The Importance of Laboratory Testing for Hepatitis A Virus

Noura.K.Fallata[1], Manal.A.Sheghdar[2], Taghreed.M.Alsenbesi[3], Naif.M.Almehmadi[4], Ayman.M.Tayeb[5], Eman.A.Felemban[6], Hani.Y.Mahrof[7], Khaled.M.Alshehri[8], Amro.D.Alqurashi[9], Arwa.H.Alahmadi[9]

Laboratory specialist at Al-Buhairat PHC[1]
Laboratory technician at Al takassie PHC[2]
Laboratory specialist at Maternity and Children's Hospital in Dammam[3]
Laboratory specialist at Al Quwayiyah PHC[4]
Laboratory specialist at the regional laboratory in Mecca[5]
Laboratory specialist at King Abdulaziz Hospital in Jeddah[6]
Laboratory specialist at East Jeddah Hospital[7]
Laboratory technician at the regional laboratory in Mecca[8]
Laboratory specialist at the regional laboratory in Mecca[9]

Abstract

This study aims to what is the importance of hepatitis A virus, what is the role of laboratory testing in detecting or diagnosing hepatitis A virus, how is hepatitis A virus transmitted to humans. A questionnaire was prepared via Google Drive and distributed to the population aged 25-55 years, men and women, in the city of Mecca and Jeddah Governorate. As for the questionnaire, it was distributed via the social networking program (WhatsApp), 650 questionnaires were distributed, and 630 responses were obtained via email to the principal researcher.

Keywords: The importance, of laboratory testing for hepatitis A, virus.

The disease described as “jaundice” in ancient Greek, Roman, and Chinese literature probably was viral hepatitis. A viral etiology was postulated as the cause of certain forms of jaundice as early as 1912, and the term “infectious hepatitis” was used because the disease often occurred in epidemics (1). Hepatitis A, a term first introduced by Krugman et al. in 1967 (2), is now known to be caused by infection with hepatitis A. virus (HAV), one of five viruses, each belonging to a different family, whose primary site of replication is the liver. Early epidemiological studies further characterized hepatitis into infectious and serum forms, based on patterns of disease transmission (3, 4, 5, 6, 7). Epidemiologic and transmission studies with humans showed that infectious hepatitis, or hepatitis A, was transmitted primarily by the fecal-oral route (8, 9, 10). In 1973, HAV was identified in the stools of infected persons (11), which eventually led to development of diagnostic tests, propagation in cell culture, molecular characterization, and development of a vaccine (11, 12), the

pathogenetic events that occur during HAV infection have been determined in experimental infection of nonhuman primates and natural infection of humans. HAV is primarily hepatotropic; it replicates in the liver, produces a viremia, and is excreted in bile and shed in the stools of infected persons. Feces can contain up to 109 infectious virions per gram and is the primary source of HAV infection (13, 14). Peak fecal excretion, and hence infectivity, occurs before the onset of jaundice, symptoms, or elevation of liver enzymes (13, 14) and declines after jaundice appears. Compared to adults, children and infants can shed HAV for longer periods, i.e., up to several months after the onset of clinical illness (15, 14). Fecal shedding of HAV has been shown to occur as late as 6 months after diagnosis of infection in premature infants (16). Viremia occurs within 1 to 2 weeks after HAV exposure and persists through the period of liver enzyme elevation, based on studies in humans and experimentally infected chimpanzees (17, 18, 19, 9, 20, 21). Virus concentrations in serum are 2 to 3 log10 units lower than those in stool (22, 18, 20). An analysis of serum specimens collected prospectively during human and chimpanzee HAV infection showed that HAV RNA was present for 3 to 4 weeks before the onset of jaundice and that virus concentrations were highest during the period that precedes onset of liver enzyme elevations (22) A humoral immune response to HAV structural proteins occurs prior to onset of symptoms. Immunoglobulin M (IgM) antibodies to HAV (IgM anti-HAV) are detectable at or prior to onset of clinical illness, decline in about 3 to 6 months, and become undetectable by commercially available diagnostic tests (23). IgG antibodies to HAV (IgG anti-HAV) appear soon after IgM, persist for years after infection, and confer lifelong immunity (24). IgA is also produced during infection for a limited time (25,26). The role of IgA antibodies in the response against HAV is still unknown. Unlike other Picornaviridae family members, HAV does not seem to elicit an effective intestinal immune response (27). IgG and IgA anti-HAV are detected in serum, saliva, urine, and feces (28,29,30,31,32,26,33,34,35,36). Saliva tests have been reported as an alternative to conventional serum testing for anti-HAV due to their simplicity of sample collection (30,33,34). Several studies have demonstrated the benefits of implementing saliva testing as screening tool in outbreak investigations and epidemiological studies (35,30,36). However, the sensitivity of detecting anti-HAV in saliva is 1 to 3 log10 units lower than that with serum (37,33,34; CDC, unpublished data). Antibodies against nonstructural proteins are also produced, although their role in maintenance of immunity is probably less important than that of antibodies to capsid antigens due to their low concentration and lack of neutralization capacity. Antibodies to nonstructural proteins have been detected in humans and experimentally infected chimpanzees but are absent in vaccinated individuals (38,39). However, because of what appears to be a variable host antibody response during HAV replication, a diagnostic test for these antibodies, which could be used to complement current anti-HAV testing and differentiate previously infected from vaccinated persons, has not been developed (40,41) HEPATITIS A VIRUS HAV is a nonenveloped RNA virus 27 to 32 nm diameter in size, with an icosahedral symmetry, which belongs to the genus Hepatovirus of the Picornaviridae family. Unlike other members of the family, HAV requires a long adaptation period to grow in cell culture, replicates slowly, and rarely produces a cytopathic effect (42,43,44,). HAV is stable in the environment for at least 1 month (45) and is more resistant to heating and chlorine inactivation than is poliovirus. Inactivation of HAV (46), and a large number of HAV isolates have been characterized by sequencing of short genome segments.

Material and Methods:

The study began in (In the city of Mecca and Jeddah Governorate in the Kingdom of Saudi Arabia), and the study ended with writing the data collection in September 2024. The researcher used descriptive analysis, an approach that uses quantitative or qualitative description of the social phenomenon (The importance of laboratory testing for hepatitis A virus). The independent variable (Percentage of the presence of this type of epidemic virus globally) and the dependent variable (Percentage of the presence of this type of epidemic virus locally). This type of study is characterized by analysis, reason, objectivity, and reality. It is also concerned with individuals and societies, as it studies the variables and their impact on the health of the individual, society, and the consumer, and the spread of diseases and their relationship. For demographic variables such as age, gender, nationality, and marital status. Status and occupation (47), and use the Excel 2010 Office suite pie chart to sort the results (48). The questionnaire is a wonderful and useful tool for collecting a huge amount of data, but the researchers were not able to conduct personal interviews with the participants in the online survey, due to social distancing rules at the time to prevent infection between participants and researchers and vice versa (Coronavirus sharing has not completely disappeared. of the community), and the questionnaire was only answered electronically, because the questionnaire consists of fifteen questions, all of which are closed-ended.

Results and discussion:

The percentage of approval to participate in the questionnaire (the importance of laboratory testing for hepatitis A virus) was 100%, the percentage of ages of participants in the questionnaire was equal, from 25-44 years old, amounting to 20%, while the percentage of ages from 45-55 years amounted to 60%, and their gender was 40% male and 60% female, and all their nationalities were Saudi men and women. As for their professions, housewives were 20% and 80%. Male and female government employees. As for their educational status, 20% are secondary school and 80% hold a bachelor's degree. As for their responses to the questionnaire questions, they were as follows: First question: Do laboratory tests help determine the presence of infectious diseases such as bacterial and viral infections? the second question: Can blood tests reveal the presence of antibodies or specific disease factors that indicate the presence of infection? The third question: The comprehensive laboratory tests that are routinely performed in hospitals and laboratories include a group of tests that evaluate the body's general health? Question Four: Comprehensive examinations help diagnose the patient's condition and early detect diseases as soon as they exist or occur? Question Five: The liver may be damaged by the virus before it causes signs and symptoms to appear in the patient? Yes, 80% and 20%, No. Sixth question: Can simply analyzes and tests help in avoiding complications? the diagnosis is made through a blood laboratory test to determine the presence of antibodies to viruses? Eighth question: Liver function is examined by taking a blood sample in order to examine the level of certain compounds in the blood that may indicate the presence of inflammation or damage to the liver? Question nine: the examination is done by taking a blood sample, usually from a vein in the arm, and sending it to a laboratory for examination? Last question: For prevention, you must eat enough foods and liquids and follow a balanced diet? All previous questions were answered 100% yes. (table:no-1)

Table:no-1: The importance of laboratory testing for hepatitis A virus according to participates

The importance of laboratory testing for hepatitis A virus	Yes	No	I don't know
Laboratory tests help determine the presence of infectious diseases such as bacterial and viral infections.	100%	0%	0%

Comprehensive examinations help diagnose the patient's condition and early detect diseases as soon as they exist or occur	100%	0%	0%
The liver may be damaged by the virus before it causes signs and symptoms in the patient?	80%	20%	0%
Diagnosis is through a blood laboratory test to determine the presence of antibodies to viruses?	100%	0%	0%

There is a study entitled (Diagnosis of Hepatitis A Virus Infection: a molecular Approach) Omana V. Nainan et al. in 2006(49), mentioned that Molecular diagnostics should be more widely used evaluating the effectiveness of vaccination against hepatitis A as a disease Infection rates are falling to very low levels. Because of high for asymptomatic HCV infections, nucleic acid amplification techniques will be needed to determine their prevalence In which an unidentified infection occurs. In addition, it will be very important for characterizing the genetic makeup of HAV of immunized people who may subsequently become infected. Such investigations would identify the potential emergence of antibody-resistant mutations, which may have the advantage of selective transmission in immunized populations with infection. Continuous exposure to HAV.

Conclusion:

Laboratory tests help determine the presence of infectious diseases such as bacterial and viral infections. 100%, comprehensive examinations help diagnose the patient's condition and early detect diseases as soon as they exist or occur 100%, the liver may be damaged by the virus before it causes signs and symptoms in the patient? 80%, diagnosis is through a blood laboratory test to determine the presence of antibodies to viruses?100%. it is concluded that the importance of early laboratory diagnosis of hepatitis A virus.

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