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ORIGINAL ARTICLE

Evaluation of serum Cholinesterase levels in liver cirrhosis patients

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ABSTRACT:
Background: Cirrhosis is the final stage attained by various chronic liver diseases after years or decades of slow progression. Cholinesterase is synthesized mainly in hepatocytes and is released into the blood. The present study was conducted for evaluating serum Cholinesterase levels in liver cirrhosis patients. **Materials & methods:** A total of 50 patients with cirrhosis of liver were enrolled. Complete demographic and clinical details of all the patients was obtained. Another set of 50 age- and gender-matched healthy subjects were enrolled as healthy controls. A Performa was made and complete medical profile of liver cirrhosis patients was recorded. Categorization of liver cirrhosis patients was done on the basis of severity according to Child Pugh score (CPS) as Grade A, Grade B and Grade C. Blood samples were obtained from all the patients and was sent to laboratory and serum cholinesterase levels were evaluated using an auto-analyzer. **Results:** Mean serum cholinesterase levels among patients of the study group and control group was 2123.3 IU/L and 7169.9 IU/L respectively. While comparing the serum cholinesterase levels among study group and control group, significant results were obtained. While correlating the serum cholinesterase levels among patients of the liver cirrhosis group with severity grading, significant results were obtained. **Conclusion:** Serum cholinesterase is useful both as a liver function test and in the assessment of liver cirrhosis.
Key words: Cholinesterase, Liver, Cirrhosis.

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INTRODUCTION

The liver is the major organ for the metabolism of three major nutrients: protein, fat, and carbohydrate. Chronic hepatitis C virus (HCV) infection affects about 170 million people worldwide and is the most common cause of chronic liver disease. Of these HCV-infected individuals, 20–30% eventually develop liver cirrhosis (LC) or hepatocellular carcinoma (HCC). Liver fibrosis can accompany almost any chronic liver disease characterised by the presence of inflammation or hepatobiliary distortion. Fibrosis or scarring arises as a result of wound repair and is the net result of the balance between fibrinogenesis (production of extracellular matrix) and fibrolysis (degradation of extracellular matrix).[1, 2] Scar formation alters liver structure and the liver responds with regeneration. Progressive fibrosis of the hepatic parenchyma leads to cirrhosis, nodule formation, altered hepatic function and risk of liver-related morbidity and mortality.Screening for chronic liver disease can be performed inexpensively and easily with clinical history-taking, measurement of transaminase concentrations, upper abdominal ultrasonography, and transient elastography (where available). Abnormal findings should prompt specific diagnostic testing to determine the etiology of the underlying disease. In most patients, the dynamic process of progressive fibrosis, which could ultimately lead to cirrhosis, can be interrupted by the timely recognition of the risk, followed by appropriate treatment.[3, 4]

Cholinesterase is synthesized mainly in hepatocytes and is released into the blood. Serum cholinesterase activity is reduced in liver dysfunction due to reduced synthesis. This is in contrast to other serum enzymes associated with the clinical assessment of liver function whose activities increase as a result of enhanced release from their cellular sources following cell membrane damage.[5]The pattern of serum cholinesterase (ChE) isozyme appeared to be characteristically abnormal in liver cirrhosis and hepatoma. In liver cirrhosis an abnormal fast-moving peak was observed in 92.5% of fifty-three patients studied. The pattern in hepatoma was essentially the same with liver cirrhosis, though diversity of bands was also present in some cases.[6] It was ascertained that these abnormalities were due to sialic acid content bound to the enzyme, but was not due to production of abnormal enzyme protein moiety. It was suggested by clinical analysis that the degree of the abnormality of the isozyme may be useful for the diagnosis and prognostic evaluation of liver cirrhosis.[7- 9] Hence; the present study was conducted for evaluating serum Cholinesterase levels in liver cirrhosis patients.

MATERIALS & METHODS

A total of 50 patients with cirrhosis of liver were enrolled. Complete demographic and clinical details of all the patients was obtained. Another set of 50 age- and gender-matched healthy subjects were enrolled as healthy controls. A Performa was made and complete medical profile of liver cirrhosis patients was recorded. Categorization of liver cirrhosis patients was done on the basis of severity according to Child Pugh score (CPS) as Grade A, Grade B and Grade C.

Blood samples were obtained from all the patients and was sent to laboratory and serum cholinesterase levels were evaluated using an auto-analyzer. All the results were recorded in Microsoft excel sheet and was subjected to statistical analysis using SPSS software. Student t test and ANOVA test was used for evaluation of level of significance.

RESULTS

Mean age of the subjects of liver cirrhosis group and control group was 52.3 years and 50.9 years respectively. Majority subjects of both the study group and control group were males. Mean serum cholinesterase levels among patients of the study group and control group were2123.3 IU/L and 7169.9 IU/L respectively. While comparing the serum cholinesterase levels among study group and control group, significant results were obtained. While correlating the serum cholinesterase levels among patients of the liver cirrhosis group with severity grading, significant results were obtained.

Table 1: Comparison of serum cholinesterase levels among study group and control group

Serum cholinesterase	Study group	Control group
Mean	2123.3	7169.9
SD	1217.3	1891.5
t-test	1.228	
p-value	0.001 (Significant)	

Table 2: Comparison of serum cholinesterase levels among study group and control group

Serum cholinesterase	Grade A	Grade B	Grade C
Mean	3084.3	2574.8	1836.2
SD	1325.4	1298.2	1124.1
p-value	0.000 (Significant)		

DISCUSSION

Cirrhosis is the final stage attained by various chronic liver diseases after years or decades of slow progression. There are, however, ways to prevent cirrhosis, because the diseases that most commonly lead to it progress slowly, and measures are available to prevent and treat them. Moreover, most cases of hepatocellular carcinoma (HCC) arise in a cirrhotic liver, so cirrhosis prevention is, in fact, also HCC prevention. The risk of developing HCC depends on the underlying disease: It is low, for example, when the underlying disease is autoimmune hepatitis (2.9% in 10 years), and high when the underlying disease is chronic hepatitis B with a viral burden greater than 107copies/mL (19.8% in 13 years).[10, 11]

In terms of diagnostic methods for liver cirrhosis, several noninvasive methods have been developed and these methods have been used for predicting prognosis in patients with liver cirrhosis; these include serum markers such as aspartate aminotransferase to platelet ratio index (APRI), FIB-4 index, aspartate aminotransferase (AST) to alanine aminotransferase (ALT) ratio, or modalities such as acoustic radiation force impulse (ARFI), transient elastography (TE), and magnetic resonance elastography.[11]Hence; the present study was conducted for evaluating serum Cholinesterase levels in liver cirrhosis patients.

Mean age of the subjects of liver cirrhosis group and control group was 52.3 years and 50.9 years respectively. Majority subjects of both the study group and control group were males. mean serum cholinesterase levels among patients of the study group and control group were 2123.3 IU/L and 7169.9 IU/L respectively. Meng F et al in a previous study assessed the value of serum cholinesterase in evaluating liver reserve function in cirrhotic patients. A total of 866 cirrhotic patients were divided into three groups according to their Child-Pugh score. Cirrhotic patients were grouped strictly into A, B and C grades, as per the Child-Pugh score. The results showed that cholinesterase tended to significantly decrease in the three grades Child A, Child B and Child C. In patients with cirrhosis, cholinesterase was positively correlated with albumin and negatively correlated with serum plasma prothrombin time. In the Child A grade, serum cholinesterase was positively correlated with albumin, but negatively correlated with serum plasma prothrombin time. In the Child B grade, serum cholinesterase remained negatively correlated with serum plasma prothrombin time although there was no significant correlation between cholinesterase and albumin. In the Child C grade, serum cholinesterase positively correlated with albumin, but there was no significant correlation between cholinesterase and serum plasma prothrombin time.[12]

While comparing the serum cholinesterase levels among study group and control group, significant results were obtained. While correlating the serum cholinesterase levels among patients of the liver cirrhosis group with severity grading, significant results were obtained. Ramachandran J et al studied 178 cirrhosis patients and 154 healthy controls prospectively. Median serum ChE in cirrhotics was 1590 IU/L (110-8143) compared to controls 7886 IU/L (2022- 21673), $p < 0.001$. Serum ChE levels below 3506 had a 98.7% sensitivity and 80.3% specificity in predicting cirrhosis. Median serum ChE was higher ($p < 0.001$) in CC (n = 51) 4246 IU/L (680-8143) compared to DC (n = 127) 1324 IU/L

(110-4550). ChE level less than 2385 IU/L had 80.1% sensitivity and 88.2% specificity in predicting DC. Follow-up levels in 25 patients showed good correlation with clinical course. The correlation coefficient between ChE and albumin was -0.67, 0.53 with PT INR and 0.59 with MELD score. Serum ChE is an excellent biomarker of cirrhosis with good sensitivity and specificity.[13]Nomura F et al assessed the significance of serum cholinesterase activity in 48 patients with nonalcoholic fatty liver, 16 obese subjects without fatty liver, 30 cases of chronic persistent hepatitis, 38 cases of chronic active hepatitis, and 20 cases of liver cirrhosis. Increased cholinesterase activity was observed in nonobese as well as obese patients with fatty liver, whereas obese subjects without fatty liver showed levels in the upper normal range. When we set a cutoff level above the upper normal limit, half of the patients with fatty liver showed values above it, with only a few overlaps with other patients. When obese patients with fatty liver took a low-caloric diet, cholinesterase activity decreased, clearly reflecting improvement of hepatic steatosis. Thus, measurement of cholinesterase activity is of diagnostic value and an alternative to computed tomography in hepatic steatosis.[14]

CONCLUSION

Serum cholinesterase is useful both as a liver function test and in the assessment of liver cirrhosis.

REFERENCES

1. Poynard T, Aubert A, Bedossa P, et al. A simple biological index for detection of alcoholic liver disease in drinkers. Gastroenterology. 1991;100:1397–402.
2. Leroy V, Monier F, Bottari S, et al. Circulating matrix metalloproteinases 1, 2, 9 and their inhibitors TIMP-1 and TIMP-2 as serum markers of liver fibrosis in patients with chronic hepatitis C: comparison with PIIINP and hyaluronic acid. Am J Gastroenterol. 2004;99:271–9.
3. Zou Z, Xin S, Li B. Relationship between cholinesterase, prothrombin activity and albumin and the pathology of the liver. Zhonghua Shi Yan He Lin Chuang Bing Du Xue Za Zhi. 2001;15:349–351. (In Chinese).
4. Imbert-Bismut F, Ratziu V, Pieroni L, Charlotte F, Benhamou Y, Poynard T. MULTIVIRC Group. Biochemical markers of liver fibrosis in patients with hepatitis C virus infection: a prospective study. Lancet. 2001;357:1069–75.
5. Association of Infectious and Parasitic Epidemiology Branch of Learning Branch of Liver Disease: viral hepatitis prevention and treatment plan. Chin J Inter Med. 2001;40:62–68.
6. Sinha SN, Keresztes-Nagy S, Frankfater A. Studies on the distribution of cholinesterases: activity in the human and dog heart. Pediatr Res. 2006;10:754–758.
7. Cornberg M, Protzer U, Petersen J, et al. Prophylaxis, diagnosis and therapy of hepatitis B virus infection - the German guideline. Z Gastroenterol. 2011;49:871–930.
8. European Association For The Study Of The Liver. EASL Clinical Practice Guidelines: Management of chronic hepatitis B virus infection. J Hepatol. 2012;57:167–185.
9. Breitling LP, Claessen H, Drath C, Arndt V, Brenner H. Gamma-glutamyltransferase, general and cause-specific mortality in 19,000 construction workers followed over 20 years. J Hepatol. 2011;55:594–601.
10. Manns MP, Czaja AJ, Gorham JD, et al. Diagnosis and management of autoimmune hepatitis. Hepatology. 2010;51:2193–2213.
11. Chen CF, Lee WC, Yang HI, et al. Changes in serum levels of HBV DNA and alanine aminotransferase determine risk for hepatocellular carcinoma. Gastroenterology. 2011;141:1240–1248
12. Meng F, Yin X, Ma X, Guo XD, Jin B, Li H. Assessment of the value of serum cholinesterase as a liver function test for cirrhotic patients. Biomed Rep. 2013;1(2):265-268. doi:10.3892/br.2013.60
13. Ramachandran J, Sajith KG, Priya S, Dutta AK, Balasubramanian KA. Serum cholinesterase is an excellent biomarker of liver cirrhosis. Trop Gastroenterol. 2014;35(1):15-20. doi:10.7869/tg.158
14. Nomura F, Ohnishi K, Koen H, et al. Serum cholinesterase in patients with fatty liver. J Clin Gastroenterol. 1986;8(5):599-602. doi:10.1097/00004836-198610000-00025