



Liver disorder and its clinical investigation

Syed Ehtaishamul Haque*

Department of Pharmacology, Faculty of Pharmacy, Jamia Hamdard, New Delhi-110062, India.

Received on:11-09-2015; Revised on: 15-10-2015; Accepted on: 28-12-2015

ABSTRACT

Liver disorder is a common disorder seen with the people of almost all age groups due to infection, wrong food habit, sedentary life style, alcoholism etc. Disorder ranges from simple infection to scarring, cirrhosis and cancer. Treatment includes from simple medication to liver transplantation depending on the severity of the disease. The clinical examination and early detection plays a vital role in treating the disease. Jaundice, cholestasis, liver enlargement, portal hypertension, ascites, liver encephalopathy and liver failure are the common symptoms of liver diseases. When diagnosing liver diseases, the physician looks at the patient's symptoms and conducts a physical examination. In addition, the physician may request a liver biopsy, liver function tests, an ultrasound, or a CT scan (computerized tomography scan). Early diagnosis translates into a better treatment and result.

KEYWORDS: Liver disorders, liver function tests, jaundice, liver cirrhosis and liver diagnosis

INTRODUCTION

Liver is a vital organ of the body which takes active part in various metabolic processes. We get important proteins and clotting factors synthesized here. Body is detoxified and the waste product from the blood is disposed off. Glucose, cholesterol, iron etc. are metabolized and proper energy regulation is maintained. This organ controls so much of functions that it is regarded as the master organ of the body. To keep the liver healthy, one has to monitor its functioning regularly and remain alert.

Liver disease symptoms

Nausea, vomiting, diarrhea, fatigue, abdominal pain, jaundice, cholestasis, liver enlargement, ascites, liver encephalopathy and liver failure are some of the common symptoms reported by the patients suffering from the liver diseases ^[1].

What is nausea and vomiting?

Nausea and vomiting is basically a sensation which one feels because of some disorder or illness. Sensation of emptying stomach is called

nausea whereas act of forcibly emptying it is called vomiting. Vomiting is a violent act when one feels its stomach almost coming inside out ^[2].

What is jaundice?

When we have abnormally high levels of bilirubin (bile pigment) in the bloodstream a yellow discoloration of the skin and eye takes place and this condition is called jaundice. This high level of bilirubin may be due to inflammation, bile duct blockage or other abnormalities of the liver. In newborns jaundice may occur due to breakdown of considerably high number of R.B.Cs. Jaundice is generally the first indication and sometimes the only indication of the liver disease ^[3-5].

What is cholestasis?

Cholestasis is reduced or stopped bile flow due to occlusion of the bile tract. Bile flow may be blocked inside or outside the liver. Symptoms may range from itching, dark urine and pale stool, jaundice, easy bleeding, enlarged spleen, bone loss, fluid accumulation in the abdominal cavity, small spider-like blood vessels visible in the skin, enlarged gall bladder size, shivering to pain in the biliary tract or pancreas ^[6].

Some causes of cholestasis include:

Hepatitis, alcoholic liver disease, primary biliary cirrhosis, drug effects, hormonal changes during pregnancy, bile duct narrowing, bile duct stone, bile duct/pancreatic cancer and inflammation of the pancreas.

***Corresponding author.**

Dr. Syed Ehtaishamul Haque
Department of Pharmacology,
Faculty of Pharmacy, Jamia Hamdard,
New Delhi-110062, India.

What is liver enlargement?

Liver enlargement is the increase in the size of the liver more than the normal. It is usually an indicator of liver disease. Usually there are no symptoms associated with a slightly enlarged liver (hepatomegaly), however, a grossly enlarged liver include abdominal discomfort or feeling fullness of the upper abdominal region ^[7].

What is portal hypertension?

When there is abnormally high blood pressure in the portal vein that supplies blood to liver from the intestine, the condition is referred as portal hypertension. This may occur due to increase in pressure or resistance to blood flow through the liver. Under this situation growth of collateral vessel takes place that connect to the general circulation, bypassing the liver, leading to the escaping of substances into the general circulation which otherwise are normally removed/detoxified by the liver ^[8,9].

Symptoms of portal hypertension

Symptoms include distension of abdominal cavity due to ascites formation, bleeding in the esophagus and in the stomach lining.

What are ascites?

Ascites are formed when fluid leaks from the surface of the liver and intestine and gets accumulated in the abdominal cavity, causing distension in abdomen, discomfort and shortness of breath ^[10].

Causes of ascites may include:

- liver cirrhosis (especially cirrhosis caused by alcoholism)
- alcoholic hepatitis
- chronic hepatitis
- obstruction of the hepatic vein

Ascites can also be caused by non-liver disorders.

What is liver encephalopathy?

Liver encephalopathy is the deterioration of brain function due to toxic substances building up in the blood, which are normally removed by the liver. Liver encephalopathy is also called portal-systemic encephalopathy, hepatic encephalopathy, or hepatic coma ^[11].

Symptoms may include:

Loss of consciousness, disorientation in logical thinking, personality, mood and behavior, impaired judgment, confusion, sluggish speech and movement, drowsiness and coma are the common symptoms seen in this condition.

What is liver failure?

Liver failure is severe deterioration of liver function. Liver failure occurs when a large portion of the liver is damaged due to any type

of liver disorder. Symptoms may include nausea, fatigue, weakness, loss of appetite, jaundice, impaired brain function, tendency to bruise or bleed ascites and overall health deterioration ^[12,13].

Liver function tests (LFTs)

Liver function tests are the tests that are performed to assess the functioning and the status of the liver. They are useful in the evaluation and management of patients with hepatic dysfunction. They can be used as a tool for detecting liver disease, types of liver disorder, extent of known liver damage and follow up of the disease in response to medication. These tests help assessing the functionality, cellular integrity or biliary tract related problems. Some of them are as follows:

- Estimation of albumin (associated with functionality)
- Estimation of transaminases (cellular integrity)
- Estimation of gamma-glutamyl transferase and alkaline phosphatase (biliary tract)

Albumin:

Albumin is synthesized in liver. Its normal level in serum ranges from 3.7-5.3 g/100 ml. Hypoalbuminemia is usually seen with its excessive loss in urine leading to albuminuria. This condition causes edema. Hypoalbuminemia is seen usually in chronic liver disease, cirrhosis and anemia ^[14].

Alanine Transaminase (ALT):

This enzyme is present in the liver cells (hepatocytes) and also referred as SGPT (Serum Glutamate Pyruvate Transaminase). As this is a cellular enzyme its level in serum reflects cellular integrity of hepatocytes. High level shows leakage of this enzyme into the serum hence cellular damage. Its level significantly increases in case of acute liver damage due to infection (viral hepatitis) or overdose of acetaminophen (paracetamol). The normal level of this enzyme in serum ranges from 5 to 40 IU/L ^[15].

Aspartate Transaminase (AST):

This is also present in the liver parenchyma and reflects cellular integrity. Another name of this enzyme is SGOT (Serum Glutamate oxaloacetate Transaminase). As this enzyme is also present in the myocardium, red blood cells and skeletal muscles, it is not specific to liver. However SGOT/SGPT ratio sometimes helps understanding the reasons of liver damage. The normal level ranges from 10 to 40 IU/L ^[16,17].

Alkaline phosphatase (ALP):

This enzyme is present in the biliary duct linings of the liver. Its level rises in bile duct obstruction, cholestasis (intrahepatic) or the

infiltrative disease of the liver. It is found raised in old patients with Paget's disease. ALP is also present in bone and placental tissue, hence high in growing children due to bone remodeling. The normal level in serum ranges from 30 to 120 IU/L [18,19].

Total bilirubin (TBIL):

Heme is the part of hemoglobin in red blood cells which forms bilirubin on degradation. Liver plays a vital role in clearing blood from bilirubin. Liver takes up bilirubin into its hepatocytes, conjugate (water soluble) it and disposes it into bile which is excreted into the intestine. Its normal level ranges from 0.1 - 1.2 mg/100ml. When its concentration is high it causes jaundice and signals a variety of complications [20,21].

Raised bilirubin production (pre-hepatic stage):

As seen in internal hemorrhage and hemolytic anemia.

Deficiencies in bilirubin metabolism (hepatic stage):

May be because of its decreased uptake, deficient conjugation and decreased secretion by the liver cells (e.g., cirrhosis and viral hepatitis).

Bile ducts obstruction (post-hepatic stage):

Obstruction may be present in the liver or in the bile duct which leads to decrease in excretion of bilirubin.

Diagnosis can be further converged into the cause by estimating direct and indirect bilirubin.

Direct bilirubin:

It is a water soluble conjugated bilirubin which when raised more than 0.5 mg/100ml indicates towards acute hepatitis, obstructive jaundice and intrahepatic cholestasis [22].

Indirect bilirubin:

It is a water insoluble (methanol soluble) free bilirubin. Its level (Total bilirubin – direct bilirubin) is found increased in hemolytic anemia, pernicious anemia, hemolytic jaundice and jaundice of the new born [20].

Gamma Glutamyl Transpeptidase (GGT):

This enzyme is a more sensitive marker for cholestatic damage than ALP and is specific to the liver. This test is used to determine the cause of ALP elevation. Both GGT and ALP get raised in bile duct and other liver diseases, but ALP is only raised in bone diseases. Its level may get raised with even minor, sub-clinical levels of liver dysfunction. Its estimation is useful in ascertaining acute and chronic alcohol toxicity. Normal level ranges from 0 to 51 IU/L [23,24].

5' Nucleotidase (5'NTD)

5'NTD is a protein synthesized by the liver. Elevated level of this protein indicates liver or skeletal muscles damage. This test is also specific for cholestasis or intra/extra hepatic biliary damage and people use it as a substitute for GGT for confirming whether the raised ALP is of biliary or extra-biliary origin [25].

Coagulation test (e.g. INR):

Coagulation factors are produced in the liver. So if there is a delay in coagulation, it may reflect hepatic damage. INR (The international normalized ratio) is the measure of the speed of coagulation. If the INR is increased, it means blood clotting is taking relatively more time than the normal and reflects the inefficiency of the liver to produce vitamin K-dependent coagulation factors. Patient planning for the surgery has to have a normal INR value because if operated with high INR may cause profuse bleeding. It is however, not a sensitive measure of the liver function [26,27].

Serum glucose (Gluconeogenesis):

Gluconeogenesis is the process by which glucose molecules are synthesized in the liver from non carbohydrate sources. It is the last function of the liver which gets disrupted due to liver failure [28].

Lactate dehydrogenase (LDH):

Lactate dehydrogenase is a cellular enzyme found in many body tissues, including the liver. Raised levels of LDH in serum may reflect the liver cells damage. This test is not a specific test for liver [29,30].

CONCLUSION:

Liver disease is a common problem seen globally. Any symptoms should not be ignored because early detection leads to a better cure. Regular checkup, planned food habit and active life style play a vital role in this disease.

REFERENCES

1. <https://www.reference.com/health/liver-test-levels-taken-f2403b0ef8eae82e?qo=similarQuestions>.
2. http://www.medicinenet.com/nausea_and_vomiting/article.htm#nausea_and_vomiting_facts.
3. <https://www.reference.com/health/elevated-liver-function-test-e1340955e413daa0?qo=cdpArticles>.
4. www.medicalnewstoday.com/articles/165749.php.
5. <https://en.wikipedia.org/wiki/Jaundice>.
6. emedicine.medscape.com/article/927624-overview
7. www.webmd.com/hepatitis/enlarged-liver-causes.
8. www.webmd.com/digestive-disorders/digestive-diseases-portal

9. <http://emedicine.medscape.com/article/182098-overview>
10. www.clevelandclinicmeded.com/medicalpubs/.../complications-of-cirrhosis-ascites/
11. <http://www.liver.ca/liver-disease/types/cirrhosis/hepatic-encephalopathy.aspx>
12. Bretherick A.D., Craig D.G., Masterton G., et al; Acute liver failure in Scotland between 1992 and 2009; incidence, aetiology and outcome. QJM. 2011, 104 (11): 945-956.
13. Williams R., Schalm S.W., O'Grady J.G. Acute liver failure: redefining the syndromes. 1993, 342, 8866: 273–275.
14. <https://medlineplus.gov/ency/article/003480.htm>
15. <http://www.webmd.com/digestive-disorders/alanine-aminotransferase-alt>
16. www.healthline.com › Reference Library
17. https://en.wikipedia.org/wiki/Aspartate_transaminase
18. <https://medlineplus.gov/ency/article/003470.htm>
19. www.healthline.com/health/alp
20. <https://en.wikipedia.org/wiki/Bilirubin>
21. medlineplus.gov › Medical Encyclopedia
22. www.urmc.rochester.edu › Encyclopedia
23. <https://labtestsonline.org/understanding/analytes/ggt/tab/test/>
24. https://en.wikipedia.org/wiki/Gamma-glutamyl_transpeptidase
25. Pratt D.S. Liver chemistry and function tests. In: Feldman M., Friedman L.S., Brandt L.J., eds. *Sleisenger & Fordtran's Gastrointestinal and Liver Disease*. 9th ed. Philadelphia, PA: Elsevier Saunders; 2010, chap73.
26. <https://labtestsonline.org/understanding/analytes/pt/tab/test/>
27. <https://healthengine.com.au/info/INR-Test>
28. Changani K.K., Jalan R., Cox I.J., Ala-Korpel M., Bhakood K., Taylor-Robinson S.D, Bell J.D. Evidence for altered hepatic gluconeogenesis in patients with cirrhosis using in vivo 31-phosphorus magnetic resonance spectroscopy. Gut 2001, 49: 557-564
29. www.nhs.uk/Conditions/LDH/Pages/Introduction.aspx
30. [www.mayomedicallaboratories.com/test-catalog/Clinical + and + Interpretive / 8344.](http://www.mayomedicallaboratories.com/test-catalog/Clinical+and+Interpretive/8344)

Source of support: Nil, Conflict of interest: None Declared