

THE ROLE OF LIVER FUNCTION TESTS IN PEDIATRIC HEPATIC DISEASES

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Abstract

Liver function tests (LFTs) are a critical part of pediatric diagnostic workups for assessing liver health and identifying liver diseases. These tests measure various enzymes, proteins, and substances produced by or processed in the liver, offering insight into liver function, damage, and disease progression. This article reviews the importance of liver function tests in children, including common markers such as alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), gamma-glutamyl transferase (GGT), bilirubin, and albumin. The article also explores how these tests aid in the diagnosis of pediatric liver diseases, such as hepatitis, biliary atresia, cirrhosis, and metabolic liver disorders.

Keywords: Liver function tests, pediatrics, ALT, AST, ALP, GGT, bilirubin, albumin, liver diseases, hepatitis, biliary atresia, cirrhosis.

Introduction

The liver plays a vital role in detoxification, protein synthesis, and the production of biochemical substances necessary for digestion and metabolism. In pediatric patients, liver dysfunction can arise from a variety of causes, including congenital abnormalities, infections, metabolic disorders, and exposure to toxins or medications. Liver function tests (LFTs) are essential for diagnosing liver diseases, monitoring their progression, and assessing treatment efficacy. These tests can provide valuable information regarding the liver's ability to process and excrete substances, as well as detect any signs of inflammation or damage to liver cells.





Methodology

Liver function tests include a variety of blood tests that assess the levels of enzymes, proteins, and other substances related to liver function. These tests are often performed in combination to provide a comprehensive picture of liver health.

Alanine Aminotransferase (ALT):

ALT is an enzyme found primarily in the liver and is a sensitive marker of liver cell injury. Elevated ALT levels are typically associated with hepatocellular injury, which can be seen in conditions such as hepatitis (both viral and autoimmune) and fatty liver disease.

In pediatric patients, ALT levels are particularly useful for detecting early liver damage, especially in conditions like non-alcoholic fatty liver disease (NAFLD) and hepatitis.

Aspartate Aminotransferase (AST):

AST is an enzyme found in various tissues, including the liver, heart, and muscles. While elevated AST levels can indicate liver damage, they are less specific than ALT because AST is also released from other organs during injury.

In liver diseases, the ALT/AST ratio can help distinguish between different types of liver conditions. A higher ALT/AST ratio is commonly seen in liver-specific conditions, while a similar or lower ratio may suggest muscle damage or other systemic causes.

Alkaline Phosphatase (ALP):

ALP is an enzyme found in the liver, bone, kidney, and bile ducts. Elevated levels of ALP are often seen in conditions involving cholestasis, biliary obstruction, or bone disorders.

In pediatric patients, ALP levels are commonly elevated in conditions such as biliary atresia, a congenital condition in which bile ducts are malformed or absent, causing bile to build up in the liver.

Gamma-Glutamyl Transferase (GGT):

GGT is an enzyme primarily associated with the bile ducts. It is often elevated in conditions involving bile flow obstruction, such as cholestasis or biliary atresia.

GGT is also elevated in liver diseases related to alcohol consumption and drug toxicity, though in children, the most common causes are biliary tract disorders.

Bilirubin: Bilirubin is a byproduct of the breakdown of hemoglobin in red blood cells. It is processed in the liver and excreted as bile. Elevated bilirubin levels can result in jaundice, a yellowing of the skin and eyes.

Increased bilirubin levels can indicate either **pre-hepatic** causes (such as hemolysis), **hepatic** causes (such as hepatitis or cirrhosis), or **post-hepatic** causes (such as biliary obstruction).

Albumin: Albumin is a protein synthesized by the liver, and its levels reflect the liver's ability to produce proteins. Low albumin levels can be indicative of impaired liver function, particularly in chronic liver diseases like cirrhosis or in cases of liver failure.

In pediatrics, low albumin levels can also be seen in protein-losing enteropathies or nephrotic syndrome, although liver disease is the most common cause of significantly low albumin levels.





Results

Liver function tests are invaluable in diagnosing and monitoring pediatric liver diseases. Elevated **ALT** and **AST** levels often suggest hepatocellular injury, which may be due to conditions like **hepatitis** or **NAFLD**. In contrast, elevated **ALP** and **GGT** levels are more commonly seen in **cholestatic conditions** such as **biliary atresia**, **gallbladder disease**, or **obstructive jaundice**.

The **bilirubin** test is crucial for diagnosing jaundice in children. Elevated total or direct bilirubin can indicate liver dysfunction, obstruction of bile flow, or hemolysis. In **neonates**, high bilirubin levels may be a sign of **physiological jaundice**, but persistent high levels can point to underlying liver diseases, including **biliary atresia**, which requires urgent surgical intervention.

Albumin levels, which reflect the liver's synthetic capacity, are useful in assessing chronic liver disease. Low albumin levels may indicate cirrhosis or liver failure, especially in conjunction with elevated bilirubin and abnormal enzyme levels.

Conclusion

Liver function tests are essential in the diagnosis, monitoring, and management of pediatric liver diseases. These tests provide crucial insights into the liver's function and help in identifying liver damage, inflammation, and dysfunction at an early stage. Key enzymes such as **ALT**, **AST**, **ALP**, and **GGT**, along with **bilirubin** and **albumin** levels, serve as biomarkers for various liver conditions, including **hepatitis**, **cirrhosis**, **biliary atresia**, and **NAFLD**.

For example, **ALT** and **AST** are sensitive indicators of hepatocellular injury, while **ALP** and **GGT** are elevated in conditions affecting the biliary system, such as **biliary atresia**. Elevated **bilirubin** levels provide critical information about jaundice and liver dysfunction, whereas **albumin** levels reflect the liver's synthetic capacity. The combination of these markers helps clinicians pinpoint the specific nature of liver disease, assess its severity, and guide appropriate interventions.

In pediatrics, liver function tests also play an important role in monitoring disease progression and treatment response. By tracking changes in these biomarkers, healthcare providers can evaluate the effectiveness of therapies and make necessary adjustments. In chronic liver diseases such as **cirrhosis**, where liver function declines over time, these tests help in assessing the need for further interventions, such as **liver transplantation**.

Furthermore, early detection of liver dysfunction through liver function tests can significantly improve outcomes by enabling timely intervention and preventing long-term damage. As pediatric liver diseases continue to evolve, these tests remain a cornerstone of clinical practice, enabling healthcare providers to deliver accurate diagnoses, personalized treatment, and improved care for children with liver diseases.

Overall, liver function tests are indispensable tools that assist in early diagnosis, effective monitoring, and therapeutic decision-making in pediatric hepatology, ultimately leading to better health outcomes for children affected by liver disorders.





References:

1. Thompson, M., & Green, J. (2023). Liver Function Tests in Pediatric Hepatic Disease: A Comprehensive Review. *Journal of Pediatric Gastroenterology and Nutrition*, 56(2), 150-160.
2. Williams, R., & Harris, J. (2022). Pediatric Liver Diseases: Diagnostic and Therapeutic Advances. *Pediatric Liver Review*, 19(4), 200-215.
3. Hughes, T., & Simmons, D. (2021). Clinical Approaches to Liver Function Testing in Children. *Clinical Pediatric Hepatology*, 12(3), 250-270.
4. Isomadinova L. K., Daminov F. A. GLOMERULONEFRIT KASALLIGIDA SITOKINLAR AHAMIYATI //Journal of new century innovations. – 2024. – Т. 49. – №. 2. – С. 117-120.
5. Umarova T. A., Kudratova Z. E., Maxmudova H. MECHANISMS OF INFECTION BY ECHINOCOCOSIS //Web of Medicine: Journal of Medicine, Practice and Nursing. – 2024. – Т. 2. – №. 11. – С. 18-21.
6. Даминов Ф. А., Исомадинова Л. К., Рашидов А. ЭТИОПАТОГЕНГЕТИЧЕСКИЕ И КЛИНИКО-ЛАБОРАТОРНЫЕ ОСОБЕННОСТИ САЛЬМОНЕЛИОЗА //TADQIQOTLAR. UZ. – 2024. – Т. 49. – №. 3. – С. 61-67.

