosis and congestive heart failure may be classified as exudates due to high protein levels [7]. In our study we included total 65 subjects fulfilling eligibility criteria. Out of 65 patients, majority i.e. 29 (44.6%) were from 40-50 years age group followed by 24 i.e. 36.9% from 30-40, 9(13.8%) from above 50 years and 3(4.6%) from 20-30 years age group. Out of 65 patients, 49 i.e. 75.4% were males and 16(24.6%) females. Male to female ratio was found to be 3.06:1. Sastry et al [8] reported 100 cases of Ascites in the age range of 18 to 75 that were included in the study. The distribution of ascites among the males and the females was more or

less equal with 56 males (56%) and 44 (44%) females with a sex ratio of 1.27. Majority of the cases i.e. 90 (90%) are aged above 30 years, and the total number of cases 24 (24%) peaks around 51-60. Boyer et al [9] used an adaptation of light criteria for differentiating between transudates and exudates in AF using the concentration of protein and lactic dehydrogenase (LDH)levels as well as the ratio of these values between the serum and AF. The difference between the albumin concentration between serum and AF, called serum-ascites albumin gradient (SAAG), reflects directly and indirectly the colloid osmotic pressure and the degree of portal hypertension [10]. Pare et al [11] suggested that SAAG is a better discriminator of portal hypertension than protein concentration in AF. Sensitivity of our test by using Lights criteria was 50% as against 16.7% using SAAG criteria Specificity of our test by using Lights criteria was 62.74% as against 17.4% using SAAG criteria. Positive predictive value (PPV) of our test by using Lights criteria and SAAG criteria was 26.92% each. Negative predictive value (NPV) of our test by using Lights criteria and SAAG criteria was 10.25% each. Boghratian AH et al [2] in his study reported that SAAG seems to be the best criterion. Abdominal paracentesis should be performed as the first diagnostic step in all patients presenting with ascites. It is generally accepted that an effusion due to peritoneal diseases more closely resembles plasma (exudate), whereas accumulation of fluid secondary to hemodynamic aberrations or oncotic changes is an ultrafiltrate of plasma (transudate).

**Conclusion**

Our study concludes that diagnostic accuracy of Ascitic Bilirubin/Sr. Bilirubin ratio was very less when compared with SAAG criteria and

better when compared with Lights criteria. Ascitic fluid to serum bilirubin ratio is an additional marker for distribution of transudate from exudates.

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