

Assessment of Some Ascitic Fluid Biochemicals in Ascites Cirrhotic and Non-cirrhotic Patients : A Pilot Study in El-Gazera state in Sudan

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ABSTRACT

Background: Ascites is a consequence or complication of many primary diseases, in particular cirrhosis.

Objectives: This study aimed to assess ascetic glucose, albumin and total protein levels in patients with ascites.

Materials and Methods: In this cross-sectional study; one hundred and twenty patients diagnosed with ascites, aged between 40 - 60 years were enrolled in this study (60 patients had ascites with liver cirrhosis and 60 non-cirrhotic patients with ascites), during a period from April to September 2018, estimation of ascitic glucose, albumin and total protein were done by Mindray 380; the obtained data were then analyzed by SPSS version 21.

Results: The results revealed a significant increase in ascetic glucose and total protein levels in ascites patients with liver cirrhosis when compared to ascites patients without liver cirrhosis (P-values: 0.00, and 0,000 respectively), in contrast there was a significant decrease in ascetic albumin level (P-value: 0.02). The glucose level was positively correlated with age (R-values = 0.266, P-values = 0.04). The glucose, total protein levels were positively correlated with duration of disease (R-values = 0.696, P-values = 0.000) (R-values = 0.431, P-values = 0.001) respectively.

Conclusion: Patients with ascites and cirrhosis had high glucose and total protein levels. The use of ascetic fluid analysis is helpful to make an accurate diagnosis of cause of ascites.

KEYWORDS: Ascitic fluid analysis, Ascites, Cirrhosis, non Cirrhotic patients, Sudanese patients.

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I. INTRODUCTION

Ascites is abnormal buildup of fluid in the abdomen. Technically, it is more than 25 mL of fluid in the peritoneal cavity. Symptoms may include increased abdominal size, increased weight, abdominal discomfort, and shortness of breath. Complications can include spontaneous bacterial peritonitis [1].

In the developed world, the most common cause of ascites is cirrhosis, other causes include cancer, heart failure, tuberculosis, pancreatitis, and blockage of the hepatic vein [2]. For a long period of time, the ascitic total protein level alone has been used to decide whether ascitic fluid was a transudate or exudates. However, this standard was unsound and resulted in frequent misclassifications. Presently, it is conventional that the accuracy of the association between ascitic protein concentration and etiology of ascites was overvalued [3],[4]. Gupta *et al.* reported that 24% of patients with unfussy cirrhosis had an ascitic total protein concentration greater than 25 g/L [5], and Alexandrakis *et al.* reported that 20% of malignant ascites cases had a low protein concentration [6]. Hence, the use of ascitic total protein alone is now considered outmoded and was replaced with serum-ascites albumin gradient [7]. Given that glucose diffuses willingly across membranes, the level of glucose in the ascitic fluid, in normal situations is equal to serum concentration [7]. Nevertheless, ascitic glucose level become low as a result of utilization by bacteria, white blood cells or cancer cells in the fluid in tuberculosis

peritonitis, spontaneous bacterial peritonitis, and malignancy [7],[8]. Mansour-Ghanaei et al., reported that ascitic glucose level is frequently lower than normal in tuberculous ascites, which makes it an indicator in differentiating tuberculosis from other diseases, such as cirrhosis [9]. According to reports, up to 60% of patients with compensated cirrhosis will develop ascites within 10 years of the disease route [10],[11], following the progress of ascites, survival rate is only 50% at two to five years [11]. For that reason, differential diagnosis is vital for better management of cirrhosis, and ascitic fluid investigation plays an important role in this context.

II. MATERIALS AND METHODS

This is a cross-sectional study conducted in Alhasaheesa hospital, in El Gazera state - Sudan, from April to September 2018. The study was approved by the ethical committee of Medical Laboratory Science, Clinical Chemistry Department -Alneelain University. One hundred and twenty patients diagnosed with ascites, aged between 40 - 60 years were enrolled in this study, 60 patients of them had ascites with liver cirrhosis (52 males and 8 females) and the rest were non-cirrhotic patients with ascites (50 males and 10 females). Patients with diabetes mellitus, alcoholic's, patients infected with the human immunodeficiency virus, patients with heart diseases and renal diseases all were excluded from the study.

After obtaining an informed consent from all participants, the demographic data was collected by using questionnaire, and 1ml of ascetic fluid were collected by abdominal paracentesis then fluoride oxalate was added to the samples. The ascetic fluid was then centrifuged at 3000 rpm for 10 minutes and the supernatant was separated for analysis. The levels of ascitic fluid glucose, albumin and total protein were measured by Mindray 380 auto-analyzer. Pathological and normal control sera were used to assure the accuracy and precision of results. The obtained data were then analyzed by using SPSS, version 21. Independent t-test was used to compare mean values in study groups. Pearson's correlation test was done to study the relationship between glucose, albumin total protein and age, p-value less than 0.05 was considered significant.

III. RESULTS

In comparison with the ascites patients without liver cirrhosis, ascites patients with liver cirrhosis had significantly increased ascitic fluid glucose and total protein levels and a significant decrease in ascitic fluid albumin level (Table 1).

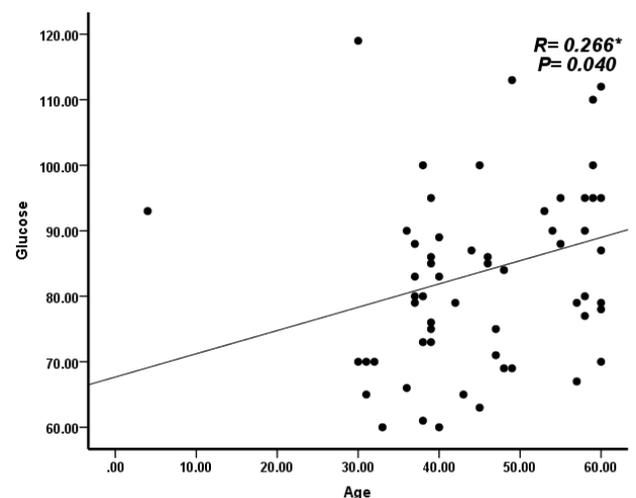
There was a positive correlation between ascitic fluid glucose level and age (Figure 1), while there were no correlation between ascitic fluid albumin or total protein and age (Figures 2,3). The ascitic fluid glucose and total protein levels were positively correlated with duration of disease while there was no correlation between ascitic fluid albumin level and duration (Figure 4,5 and 6).

Table1: Means comparison of ascetic fluid glucose, total protein and albumin in ascites patients with liver cirrhosis and ascites patients without liver cirrhosis.

Parameters	Ascites with liver cirrhosis (Mean ± SD)	Ascites without liver cirrhosis (Mean ± SD)	P-value
Total Protein g/dl	3.34 ± 0.32	2.49 ± 0.31	0.000
Albumin g/dl	1.21 ± 0.21	1.38 ± 0.34	0.002
Glucose mg/dl	83.83 ± 14.88	56.73 ± 11.67	0.000

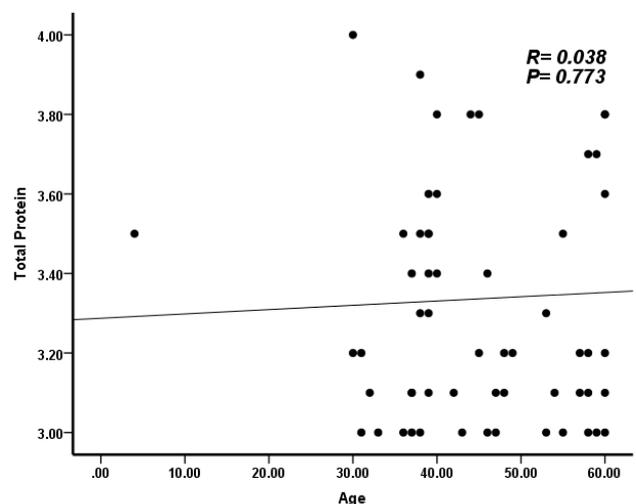
Results expressed as Mean ±SD and significant differences considered as p-value < 0.05.

Figure 1: Correlation between Ascitic fluid glucose level and age



P-value <0.05 consider as significant.

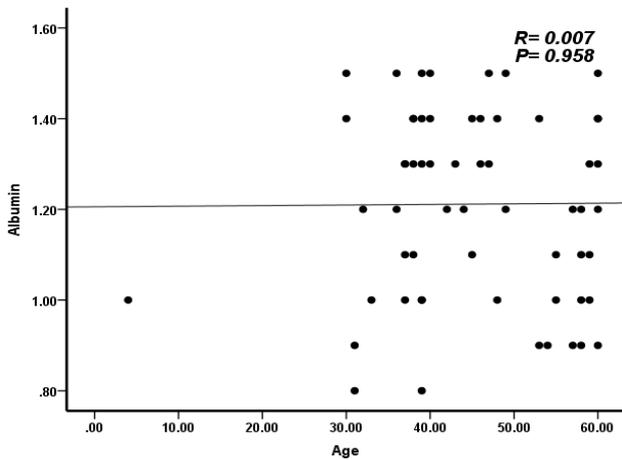
Figure 2: Correlation between ascitic fluid total protein level and age



P-value <0.05 consider as significant.

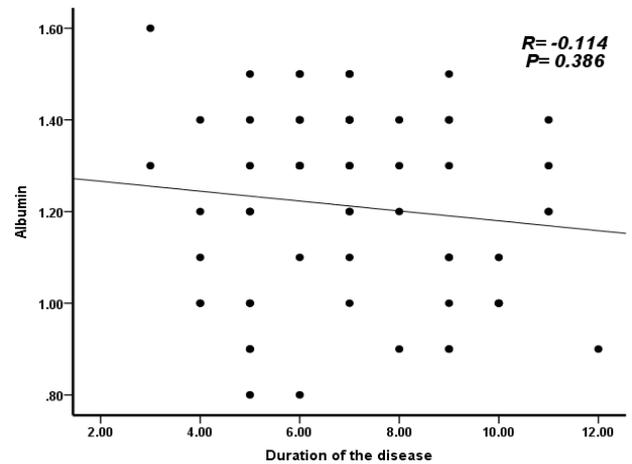
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Figure 3: Correlation between ascitic fluid albumin level and age



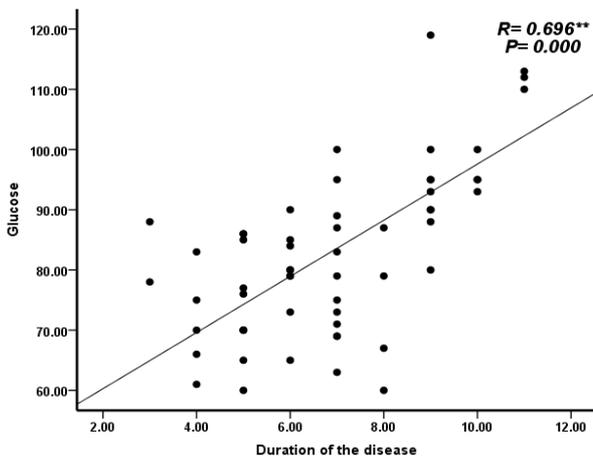
P-value < 0.05 consider as significant.

Figure 6: Correlation between ascitic fluid albumin level and duration of disease



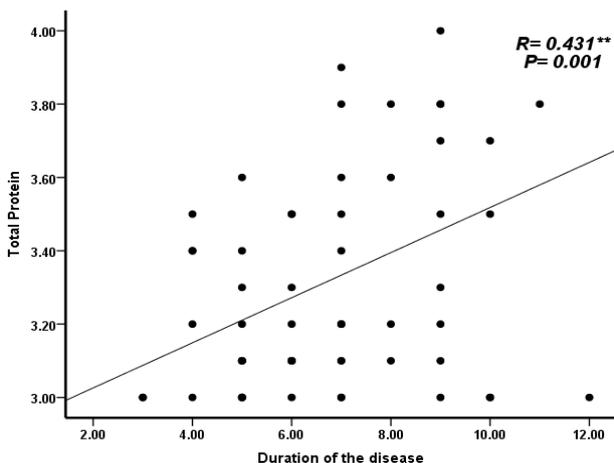
P-value < 0.05 consider as significant.

Figure 4: Correlation between ascitic fluid glucose level and duration of disease



P-value < 0.05 consider as significant.

Figure 5: Correlation between ascitic fluid total protein level and duration of disease



P-value < 0.05 consider as significant.

IV. DISCUSSION

The development of ascites is associated with a poor prognosis, with a mortality of 15% at one-year and 44% at five years follow-up, respectively [12]. In the current study, the levels of ascitic total protein in ascites patients with liver cirrhosis showed a significant increase, compared to ascitic total protein level in ascites patients without liver cirrhosis. The result of this study was similar to another result carried out by Sampliner and Iber [13], which reported that 12% of unselected patients with chronic liver disease had an ascitic fluid protein >30 g/L. A similar proportion (17%) was reported by Boyer *et al.*, and moreover, in 12% the ascitic fluid protein concentration was ≥40 g/L [14]. The reports suggested that there may be a leakage of protein rich fluid into the peritoneal cavity by the inflamed peritoneum and this could be the good explanation of increased protein levels [15]. On the other hand, the result of the current study disagreed with a previous study done by Alexandrakis *et al.*, which found that, protein concentration decreased in 20% of ascites cases [6]. Also the result disagreed with another result which reported that, the patients with ascites liver cirrhosis had lower fluid total protein concentrations due to the dilution effect from water and salt retention [16, 17].

Results of this study showed significant increase in serum glucose level in patients with ascites with liver cirrhosis compared to ascites patients without liver. This result agreed with another result done by Nishida *et al.*, which showed that, elevated ascitic glucose level has been reported in 15% to 30% of patients with liver cirrhosis [18], in contrast to several studies which confirmed that, there was significant decreased in glucose level in ascites patients with liver cirrhosis and this might have occurred due to consumption of glucose concentration by bacteria in those patients [9],[19],[20].

Result of the present study illustrated that, there was significant decrease in ascitic albumin level in ascites patients with liver cirrhosis compared to that in ascites

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patients without liver cirrhosis. This result in agreement with previous studies results and to what reported by Alves de *etal.*, that patients with cirrhosis have impaired hepatocellular function and reduced albumin synthesis, which can reach a 60-80% reduction in advanced cirrhosis [21], [22], [23].

The current study results showed a positive correlation between ascitic fluid glucose level and age. This result is in parallel to another previous result [24]. On the other hand there were no correlation between ascitic fluid albumin or total protein and age which comes on line to what reported in one previous study [25]. The glucose and total protein levels in ascitic fluid were positively correlated with duration of disease, these due to long period of liver dysfunction and hormonal concentration disturbance like insulin and glucagon are associated with increased levels of ascetic glucose and total protein levels, while there was no correlation between albumin level and duration of disease which agreed to previous reports [26].

V. CONCLUSIONS

Ascites patients with liver cirrhosis had elevated ascetic fluid glucose and total protein levels and lowering in ascetic fluid albumin level when compared to ascites patients without liver cirrhosis. Ascetic fluid biochemical analysis may be more sensitive to formative the cause of ascites and more valuable in follow-up of cirrhotic ascetic patients for early detection of complication.

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