

CORRELATIVE STUDY OF BIOCHEMICAL INVESTIGATION AND IMAGE FINDINGS IN LIVER DYSFUNCTION

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ABSTRACT: The study is undertaken to follow the course of liver disease to accurately evaluate the response to treatment and to adjust treatment when necessary. More so in patients with steroid response auto immune Chronic Hepatitis. Serum Assay for Biochemical Markers of Liver diseases play an important role in proper evaluation of liver and biliary tract diseases. On Imaging side, Ultrasound is Non-Invasive, safe, widely available and relatively inexpensive used as frontline Imaging modality for evaluation of liver and it's vasculature. In the present study, the Liver Function Tests which include Serum Concentration of Amino Transferases (ALT & AST), Alkaline Phosphatase, Bilirubin, Total Proteins (Albumin & Globulin) in various Liver disorders like Acute and Chronic parenchymal Liver diseases, Jaundice and SOL's (Space Occupying Lesions) like Amoebic Liver Abscess, Hepatocellular Carcinoma, Metastatic tumours are compared with Imaging Studies like Conventional X-Rays, Ultrasound, CT (Spiral scanning).

KEYWORDS: Alanine Transferase, Aspartate Transferase, Alkaline Phosphatase, Bilirubin, Computerized Axial Tomography of Liver (CT), Ultra Sound.

INTRODUCTION: Multiple Imaging modalities are currently available for Imaging of liver. Computed Axial Tomography is indicated for the identification of liver masses. Diagnosis is usually confirmed by Liver Biopsy. However, Cross sectional Imaging may allow identification and characterization of these lesions and can avoid an Invasive Biopsy. Once the presence of Hepatic Dysfunction is recognized, the pattern of laboratory tests abnormalities may allow clinicians to recognize the general type of Hepato Cellular disorders such as Viral Hepatitis, Cholestatic Syndromes viz., Primary Biliary Cirrhosis and Bile Duct obstruction. The liver is well demonstrated on Ultrasound evaluation and assessed for diffuse and focal abnormalities. Ultrasound is non-invasive, safe, widely available, relatively inexpensive and widely used as the initial imaging test for the evaluation of the liver and its vasculature. The Computerised Axial Tomography (CT) is indicated for identification of liver masses like Haemangiomas, liver tumors, diffuse infiltrative diseases. The diagnosis is usually confirmed by Liver Biopsy, however cross sectional imaging may allow identification and characterization of these diseases and potentially prevent an Invasive Biopsy. In the present study, the Liver Function Tests which include Serum Concentration of Amino Transferases (ALT & AST), Alkaline Phosphatase, Bilirubin, Total Proteins (Albumin & Globulin) in various Liver disorders like Acute and Chronic parenchymal Liver diseases. Jaundice and SOL's (Space Occupying Lesions) like Amoebic Liver Abscess, Hepatocellular Carcinoma, Metastatic tumours are compared with Imaging Studies like Conventional X-Rays, Ultrasound, CT (Spiral scanning).

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AIM OF THE STUDY: The present study is to evaluate a comparative study of Serum Enzymes and Biochemical Profile in various Liver disorders with imaging techniques.

MATERIALS AND METHODS: SOURCE: Out-patients and Patients admitted in Surgery, Medicine and Gastroenterology wards of King George Hospital, Visakhapatnam. 60 Patients of various Liver diseases of age ranging from 20-60 years were selected for the present study. Patients were categorized into following groups according to disease – Amoebic Liver Abscess, Cirrhosis of Liver, Viral Hepatitis, Obstructive Jaundice, Hepatic Tumours. Age and Sex were matched and 25 persons were selected for the study as controls.

METHODS: Random blood samples were collected without anti-coagulants from the Outpatients as well as Inpatients under aseptic precautions. Thorough Clinical Examination was done along with biochemical Investigations. Following were the investigations done:

1. Estimation of alanine aminotransferase (Reitman & Frankel, 1957).^[1,2,3,4,5,6,7,8]
2. Estimation of aspartate aminotransferase (Reitman & Frankel, 1957).^[1,2,4,5,6,7,8]
3. Determination of alkaline phosphatase (King & Kinds method, 1954).^[1,2,4,5,6,7,8,9]
4. Estimation of total serum bilirubin (Malloy & Evelyn method).^[2,4,5,10,11,12]
5. Estimation of serum total proteins (Biuret method).^[4,5,13,14,15]
6. Estimation of albumin (Bromo Cresol Green dye binding method-Bartholomew & Delaney, 1966).^[4,5,14,15]

In addition to biochemical tests, the Imaging methods were done & analysed in the various disorders of Liver parenchyma.

DISCUSSION: The present study includes estimation of Serum hepatic enzymes Serum Glutamic Pyruvic Transaminase (SGPT) or Alanine Transaminase (ALT), Serum Glutamic Oxaloacetic Transaminase (SGOT) or Aspartate Transaminase (AST) and Alkaline Phosphatases in diseases of the liver like (1) Amoebic Liver Abscess, (2) Cirrhosis Liver, (3) Obstructive Jaundice, (4) Acute Hepatitis, (5) Tumours of Liver and compared with Imaging studies like Conventional X-Rays, Ultrasound Scanning and Computed Tomographic (Spiral CT) Scanning. The present study includes Sixty (60) cases of different categories of liver diseases as mentioned above and Twenty five (25) healthy individuals as control group. In this present study thirteen cases (21.6%) had Amoebic liver abscess. Alanine Transaminase (ALT), Aspartate Transaminase (AST) and Alkaline Phosphatase values show significant elevation (P value < 0.01) in these cases compared to controls and they also showed Hepatomegaly (92%) and Space occupying Lesions (100%) while doing ultrasound scan and CT scan which are relatively accurate. X-Rays showed right dome elevation in 62% of cases and Hepatomegaly in 77% of cases. The present study includes 17 cases (28.3%) which are Cirrhosis of Liver. In this all the three enzymes (ALT, AST & ALP) are highly significant (with P value > 0.001) compared to controls and radiological investigations like X-Rays showed significant changes of dome elevation in 70% of cases, Ascites seen in 59% of cases & Hepatomegaly in 24% of cases. Ultrasound scan study showed decreased liver size in 65% of cases, Hepatomegaly in 35% of cases, Ascites in 65% of cases.

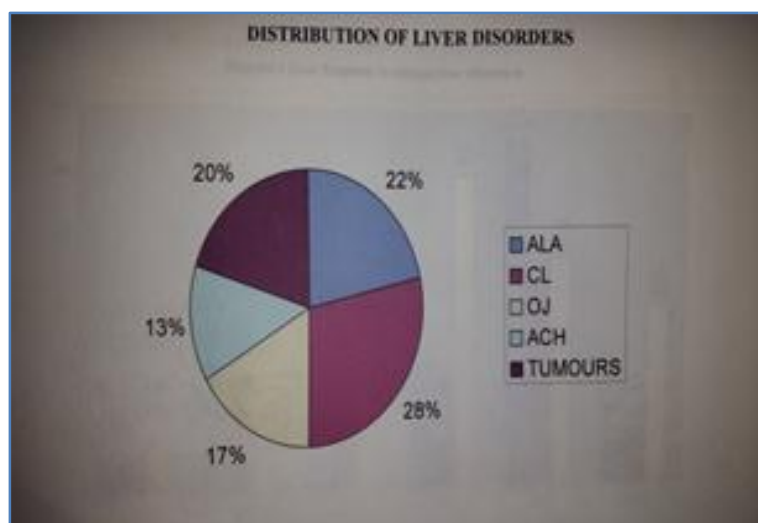


Fig. 1

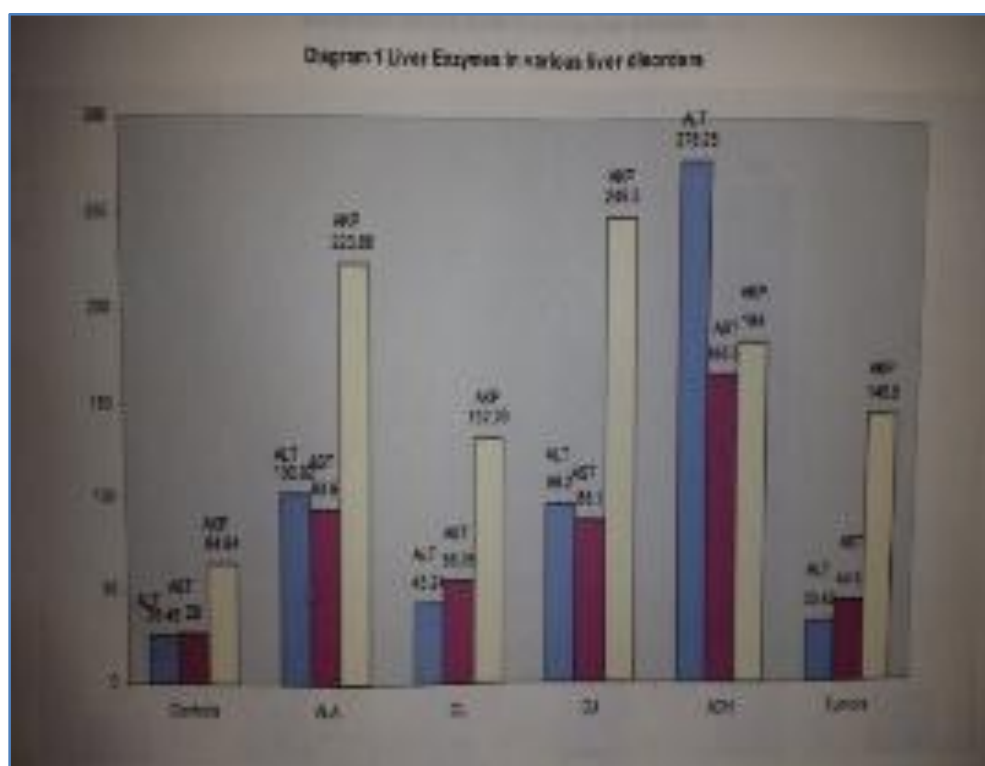


Fig. 2

CT scan showed sufficiently accurate results like decreased liver size in 65% of cases, Hepatomegaly in 35% of cases & Ascites in 65% of cases. The present study includes 10 cases (16.7%) of obstructive jaundice. All the three enzymes (SGPT, SGOT & ALP) showed highly

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significant elevation (P values <0.001, 0.0001, 0.01 respectively) compared to controls. Radiological Investigations also showed highly significant results like Hepatomegaly, CBD (Common Bile Duct) dilatation, Gall bladder wall thickening in 90% of cases. Acute hepatitis cases are eight in number in the present study. They showed significant elevation in P value > 0.05 of all the three enzymes (SGPT, SGOT & ALP) compared to controls. Radiological investigations showed significantly correlative results in 100% of cases. In the present study, twelve cases had Tumours of Liver. ALT showed no significant variation. (P value < 0.4) AST showed significant elevation (P value > 0.01) ALP showed highly significant elevation (P value > 0.0001) Compared to control group. Radiological investigations showed highly significant positive correlation in 100 % of cases. A number of Serum Enzymes have been used to distinguish and assess hepatocellular injury and biliary tract dysfunction or obstruction. These laboratory tests have certain limitations in sensitivity and specificity. No single LFT enables the clinician to accurately assess the total functional capacity of the liver. The liver carries out thousands of biochemical functions, most of which cannot be measured easily by blood tests. The Aminotransferases & Alkaline Phosphatase detects liver cell damage or interference with bile flow. When the tests provide abnormal findings, the probability of liver disease is high and when the results are normal, the probability of missing occult liver disease is low.

Hence, by using Imaging investigations which include conventional X-Ray studies, ultrasound and CT scan, it is possible to evaluate the anatomical and pathological changes within the liver. For the evaluation of hepatocellular and bile duct disorders, the conventional X-Ray studies have limited role, whereas ultrasound is commonly utilized to evaluate the liver, gall bladder & bile ducts. CT scan is indicated for the identification of liver masses (<1cm), haemangiomas and in the evaluation of Infiltrative diseases. Because of the large size and obscured location of the liver, determination of its involvement by disease remains a different clinical problem. The early detection of metastatic disease has become of greater importance with development of new techniques for the successful resection of hepatic metastasis.

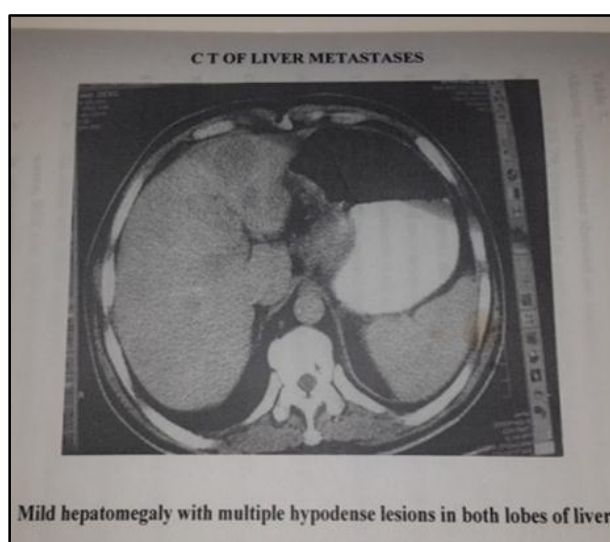


Fig. 3

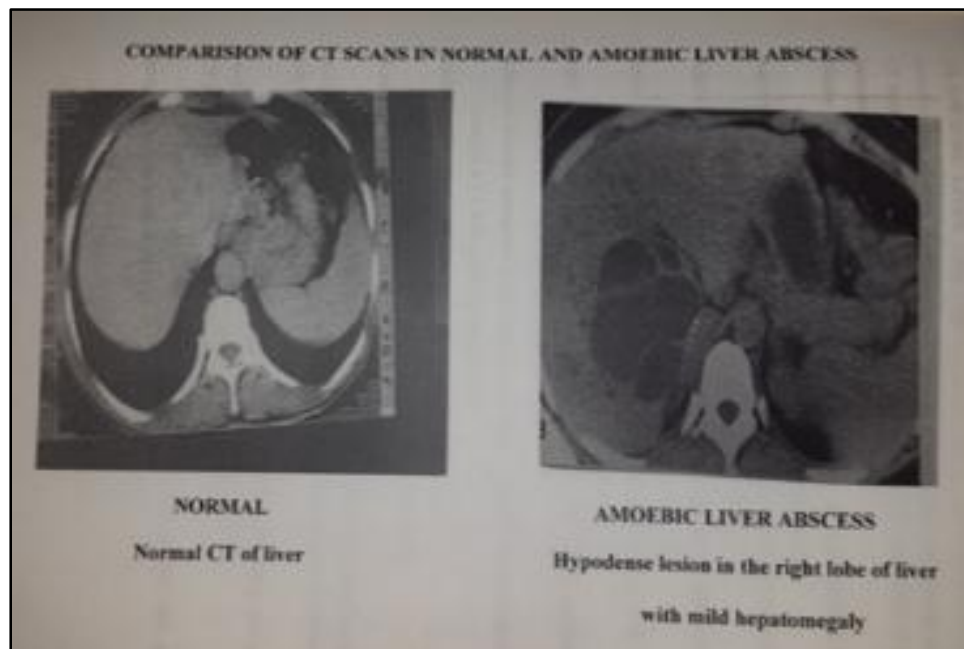


Fig. 4



Fig. 5

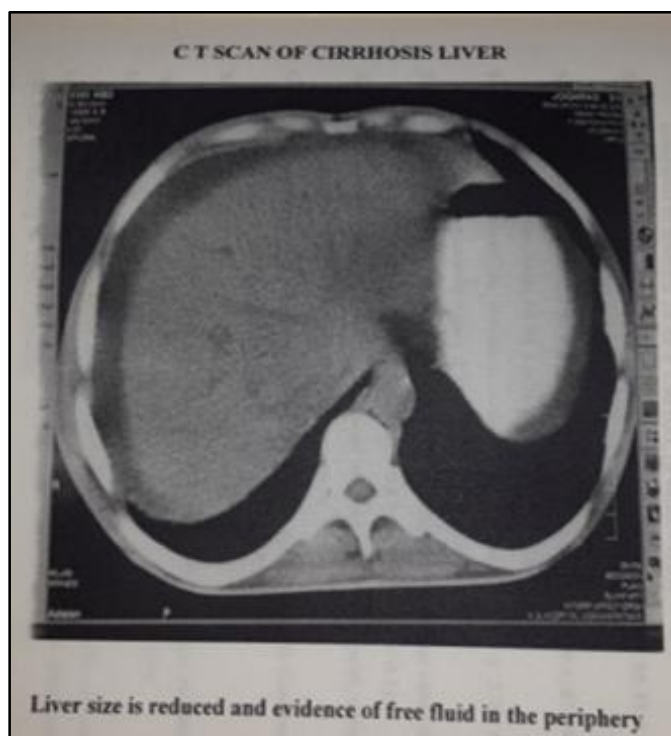


Fig. 6

CONCLUSION: Hence, laboratory tests alone are not sufficient for accurate detection of Liver metastasis and other liver diseases. Additional accuracy can be obtained by the combined use of a single liver imaging test and selected laboratory tests. Both Biochemical and Radiological Investigations are necessary to arrive at reasonable diagnosis of various liver disorders.

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