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Telp/Fax. (031) 5042113, 085-733220600 E-mail: majalah.ijcp@yahoo.com, jurnal.ijcp@gmail.com
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RESEARCH

THE AGREEMENT BETWEEN LIGHT CRITERIA AND SERUM ASCITES ALBUMIN GRADIENT FOR DISTINGUISHING TRANSUDATE AND EXUDATE

(Kesesuaian Patokan Light dengan Serum Ascites Albumin Gradient dalam Membedakan Transudat dan Eksudat)

Rike Puspasari, Lillah, Efrida

ABSTRAK

Jenis cairan asites transudat atau eksudat perlu dibedakan sebagai tahap awal untuk mengetahui penyebab penyakit yang mendasari asites. Penggabungan beberapa tolok ukur memiliki kepekaan dan kekhasan yang baik dalam membedakan jenis cairan asites. Penelitian ini bertujuan untuk mengetahui kesesuaian antara patokan Light dan Serum Ascites Albumin Gradient (SAAG) dalam membedakan transudat dan eksudat pada cairan asites. Penelitian ini merupakan penelitian analitik dengan desain potong lintang terhadap 24 pasien asites di RSUP Dr. M. Djamil Padang, mulai bulan Maret sampai September 2016. Tolkuk ukur yang diperiksa adalah protein jumlah keseluruhan (metode kolorimetrik biuret), albumin (metode kolorimetrik bromocresol green), serta laktat dehidrogenase (LDH) (metode enzimatik). Hasil pemeriksaan setiap tolok ukur dirumuskan kedalam patokan Light dan SAAG. Kesesuaian patokan Light dan SAAG dalam membedakan transudat dan eksudat cairan asites ditentukan dengan uji kappa. Hasil dianggap bermakna secara statistik jika $p < 0,05$. Ciri subjek penelitian ini adalah laki-laki sebanyak 54,2% dan perempuan 45,8% dengan rentang umur 22–76 tahun. Patokan Light dapat menentukan 9 eksudat dan 15 transudat, sedangkan menggunakan SAAG dapat menentukan 2 eksudat dan 22 transudat. Kesesuaian patokan Light dengan SAAG menggunakan uji kappa adalah cukup (nilai kappa=0,26) dan tidak bermakna secara statistik ($p > 0,05$). Hasil penelitian ini menyimpulkan tidak terdapat kesesuaian antara patokan Light dan SAAG dalam membedakan transudat dan eksudat pada cairan asites. Penelitian dalam jumlah besar perlu dilakukan untuk menentukan kepekaan dan kekhasan kedua pemeriksaan.

Kata kunci: Patokan Light, serum ascites albumin gradient

ABSTRACT

Ascites fluid transudate or exudate should be distinguished as the first step to determine the cause of the underlying ascites disease. Combining some biochemical parameters will increase the sensitivity and specificity to distinguish types of ascites. This study aimed to determine the agreement of Light criteria and Serum Ascites Albumin Gradient (SAAG) to differentiate transudate and exudate in ascites fluid. This analytical cross sectional study was performed on 24 patients with ascites in the Dr. M. Djamil Hospital Padang, in March to September 2016. The parameters examined were total protein (colorimetric Biuret method), albumin (colorimetric bromocresol green method) and lactate dehydrogenase (LDH) (enzymatic method). The results of each parameter were formulated into Light criteria and SAAG. Light criteria and SAAG agreement in distinguishing a transudate and exudate ascites fluid was determined by kappa test. The results were considered statistically significant if p was < 0.05 . Characteristics of the subjects in this study were 13 males (54.2%) and 11 females (45.8%) with a range of 22-76 years. Light criteria could determine 9 ascites fluid exudates and 15 ascites fluid transudates and SAAG could determine 2 ascites fluid exudates and 22 ascites fluid transudates. There was sufficient agreement (kappa value=0.26) but not significant ($p>0.05$) between Light criteria and SAAG. This study showed no agreement between the Light criteria and SAAG in distinguishing transudate and exudate ascites fluid. Further studies are needed to determine the sensitivity and specificity of both tests.

Key words: Light criteria, serum ascites albumin gradient

INTRODUCTION

Classification of ascites consists of transudate and exudate. Ascites fluid types need to be distinguished as the first step to determine the cause of the disease that causes ascites.¹ Ascites fluid transudate and exudate initially distinguished only by total protein content. Ascites fluid protein content of ≤ 2.5 g/dL was classified as transudate and generally caused by portal hypertension or hypoalbuminemia, if the ascites fluid protein level was ≥ 2.5 g/dL it was classified as exudate and generally caused by tuberculosis, malignancy, pancreatitis, bacterial peritonitis.^{2,3}

Use of a single biochemical parameters is often incompatible with the clinical findings thus showing a different classification, namely the discovery of results in infections and tumors transudate and exudate in liver cirrhosis and heart failure.⁴ Single biochemical parameters have a low specificity in differentiating transudate and exudate in some previous research. A recent research showed protein levels ≥ 2.5 g/dL providing 56% accuracy in determining the exudate.^{5,6}

Merging multiple parameters to differentiate transudate and exudate fluid was first introduced by Dr. Richard Winterbauer Light in 1968 called Light criteria. These criteria identify exudates by three parameters: the ratio of liquid to serum protein >0.5 ; the ratio of liquid to serum LDH >0.6 and the levels of fluid LDH $>2/3$ the upper limit of serum LDH. Exudate liquid is determined by finding at least one of the three criteria above. Barron *et al.*⁶ obtained a Light criteria with 90% sensitivity and 67% specificity in differentiating transudate and exudate.^{7,8}

Serum Ascites Albumin Gradient (SAAG) has been recommended as an alternative to determine the type of ascites (transudate or exudate). Serum ascites albumin gradient is the difference between the levels of serum albumin and ascites fluid associated with colloid osmotic pressure. Gradients ≥ 1.1 g/dL determine the presence of portal hypertension that describe fluid transudate (high gradient) and the gradient of <1.1 g/dL indicate fluid exudates (low gradient). Barron *et al.*⁶ obtained SAAG with 80% sensitivity and 92% specificity in differentiating transudate and exudate.^{7,8}

METHODS

This study aimed to determine the agreement between light criteria and serum ascites albumin gradient for distinguishing transudate exudate in ascites fluid.

This analytical cross sectional study was performed on 24 patients with ascites in Dr. M. Djamil Hospital

Padang, in March to September 2016. Red liquid and chylus were not included in this study. Material examination of venous blood was taken about 3 mL using a vacutainer without anticoagulant, specimen subsequently was centrifuged at 3000 rpm for 15 minutes to obtain serum. Samples of fluid (in the syringe rinsed with heparin) centrifuged at 1500 rpm for 15 minutes to obtain a supernatant. The parameters examined were total protein (Biuret colorimetric method), albumin (colorimetric method Bromocresolgreen) and lactate dehydrogenase (LDH) (enzymatic method). Examination results in total protein, albumin and LDH in serum and fluids were formulated into Light and SAAG criteria to determine transudate and exudate. Light criteria and SAAG agreement in distinguishing a transudate and exudate ascites fluid was determined with kappa test. The results were considered statistically significant ($p < 0.05$).

Statistical analysis was processed using a computer program. Light and SAAG suitability criteria specified using the kappa test interpretation

<0	: Very weak
0.0 to 0.2	: Weak
0.21 to 0.4	: Fair
0.41 to 0.6	: Good
0.61 to 0.8	: Excellent
0.81 to 1.0	: Almost perfect

test is said to be significant if p was <0.05

RESULTS AND DISCUSSION

The results obtained in the ascites fluid of research subjects who met the inclusion and exclusion criteria were as much as 24 subjects. Characteristics of research subjects can be seen in Table 1.

Based on the table most of the research subjects were males (54.2%) with a lifespan of 22–76 years.

Table 1. Characteristics of research subjects

Variable	n %	Mean \pm SD
Gender		
Males	13 (54.2)	
Females	11 (45.8)	
Age		of 48.7 ± 16.6

Table 2. Frequency distribution of type liquid based Light and SAAG criteria

Variable	SAAG n (%)	Light criteria n (%)
Transudate	22 (91.7)	15 (62.5)
Exudate	2 (8.3)	9 (37.5)

Table 3. Compliance test between Light criteria with SAAG

Light criteria	SAAG		Kappa	P
	Lowgradient (exudates)	High gradient (transudate)		
Exudate	2 (22.2%)	7 (77.8%)	0.26	0.056
Transudate	0 (0%)	15 (100%)		

Table 2 shows the Light criteria determining the type of ascites fluid as transudate 62.5% while SAAG was 91.7%.

Table 3 shows the fit test between Light and SAAG criteria in determining the exudate transudate with a kappa value of 0.26 (enough) but was not statistically significant ($p>0.05$).

Analysis of the liquid ascites is necessary to distinguish the types of fluids, for ascites is an early clinical manifestation of certain chronic diseases which describes a disease process.^{9,10} Total protein content have been used to differentiate transudate and exudate in the ascites fluid over the years, and often lead to results that do not fit with existing clinical findings.

Light criteria is a combination of several parameters examined to differentiate transudate and exudate ascites fluid. The parameters examined were fluid and serum protein ratio, the ratio of fluid and serum LDH and LDH levels fluids. Research in 2002 in the UK indicated that the criteria of Light is the best criteria to differentiate transudate and exudate in ascites fluid with an accuracy of 81% compared to a single parameter such as cholesterol levels of fluid and fluid total protein content.^{11,12}

Serum ascites albumin gradient was first developed by Hoefs *et al.*^{5,10} in 1981 by calculating the reduction of serum albumin with ascites albumin levels on the same day. The previous study (2011) showed a sensitivity and specificity compared with the criteria of Light in differentiating transudate and exudate. SAAG value a low (<1.1 g/dL) can occur in ascites caused by infections and malignancies without portal hypertension and high SAAG (≥1.1 g/dL) generally in ascites due to liver cirrhosis and congestive heart failure associated with portal hypertension. The mechanism of these causes can be identified in 97% of cases using SAAG, 88% use the criteria of Light and only 55% could be identified using total protein concentration^{7,13}

This study showed that Light and SAAG criteria can be used to differentiate transudate and exudate fluid ascites. So far the researchers did not find the study results fit the test between Light and SAAG criterion in distinguishing a transudate and exudate, so it can not be compared with the results of other studies.

CONCLUSIONS AND SUGGESTIONS

In this study showed the suitability of sufficient but not significant between the Light criteria and SAAG in distinguishing the type of fluid transudate and exudate in the ascites fluid, so further studies are needed with a larger sample to determine the sensitivity and specificity of both tests and comparing several other criteria to distinguish transudate and exudate fluid ascites.

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