

## STUDY COMPARING DIAGNOSTIC VALUE OF SERUM ASCITIC ALBUMIN GRADIENT AND ASCITIC FLUID TOTAL PROTEIN CONCENTRATION IN SEPARATING EXUDATIVE AND TRANSUDATIVE CAUSES OF ASCITES IN CHILDREN

Chandra Sekhar Kondapalli<sup>1</sup>, Aswini Devadi<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Paediatrics, Katuri Medical College, Guntur.

<sup>2</sup>Senior Resident, Siddhartha Medical College, Vijayawada.

### ABSTRACT

#### BACKGROUND

The Ascitic Fluid Total Protein Concentration (AFTP) has been used to classify samples into broad categories of "Transudate" or "Exudate." The aim of this study is to compare the diagnostic value of Serum Ascites Albumin Gradient and the Ascitic Fluid Total Protein concentration in separating exudative and transudative causes of ascites and to study the value of Serum Ascites Albumin Gradient in separation of ascites related to Portal hypertension from ascites not related to Portal hypertension.

#### MATERIALS AND METHODS

Place of Study- Katuri Medical College and Hospital, Guntur. Study Design- Descriptive Study. Period of Study- Nov 2014 - Oct 2016. Study Population- Hospitalised children of Katuri Medical College, Guntur, in the age group of 1 month to 12 years who are clinically diagnosed as having ascites.

#### RESULTS

Of the patients studied, 52% cases were females and 48% cases were males. Highest number of cases were due to Nephrotic syndrome (38%) followed by Cirrhosis of liver (22%), Tuberculous ascites (20%) and Cardiac ascites (16%). Ascitic fluid total protein (AFTP) at a cut-off of 2.5 g/dL had a Sensitivity of 82.5%, Specificity of 60%, Positive predictive value of 89.2%, Negative predictive value of 46.2% and Accuracy of 78% in classifying ascites as 'Transudate' or 'Exudate.' Serum Ascites Albumin Gradient (SAAG) of 1.1 g/dL had a Sensitivity of 47.5%, Specificity of 80%, Positive predictive value of 90.5%, Negative predictive value of 27.6% and Accuracy of 54% in classifying ascites as 'Transudate' or 'Exudate.' Serum Ascites Albumin Gradient (SAAG) at 1.1 g/dL had a Sensitivity of 100%, Specificity of 93.5%, Positive predictive value of 90.5%, Negative predictive value of 100% and Accuracy of 96% in classifying ascites as 'High gradient' (due to Portal hypertension) or 'Low gradient' (non-Portal) hypertensive conditions. The accuracy of ascitic fluid total protein (AFTP) at 2.5 g/dL was 100% in diagnosing Nephrotic syndrome, 63.6% in Cirrhosis, 60% in Tuberculous ascites and 62.5% in Cardiac ascites when classifying as transudates and exudates. The accuracy of serum ascites albumin gradient at 1.1 g/dL was 100% in Nephrotic syndrome, 100% in Cirrhotic ascites, 80% in Tuberculous ascites and 100% in Cardiac ascites when classifying as High gradient and Low gradient ascites.

#### CONCLUSION

Serum Ascites albumin gradient is found to be superior to ascitic fluid total protein in the diagnosis of ascites and recommended for classification of ascites as 'High-gradient' or 'Low-gradient' ascites instead of 'Transudative' or 'Exudative' ascites. SAAG is superior to transudate-exudate concept, not only because of its high diagnostic accuracy but also because of it being a better approach to the pathogenesis of ascitic fluid collection.

#### KEYWORDS

Laboratory Analysis of Ascites in Children, Transudate vs Exudate, SAAG vs Ascitic Fluid Total Protein, Portal Hypertension Ascites vs Non-Portal Hypertension Ascites, Diagnostic Value of SAAG.

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Corresponding Author:

Dr. Chandra Sekhar Kondapalli,  
Door No. 7-159/51, Kondapalli Hospitals, Ravipadu road,  
Narsraopet, Guntur, (District), Andhra Pradesh-522601.  
E-mail: drchandoo@gmail.com  
DOI: 10.18410/jebmh/2017/900



#### BACKGROUND

The Ascitic Fluid Total Protein Concentration (AFTP) has been used to classify samples into broad categories of "Transudate" or "Exudate." Samples are traditionally classified as transudates, if the AFTP is less than 2.5 g/dL and as exudates if AFTP is greater than 2.5 g/dL.

The exudate-transudate concept is based on the assumption that fluid formed by exudation from an inflamed or tumour laden peritoneal surface is high in protein. The causes of exudate are bacterial peritonitis, tuberculous

peritonitis and intra-abdominal malignancies. Fluid that transudates from a normal peritoneal surface due to an imbalance of Starling forces as in cirrhosis, heart failure and nephrotic syndrome is assumed to be low in protein.<sup>1</sup> The AFTP concentration in ascites depends on serum total protein concentration and in cirrhosis it also depends on portal pressure.<sup>2</sup>

Many problems and exceptions have been noted with transudate-exudate concept. They are-

- One-fifth of cirrhotic patients have ascitic fluid total protein values of 2.5 g/dL or greater.<sup>3</sup>
- During diuretic therapy, more cirrhotic patients mainly two-thirds of them have ascitic fluid total protein values of 2.5 g/dL or greater.
- Most of the cardiac ascites samples have ascitic fluid total protein values of 2.5 g/dL or greater.<sup>4</sup>
- Nearly half of the tuberculous ascites have ascitic fluid total protein values below 2.5 g/dL.
- Most of the spontaneous bacterial peritonitis samples have ascitic fluid total protein values less than 2.5 g/dL.
- Many infected or malignancy related samples have been reported to have protein concentration in the transudate range.<sup>1</sup>

It is also found that in most of the studies, the SAAG cut-off level in classifying ascites was at 1.1 g/dL. Ascites with SAAG greater than 1.1 g/dL is classified as "High Gradient" ascites and is usually associated with the presence of portal hypertension and those with SAAG less than 1.1 g/dL is classified as "Low Gradient" ascites and there is no portal hypertension.<sup>1</sup>

#### It has been shown that-

- The accuracy of SAAG in identifying causes of ascites due to portal hypertension from those which are not due to portal hypertension is far better when compared to the exudate-transudate concept by AFTP.
- It has also been emphasised that SAAG does not show any significant change after diuresis or paracentesis.
- In addition to classifying ascites, the SAAG is useful in predicting the response to treatment with diuretics and sodium restriction. Patients with high gradient ascites respond to diuretics and salt restriction, whereas patients with low gradient ascites show no response.

#### Aims and Objectives

To compare the diagnostic value of Serum Ascites Albumin Gradient and the Ascitic Fluid Total Protein concentration in separating exudative and transudative causes of ascites.

To study the value of Serum Ascites Albumin Gradient in separation of ascites related to Portal hypertension from ascites not related to Portal hypertension.

#### Inclusion Criteria

Children in the age group of 1 month to 12 years clinically presenting with ascites of various causes such as-

- Nephrotic syndrome.
- Portal hypertension.
- Tuberculous ascites.
- Cardiac ascites.
- Malignant ascites.
- Spontaneous bacterial peritonitis.
- Chylous ascites.
- Pancreatic ascites.

#### Exclusion Criteria

Children presenting with-

- Acute fulminant hepatic failure.
- Mixed ascites (Patients with portal hypertension due to cirrhosis plus another cause for ascites formation such as tuberculous peritonitis, or
- Intra-abdominal malignancies, if found out with subsequent investigations.
- Dialysis-related ascites.
- Ascites secondary to liver trauma, biliary tract leakage after biliary tract surgery.

Sample Size- Fifty patients were recruited for the study.

Description of Manoeuvre- This is a hospital-based study carried out in the ward of the Katuri Medical College, Guntur. The children in the age group of 1 month to 12 years satisfying the inclusion criteria were registered. Children having conditions enlisted in the exclusion criteria were carefully excluded.

A detailed history enlisting the presenting complaints, history of present illness, past history, family history, nutritional history and treatment history were noted.

A thorough general examination was done followed by systemic examination with particular emphasis on examination of abdomen and other systems and the findings recorded in a proforma which follows.

Serum and ascitic fluid were obtained simultaneously from the children satisfying the inclusion criteria and separately tested for total protein concentration by Biuret reaction and Albumin concentration by Bromocresol Green method.

Ascitic fluid was studied for its gross appearance, cell count and smear study for Gram stain and Acid fast stain by Ziehl Neelsen's technique. Ascitic fluid culture was done. Other routine investigations on blood and urine were also done.

The Serum-Ascites Albumin Gradient (SAAG) was calculated by subtracting ascitic fluid albumin level from the serum albumin level.

SAAG= Serum Albumin Minus Ascitic Fluid Albumin.

The diagnosis for various causes of ascites was obtained as follows-

- For Portal hypertension due to cirrhosis, liver biopsy suggestive of cirrhosis along with demonstration of oesophageal varices by upper gastrointestinal endoscopy was considered as the gold standard,<sup>5</sup> though portal venous pressure measurement would be an appropriate investigation for establishing portal hypertension. It was not performed due to its invasiveness.

Ultrasonogram of the abdomen was routinely performed in all patients.

- Tuberculous ascites was mainly diagnosed by taking detailed family history, clinical examination, x-ray chest and Mantoux and biochemical examination of ascitic fluid. The culture was negative in all the cases recorded in the present study.
- For tuberculous peritonitis, ascitic fluid smear for Mycobacterium tuberculosis by acid fast stain by Ziehl-Neelsen’s technique or ascitic fluid culture for Mycobacterium tuberculosis or ascitic fluid ADA levels or PCR was considered confirmatory.<sup>6,7,8</sup>
- Nephrotic syndrome was diagnosed in children with massive proteinuria more than 40 mg/m<sup>2</sup>/hour, serum albumin less than 2.5 g/dL, serum cholesterol more than 200 mg/dL with oedema as suggested by International Study of Kidney Diseases in Children (ISKDC).<sup>9,10,11</sup>
- Clinical findings, Chest x-ray and Echocardiography were used as the standard to establish the cardiac lesion in cardiac ascites.<sup>4</sup>
- PEM was diagnosed based on the anthropometric values as per the IAP classification.

**Statistical Analysis**

The values obtained by biochemical analysis of ascitic fluid namely Ascitic Fluid Total Protein (AFTP), Ascitic fluid Albumin along with Serum Albumin, Serum-Ascites Albumin Gradient (SAAG) and the confirmatory diagnosis as established were entered in the Master Chart.

The diagnosis obtained on the basis of AFTP as “Transudate” and “Exudate” was compared with the confirmatory diagnosis as established by the standards using a 2 x 2 table and the diagnostic characteristics like sensitivity, specificity, positive predictive value, negative predictive value and accuracy for AFTP were calculated.

The diagnosis obtained on the basis of SAAG as “High Gradient” ascites and “Low Gradient” ascites was compared with confirmatory diagnosis using a 2 x 2 table and the diagnostic characteristics for SAAG were calculated similarly as for AFTP.

The accuracy rate for Ascitic Fluid Total Protein (AFTP) and Serum-Ascites Albumin Gradient (SAAG) in various causes of ascites was also calculated individually.

**Protein Determination**

Procedure- Methods of estimation of Biuret  
Take 3 test tubes S, T and B.

Reagents	Test (T)	Standard (S)	Reagent (B)
Serum	0.1 mL	-	-
Standard albumin solution	-	1 mL	-
N.S	0.9 mL	-	-
Biuret Reagent	4 mL	4 mL	4mL

**Table 1. Protein Determination by Biuret Method**

Now mix thoroughly and violet colour develops in the test after 15 minutes.

<b>Calculation-</b>			
Amount of protein in g/dl =	$\frac{T-B}{S-B}$	$\times$	$\frac{\text{Concentration of Standard Solution} \times 100}{\text{Sample Volume}}$

Determination of Albumin.

1. Bromocresol green (BCG) method-

**RESULTS**

A total of 50 patients were evaluated for the study.

From the study it was found that Nephrotic syndrome, Portal hypertension, Tuberculosis and Cardiac ascites were the major causes for ascites comprising of 19, 11, 10 and 8 respectively and only 2 cases of ascites caused by protein energy malnutrition was recorded. It was also observed that major causes of ascites were of non-infective comprising 40 against infective causes like tuberculosis of 10.

The study showed that 26 females were having ascites against 24 males comprising of 48% and 52%, respectively. The female-to-male ratio is 1.08:1.

Studying age wise distribution of cases, more number of cases were recorded between 3 and 9 years comprising of 70% and remaining 30% of incidence was recorded in the age group of 1 to 3 years and 9 to 12 years.

	Positive (Transudate)	Negative (Exudate)	Total
AFTP < 2.5 g/dL	33 (a)	4 (b)	37
	7 (C)	6 (d)	13
<b>Total</b>	<b>40</b>	<b>10</b>	<b>50</b>

**Table 2. Comparison of AFTP against Diagnosis of Ascites in Classifying Transudates and Exudates**

- Sensitivity= 82.5%
- Specificity= 60%
- Positive predictive value= 89.2%
- Negative predictive value= 46.2%
- False positives= 40%
- False negatives= 17.5%
- Accuracy= 78%

		Positive (Transudate)	Negative (Exudate)	Total
SAAG ≥ 1.1 g/dL	Positive	19 (a)	2 (b)	21
	Negative	21 (c)	8 (d)	29
<b>Total</b>		<b>40</b>	<b>10</b>	<b>50</b>

**Table 3. Comparison of SAAG against Diagnosis of Ascites in Classifying Transudates and Exudates**

- Sensitivity= 47.5%
- Specificity= 80%
- PPV= 90.5%
- NPV= 27.6%
- FP= 20%
- FN= 52.5%
- Accuracy= 54%

		Positive (Transudate)	Negative (Exudate)	Total
SAAG ≥ 1.1 g/dL%	Positive	19 (a)	2 (b)	21
	Negative	0 (c)	29 (d)	29
<b>Total</b>		<b>19</b>	<b>31</b>	<b>50</b>

**Table 4. Comparison of SAAG against Diagnosis of Ascites in Classifying High Gradient and Low Gradient Ascites**

Sen= 100%  
 Spe= 93.5%  
 PPV= 90.5%  
 NPV= 100%  
 fp= 6.5%  
 fn= 0%  
 Accuracy= 96%

Ascitic fluid total protein is useful in differentiating ascitic fluid into exudates and transudates, whereas serum ascites albumin gradient is useful in differentiating portal hypertensive causes (high SAAG) from non-portal hypertensive causes (low SAAG).

Sensitivity of AFTP is more when compared to SAAG, but specificity of SAAG is higher in differentiating exudates and transudates.

The overall accuracy is higher for AFTP than SAAG in classifying ascitic fluid into exudates and transudates.

For ascitic fluid total protein, ascitic fluid having total protein > 2.5 g/dL is considered as exudate and < 2.5 g/dL is considered as a transudate.

For serum ascites albumin gradient, a value of 1.1 g/dL is taken as cut-off mark; ascitic fluid with albumin gradient ≥ 1.1 g/dL as high-gradient ascites which is seen in portal hypertension and < 1.1 g/dL as low-gradient ascites seen in non-portal hypertensive causes of ascites. With the above values, ascitic fluid total protein and serum ascites albumin gradient were compared for their sensitivity, specificity, positive predictive value, negative predictive value and accuracy with the following results.

	SAAG (%)	AFTP (%)
Sensitivity	100	82.5
Specificity	93.5	60
Positive Predictive Value	90.5	89.2
Negative Predictive Value	100	64.2
Accuracy	96	78

**Table 5. Comparing Sensitivity, Specificity, PPV and NPV and Accuracy of SAAG and AFTP**

From the above analysis it was observed the sensitivity, specificity, positive predictive value, negative predictive value and accuracy for SAAG ratio were more than AFTP.

Diagnosis	AFTP	SAAG
Nephrotic syndrome	100%	100%
Cirrhosis with portal hypertension	63.6%	100%
Tuberculous abdomen	60%	80%
Cardiac ascites	62.5%	100%

**Table 6. Comparison of the Accuracy of Albumin Gradient and Ascitic Fluid Total Protein in different Diseases**

The above table showed that SAAG ratio showed more accurate values than AFTP in evaluation of ascites caused by various diseases.

The accuracy of albumin gradient and ascitic fluid total protein were compared in different conditions. Both were 100% accurate in Nephrotic syndrome. The accuracy of albumin gradient was higher when compared to ascitic fluid total protein in cirrhosis with portal hypertension, tuberculous ascites and cardiac ascites.

Disease	SAAG (G/DL)	AFTP (G/DL)
Congestive cardiac failure	1.86	2.48
Nephrotic syndrome	0.75	1.5
Protein energy malnutrition	0.9	1.5
Cirrhosis with portal hypertension	1.57	2.54
Tuberculous ascites	1.01	2.93

**Table 7. Mean Values of SAAG and AFTP in different Conditions**

The ascitic fluid total protein rightly classified nephrotic syndrome, congestive cardiac failure and malnutrition as transudative causes of ascites (< 2.5 g/dL), but misclassified cirrhosis of liver as an exudate (> 2.5 gm/dL). This parameter rightly classified the exudates (> 2.5 g/dL) with a mean value of 2.93 for tuberculous ascites.

Serum Ascites Albumin gradient rightly classified the causes of ascites with portal hypertension and without portal hypertension at a cut-off value of ≥ 1.1 g/dL included the conditions with portal hypertension, viz. cirrhosis of liver with a mean value of 1.57 and congestive cardiac failure with a mean value of 1.86.

**DISCUSSION**

Numerous studies have highlighted the usefulness and importance of biochemical analysis of ascitic fluid in the diagnosis of the cause of ascites in adult population, but there is paucity of literature in paediatric age group.

This study determines the utility value of Ascitic Fluid Total Protein (AFTP) and Serum-Ascites Albumin Gradient (SAAG) as diagnostic tests in various causes of ascites in children in the age group of 1 month to 12 years attending Katuri Medical College, Guntur.

It also sheds light on the usefulness of Ascitic Fluid Total Protein (AFTP) and Serum-Ascites Albumin Gradient (SAAG) in classifying ascites of varied aetiology.

A total of 50 children who met the standard of inclusion criteria were studied. Biochemical analysis of ascitic fluid was done for the two parameters namely Ascitic Fluid Total Protein (AFTP) and Serum-Ascites Albumin Gradient (SAAG). The diagnostic tests for various causes of ascites were appropriately done as per the availability in the hospital to confirm the diagnosis.

During the study period, no spontaneous bacterial peritonitis (SBP), malignant ascites, chylous ascites or pancreatic ascites were noted.

The most common cause of ascites was nephrotic syndrome (38%) followed by cirrhosis with portal hypertension (22%) and tuberculous ascites (20%). Cardiac ascites accounted for 16% of cases and malnutrition in 4% of cases.

Tuberculous ascites was mainly diagnosed by taking detailed family history, clinical examination, x-ray chest and Mantoux and biochemical examination of ascitic fluid. The culture was negative in all the cases recorded in the present study.

In the study conducted by Runyon BA et al<sup>1</sup> in Los Angeles, USA, 901 patients with ascites have been studied and the most common cause of ascites was found to be cirrhotic ascites (84.1%). Malignant ascites was encountered in 5% of cases followed by cardiac ascites (2.7%). Tuberculous peritonitis was found in 0.7% and nephrotic syndrome in 0.2% of ascites.

During the present study, nephrotic syndrome was the most common cause in contrast to study population of Runyon BA et al,<sup>1</sup> as present only included the paediatric age group. Cirrhotic ascites accounted to 22% followed by tuberculous ascites, which could be due to the high prevalence of tuberculosis in our population.

In a retrospective study conducted at Hadassah University<sup>12</sup> in both adults and children with nephrotic syndrome, they found that there is a significant difference in the prevalence of ascites between paediatric (52%) and adult patients (23%).

Ascites in nephrotic syndrome is more common in children than in adults.

In a study conducted at Nijalinagappa Medical College,<sup>13</sup> Bagalkot, on 102 children over a period of 18 months, nephrotic syndrome contributed 32.35% followed by abdominal tuberculosis 8.80% and chronic liver diseases about 8.80%.

In the study by Runyon BA et al,<sup>1,14</sup> the compatibility of AFTP at a cut-off value of 2.5 g/dL was 55.6% in differentiating transudative and exudative ascites and the compatibility of SAAG at a cut-off value of 1.1 g/dL was 96.7% in differentiating portal hypertensive and non-portal hypertensive causes of ascites.

The compatibility of AFTP was greater in present study (78%) at a cut-off level of 2.5 g/dL than by Runyon BA et al (55.6%). This was due to the inclusion of numerous causes of ascites in their study.

During the study, AFTP at a cut-off level of 2.5 g/dL had a sensitivity of 82.5%, specificity of 60%, positive predictive value of 89.2%, negative predictive value of 46.2% and with an accuracy of 78% in discriminating "Transudative" and "Exudative" ascites.

Gupta R et al<sup>15</sup> had shown that AFTP at a cut-off level of 2.5 g/dL had an accuracy of 88% to differentiate cirrhotic and non-cirrhotic (malignant and tuberculous) ascites. This differed during the present study; the accuracy of AFTP being 78% at a cut-off level of 2.5 g/dL.

Jungst D et al<sup>16</sup> found that AFTP at a cut-off level of 2.5 g/dL had an accuracy of 79.4% in classifying ascites, as transudate or exudate which was similar to the accuracy of

present study of 78% at a cut-off level was 2.5 g/dL.

In the present study, SAAG at a cut-off level of 1.1 g/dL had a sensitivity of 100%, specificity of 93.5% with a predictive value of 90.5%, negative predictive value of 100% and an accuracy of 96% in differentiating ascites as "High Gradient" ascites and "Low Gradient" ascites.

Marshall JB et al<sup>17</sup> in their study found that SAAG was less than 1.1 g/dL in all the patients with malignant and tuberculous ascites. In present study, it was found that SAAG was less than 1.1 g/dL in the patients with tuberculous ascites.

Gupta R et al<sup>15</sup> found that SAAG at a cut-off level of 1.1 g/dL had an accuracy of 92% in distinguishing cirrhotic ascites from tuberculous and malignant ascites, which was similar to this study.

In the study by Runyon BA et al,<sup>4</sup> 40 patients with cardiac ascites and cirrhotic ascites were studied and the SAAG was  $\geq$  1.1 g/dL in all the 40 patients. This is in correlation to the present study, in which the SAAG is high in cardiac ascites (mean 1.57 g/dL).

Starling recognised that the protein content of oedema fluid is a reflection of its oncotic pressure gradient between blood and interstitial fluid is a direct function of the corresponding capillary hydrostatic pressure gradient. Using Starlings concept, it is possible to understand why the ascitic total protein concentration has been useful in the differential diagnosis of ascites and also to understand the inherent limitations of the test. A large hydrostatic pressure gradient between the portal capillaries and the peritoneal cavity characterises all transudative causes of ascites except nephrotic syndrome, generating a large blood to ascites oncotic pressure difference and consequently low ascites total protein concentration. The converse is theoretically true of all exudative causes of ascites. A relatively high ascites protein concentration may be seen in patients with transudative ascites when the blood oncotic pressure, determined chiefly by the albumin concentration, is relatively well preserved, as occurs in some patients with cirrhosis and congestive heart failure or constrictive pericarditis.

Conversely, a relatively low ascites protein concentration may be found in patients with exudative ascites, if there is a severe reduction of the serum albumin concentration. These relationships limit the diagnostic usefulness of the ascites total protein concentration.

In contrast, the albumin gradient classifies fluid by the presence or absence of portal hypertension, which is physiologically based and intuitive. The albumin gradient classifies cardiac ascites in the high albumin gradient category, similar to cirrhotic ascites. The high SAAG of cardiac ascites is presumably due to high right-sided heart pressures and the fact that the SAAG measures absolute portal pressure, which is increased when the right-sided heart pressure is high.

On initial exposure to the albumin gradient, some physicians suggest substituting low gradient for exudate and high gradient for transudate. Unfortunately, ascites does not lend itself to such easy translation. For example, nephrotic ascites is low gradient, but not exudative. The best approach

is to abandon the exudate/transudate system and use the method of classification that has been proven to be superior, that is the serum-ascites albumin gradient.

In present study, the findings were similar with 100% sensitivity and 96% accuracy for SAAG and 82.5% sensitivity and 78% accuracy for AFTP.

In the present study, SAAG had similar accuracy of 96% in classifying ascites due to portal hypertension and not due to portal hypertension. But AFTP had a greater accuracy of 78% in classifying ascites into transudates or exudates.

This is similar to the observations made in the present study, in which AFTP had a somewhat higher accuracy of 78% in differentiating transudates and exudates, whereas SAAG had an accuracy of 96% in differentiating ascites related or not related to portal hypertension.

## CONCLUSION

1. By considering Ascitic fluid total protein separated as exudate and transudate with an accuracy of 78%, whereas SAAG separated them with an accuracy of 54%.
2. Serum Ascites Albumin Gradient separated ascitic fluid into Portal hypertension from non-portal hypertension with an accuracy of 96%, dividing them into 'high-gradient' and 'low-gradient' ascites.
3. It is not appropriate to substitute 'low albumin gradient' for 'exudate' and 'high albumin gradient' for 'transudates.'
4. Serum Ascites albumin gradient is found to be superior to ascetic fluid total protein in the diagnosis of ascites and recommended for classification of ascites as 'High-gradient' or 'Low gradient' ascites instead of 'Transudative' or 'Exudative' ascites.
5. SAAG is superior to transudate-exudate concept, not only because of its high diagnostic accuracy but also because of it being a better approach to the pathogenesis of ascitic fluid collection.

## Summary

A total of 50 patients with ascites were studied over a period of 2 years from November 2014 to October 2016.

1. Of the 50 patients studied, 52% cases were females and 48% cases were males.
2. Large number of cases were found to have Nephrotic syndrome (38%) followed by Cirrhosis of liver (22%), Tuberculous ascites (20%) and Cardiac ascites (16%).
3. Ascitic fluid total protein (AFTP) at a cut-off of 2.5 g/dL had a Sensitivity of 82.5%, Specificity of 60%, Positive predictive value of 89.2%, Negative Predictive value of 46.2% and Accuracy of 78% in classifying ascites as 'Transudate' or 'Exudate'.
4. Serum Ascites Albumin Gradient (SAAG) of 1.1 g /dL had a Sensitivity of 47.5%, Specificity of 80%, Positive predictive value of 90.5%, Negative predictive value of 27.6% and Accuracy of 54% in classifying ascites as 'Transudate' or 'Exudate'.
5. Serum Ascites Albumin Gradient (SAAG) at 1.1 g/dL had a Sensitivity of 100%, Specificity of 93.5%, Positive

Predictive value of 90.5%, Negative predictive value of 100% and Accuracy of 96% in classifying ascites as 'High gradient' (due to portal hypertension) or 'Low gradient' (non-portal hypertensive conditions).

6. The accuracy of ascitic fluid total protein (AFTP) at 2.5 g/dL was 100% in diagnosing Nephrotic syndrome, 63.6% in Cirrhosis, 60% in Tuberculous ascites and 62.5% in Cardiac ascites when classifying as transudates and exudates.
7. The accuracy of serum ascites albumin gradient at 1.1 g/dL was 100% in Nephrotic syndrome, 100% in cirrhotic ascites, 80% in Tuberculous ascites and 100% in cardiac ascites when classifying as High gradient and Low gradient ascites.

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