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Correlation Between Serum Ascites Albumin Gradient And Esophageal Varices In Portal Hypertension

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I. Introduction

Ascites is defined as accumulation of fluid within the peritoneal cavity. ascites classified as transudate (ascites total protein <2.5 g/dl) or exudate (ascites total protein>2.5 g/dl).In 1922, Runyon et al. studied the superiority of serum ascites albumin gradient to the transudates –exudates concept in determining thecause of ascites. SAAG has a 97% of accuracy in portal hypertension. [(1)]"High-albumin gradient" (>1.1 gm/dl) or "low-albumin gradient" (<1.1 gm/dl) have replaced the terms "transudative" or "exudative" in the description of ascites in all recent publications (Babu et al 2004 & Jain et al 2004). The correlation between SAAG and EV was emphasized.In 2003, Mene et al., found that SAAG in patients with PHT and ascites was correlated significantly with gastrointestinal bleeding and splenomegaly. They concluded that SAAG had a sensitivity of 100% and specificity of 33.33% for prediction of bleeding EV. [(2)]In order to determine the correlation and association between the level of SAAG and the complications of PHT, mainly the presence and grade of esophageal varices (EV) found on upper gastrointestinal endoscopy, this study is conducted among 100 patients in Government Thiruvannamalai medical college and hospital from Jan 2016 to June 2016.

II. Aim And Objectives Of The Study

To determine the correlation and association between the level of SAAG and presence and grade of esophageal varices found on OGD scopy.
This would permit the use of the SAAG as a preliminary indicator that would indicate the presence of esophageal varices as a manifestation of PHT.

III. Methodology

Research Design
The present study was observational and prospective study.

Study population and Place of study
The study population includes 100 patients who attend as out-patient or in-patient with ascites in the department of Medicine at Government Thiruvannamalai medical college hospital, Thiruvannamalai. This hospital is a public hospital as well as referral centre from peripheral health care centre.this Study conducted in 6 months (Jan 2016-June 2016).

Selection criteria.
Inclusion criteria
Age 18 years or more of either sex
Presence of ascites by clinical examination and confirmed by abdominal ultrasound.
Exclusion criteria Patient who fail to give consent.
Patient with local sepsis.
Pregnancy.
Active bleeders
Patient having bleeding disorder.
Hepatic encephalopathy.

Statistical Analysis The obtained data was entered in a Microsoft Excel Spread Sheet and analysed statistically. The data was analysed using ratios, percentage. Continuous data was examined as mean. The significance testing was done using the Chi Square Test, the Pearson correlation co efficient and screening tests. The results were considered significant if the 'p' value was below 0.05.

IV. Discussion

For our study total 100 cases that fulfilled the inclusion and exclusion criteria were selected. In our series the youngest patient was 19 years and oldest was 76 years of age.

Table-19. Comparison of Age distribution in various studies

Studies	Age (years)
Allam study	**37-67**
Jiang et al study	**24-68**
Current study	**19-76**

In current study 83 patients (83%) had High SAAG and 17patients (17%) had Low SAAG. Although the present study conducted in patients with portal hypertension, 11 cirrhotic patients had Low SAAG. Also,**Gurubacharya et al.** [(3)] studied with a total population of 32 patients. 25(78.13%) of them had High SAAG. 7(21.87%) of them with Low SAAG. Similarly, the study carried out by **AlKnawy** showed that 96.5% patients with High SAAG and 3.5 % of patients with Low SAAG.

Table-22. Comparison of SAAG level in various studies

Studies	High SAAG	Low SAAG
Gurubacharya et al	25(78.13%)	7(21.87%)
AlKnawy study	96.5%	3.5%
Current study	83%	17%

The discrepancy in the results of SAAG level and its relation to portal hypertension may be attributed by the fact that When ascites albumin level within very narrow range (0-1 g/dl) result in 3.3% error in its diagnostic accuracy.When the serum and ascites fluid specimens are not obtained simultaneously will also result in discrepancy of report. This is because both of them were change over time in parallel, so that the difference between them is stable. However, in the present study this problem was overcome by obtaining specimens to measure albumin from serum and ascites on the same day. [(4)]A low SAAG does not differentiate between tuberculous and malignant ascites. Consequently, there is still need to test for cytology or culture for mycobacteria. [(5)]The study carried out by **Kajani et al** showed that low SAAG can present in patients with advanced liver disease in the absence of malignancy.**Das et al.,** studied the use of SAAG and ascites fluid total protein for differential diagnosis of ascites. They found that the SAAG was > 1.1 in 85% cases of chronic liver disease patients with PHT. On the other hand, SAAG < 1.1 would suggest absence of significant PHT in ascites patients. They insisted that SAAG did not provide the exact etiology of ascites despite its superior discriminatory power. The presence of a High SAAG did not indicate the cause as cirrhosis. It simply indicated the presence of PHT. Similarly, a low SAAG did not indicate any specific etiology. It simply indicates absence of portal hypertension.In present study, the correlation between presence or absence of EV and SAAG was present in patients with ascites. EV present in 75 of 83 patients (93.5%) with High SAAG. There was increased probability ofEV in patients with High SAAG.

Table-24. Comparison of patients with EV in High &Low SAAG level in various studies

Studies	High SAAG &EV	Low SAAG &EV
AlKnawy et al	94%	5%
Torres et al	68%	0%
Abo Hamila	100%	0%
Gurubacharya et al	72%	0%
Current study	93.5%	5%
In contrast to	studies conducted by	people like **Torres et al,**

Gurubacharya et al. Abo Hamila et al.who found no significant association between SAAG and degree of EV. The study by **Masroor et al.** showed the positive correlation between degree of EV and SAAG as follows: [(6)] He studied 50 patients with liver cirrhosis. SAAG was found to be between 1.1 and 3.2g/dl in all of them. The EV present in 46 of them (96%).Among the patients with High SAAG the correlation between the grade of EV and SAAG as follows: In SAAG between 1.10 and 1.49 g/dl, four patients (14.29%) had grade I EV, two patients (7.14%) had grade I-II EV, 5 patients (17.86%) had grade II EV, 8 patients (28.57%) had grade II- III EV, 2 patients (7.14%) had grade III EV and 2 patients (7.14%) had grade III-IV EV. In SAAG between 1.50 and 1.99 g/dl, only one patient (3.57%) had grade I-II EV and one patient (3.57%) had grade III EV. In SAAG 2.0 g/dl, only one patient (3.57%) had grade I EV and two patients (7.14%) had grade II- III EV. The grade of the esophageal varices did not show any correlation with the degree of SAAG. These results were similar to all previous studies in this aspect.Our study found that the association between the degree of EV and SAAG values as follows: The SAAG values between 1.10-1.49 g/dl, 13 patients had grade I EV, 11 patients had grade I EV, none had grade III EV. In SAAG between 1.5-1.99 g/dl, 5 had grade I EV, 28 patients had grade II EV, 3 patients had grade III EV. In SAAG >2.00 g/dl none had grade I EV, 6 patients had grade IIEV, 9 patients had grade III EV. Hence the correlation between SAAG and degree of esophageal varices showed significant result with correlation co efficient r=0.637, p value <0.05

Table-25. Comparison of accuracy of SAAG level in various studies

Studies	**SAAG Accuracy**
Beg et al	96%
Alkriviadis et al	98%
Kajani et al	87.5%
Runyon et al	96.7%
Chen et al	90.2%
Current study	89%

In Beg et al study, [7]		
	SAAG	**Ascites protein**
Sensitivity	94.73%	65.62%
Accuracy	96%	68%

In Akriviadis et al study,

	SAAG	**Infected ascites**
Accuracy	98%	89%

They concluded that the SAAG is a reliable marker in differentiating the ascites due to PHT from non PHT causes, regardless of the presence of bacterial infection.They concluded that the SAAG is a reliable marker in differentiating the ascites due to PHT from non PHT causes, regardless of the presence of bacterial infection

In our study,

	SAAG
Sensitivity	90%
Specificity	82%
Accuracy	89%

V. Summary

In this study 100 patients with ascites who fulfilled the inclusion and exclusion criteria were studied. In the present study the commonest cause of ascites are cirrhosis, abdominal TB, and congestive cardiac failure. Among these patients the commonest cause of ascites in High SAAG patients was Cirrhosis of liver. The common cause of ascites in Low SAAG patients was TB abdomen. Malignancy was accounts for third common cause of ascites in Low SAAG patients. In current study 83 patients (83%) had High SAAG and 17patients (17%) had Low SAAG. Although the present study conducted in patients with portal hypertension, 11 cirrhotic patients had Low SAAG. In the present study showed the correlation between the presence and degree of esophageal varices and SAAG was present in patients with ascites. The oesophageal varices were present in 93.5% of patients withhigh SAAG; there was increased probability of oesophageal varices in patients with higher values of high SAAG. In the present study there was an association and positive correlation between the level of SAAG and the degree of oesophageal varices in patient with ascites was found.

In present study, the SAAG with mean value of 1.48±0.44 g/dl was an accurate indicator of presence of esophageal varices with the sensitivity of 90%, specificity of 82% and accuracy of 89%.

VI. Conclusion

The present concludes the results as SAAG is a very good biochemical marker for assessing the presence of Portal hypertension and its complication like esophageal varices. The simple and minimally invasive method of measuring SAAG may prove its usefulness and as an indirect indicator of portal hypertension and its complications, such as esophageal varices.

We conclude that the presence of oesophageal varices in patients with ascites is highly associated with patients with high SAAG and it also correlate with the degree of esophageal varices. Hence the SAAG should be viewed as a preliminary and indirect method of estimating PHT and its complication such as esophageal varices.

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