

Serological Diagnosis of Hepatitis A Virus Among Children with Acute Viral Hepatitis in AL-Kut City

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Abstract

In this study, 150 blood samples were randomly collected from patients (non-immunized children) with clinical suspect of acute viral hepatitis of age groups ranging from 1-15 years of both genders who were admitted to the Al-Karama Educational Hospital, during the period from August (2018) to January (2019) in AL-Kut City.

Every one of the 150 blood samples were testicles for determination of hepatitis an infection by serological, and biochemical tests. Likewise, 50 blood samples were taken from normal healthy individuals who were involved as a control group.

Anti-HAV IgG antibody was detected and observed in that 78 out of 150 samples (52%). Some biochemical tests were utilized as a confirmation test of hepatitis A virus an infection, and to estimate the levels of some biochemical markers such as total serum bilirubin (TSB), alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP), The results showed that a mean \pm standard deviation (SD) of TSB, ALT, AST, and ALP were 13.387 ± 6.812 , 771.982 ± 14.281 , 697.146 ± 13.734 and 331.659 ± 8.38 , respectively.

On the other hand, hepatitis A virus is increasingly normal in children (47.4%), who age groups are (6–10) years, while it was appear to be practically identical (25.6%) and (26.9%) in children who age groups are (1–5) and (11–15) years respectively.

Furthermor, the results showed that both sexes had been affected with hepatitis A virus with preference of male (70.5%) from female (29.5%).

Keywords: *Hepatitis A virus, Viral hepatitis, Serological tests, Laboratory liver test.*

I. INTRODUCTION

Hepatitis A virus (HAV) infection, as a significant public health problem. It is estimated as approximately 1.4 million cases of HAV infection happen each year worldwide ^[1], but a day the infection rate is likely as much as ten times higher ^[2]. The infection with this virus happens worldwide with more prevalence in low socioeconomic region ^[1,3], poor hygiene, and directly related to overcrowding regions where sterile, clean and hygienic conditions are not well maintained ^[4].

The word hepatitis indicates an illness or inflammation of the hepatocytes, that can be confirmed by unusual liver function tests (LFTs) ^[5]. Viral hepatitis is caused by any of no under five specific viruses ^[6]. Hepatitis A virus (HAV) is a typical reason for intense viral hepatitis and has a general spread far and wide and for the most part in the world as developing countries that occurs in epidemic and sporadic forms. It is a non-wrapped single-stranded RNA virus which is organized as a member from the genus Heparnavirus in Picornaviridae family ^[7].

In Iraq, there is a hyperendemic infection of HAV is with a native estimation of IgG sero-prevalence rate of 98% in the fifth decade and older age groups ^[8]. Fecal–oral route is the main mode of disease transmission, it happen either by direct contact with an infected individual with hepatitis A virus or by ingestion of contaminated food or water with the virus ^[9,10]. HAV Infection would cause an acute viral disease characterized by fever, increased levels of amino transferase enzymes, abdominal pain, and jaundice ^[11]. An asymptomatic course has for the most part occurred in children while in adults the clinical symptoms are increasingly regular ^[12]. It is normally an infection of childhood that is progressively ordinary under conditions of poor cleanliness and crowding ^[13].

Diagnosis of HAV infection dependent on clinical appearances is not possible ^[14]. However, evaluation of Immunoglobulin (Ig) antibody to HAV has been proposed for finding of HAV infection. IgM anti-HAV anti-body

emerges (1–2) weeks after introduction to infection and vanishes after (3–6) months, and the diagnose of acute phase of HAV infection can be possible. Positive results for testing Anti-HAV IgG antibody as well as indicates past history of HAV disease [15].

The aims of this study were to diagnosis of hepatitis A virus in the general children population with acute viral hepatitis disease, and determine the age-specific seroprevalence of HAV among children population who age groups between (1 and 15) years in AL-Kut City.

II. MATERIAL AND METHOD

Blood samples (5 ml) were collected from 150 randomly selected patients (non-immunized children) suffering from acute viral hepatitis of age extending from (1– 15) years of both genders (105 male and 45 female) who were attended to the Al-Karama Educational Hospital, and 50 blood samples were taken from normal individuals as a control group, during the period from August (2018) to January (2019) in AL-Kut City.

Laboratory Diagnosis

Serological Tests

Serum samples of 150 subjects were separated by centrifugation at 5,000 rpm for five minutes and stored at -20 °c until use. Then serum Anti-HAV IgG antibody was estimated by Enzyme-linked immunosorbent assay (ELISA) using the commercially available (Cobas e411, Roche) (Germany), according to the manufacturer’s instructions.

Biochemical Tests

Serum samples that positive for anti-HAV antibody were submitted for specific biochemical tests to achieve the last identification. These tests including, total serum bilirubin (TSB), alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP), by using Roch Cobas C111(Germany). Data were analyzed using commercially available software (SPSS Version 18).

III. RESULT

A total of 150 serum samples of both sexes suffering from acute viral hepatitis, it was found that 78 samples showed positive results for anti-HAV IgG antibody, and 72 samples showed negative results for anti-HAV antibody , as shown in the table (1)

Table (1): Distribution of serum samples according to the results of anti-HAV IgG antibody in patients

Results	No. of samples	Gender		Percentage %
		Male	Female	
Positive test	78	55	23	52
Negative test	72	50	22	48
Total	150	105	45	100

All 78 hepatitis A virus-positive samples from patients (males and females) of age groups ranging from (1-15) years were taken. The results were shown in table (2)

Table (2): Distribution of studying samples according to age groups

Age groups (years)	No. of patients %	Gender	
		Male	Female
1 – 5	20 (25.6%)	13	7
6– 10	37 (47.4%)	26	11
11– 15	21 (26.9%)	16	5
Total	78	55 (70.5%)	23 (29.5%)

From the results in table (2), indicated that hepatitis A virus is common in children (47.4%), who age groups are (6– 10 years), while it was seem to be identical (25.6%) and (26.9%) in children who age groups are (1–5) and (11–15) years respectively.

Furthermor, the results showed that both sexes had been affected with hepatitis A virus with preference of male (70.5%) from female (29.5%).

Moreover, the results in table (3) TSB level was significantly raised in viral hepatitis. The levels being 13.387 ± 6.812 as compared to healthy control 0.563 ± 0.084 . ALT level was significantly raised in viral hepatitis 771.982 ± 14.281 , but in healthy control was 15.273 ± 4.371 . In addition, The AST and ALP levels were significantly raised in viral hepatitis, the levels being 697.146 ± 13.734 and 331.659 ± 8.38 as compared to normal control 14.148 ± 6.372 and 51.178 ± 12.412 respectively.

Table (3): Enzymes value (Mean \pm SD) for patients with viral hepatitis and healthy control

Subjects	Mean \pm SD				P-value
	TSB Mg/dl	ALT U/I	AST U/I	ALP U/I	
Patients (n = 78)	13.387 ± 6.812	771.982 ± 14.281	697.146 ± 13.734	331.659 ± 8.38	P < 0.05*
Healthy control (n = 50)	0.563 ± 0.084	15.273 ± 4.371	14.148 ± 6.372	51.178 ± 12.412	

S.D Standard Deviation, * Significant

IV. DISCUSSION OF RESULTS

HAV is a major public health problem worldwide, the geographical patterns of HAV infection vary greatly, not only between countries as well as inside every country [16].

In this study, there are two methods were utilized to detect HAV infection including: serological method by identifying anti-HAV IgG antibody, and biochemical investigation of the serum tests as a confirmation test of HAV infection, includes levels of serum TSB, ALT, AST, and ALP.

Likewise, in this study the results demonstrated that hepatitis A virus increasingly normal in children (47.4%), who age groups are (6– 10) years, while it was appear to be practically identical (25.6%) and (26.9%) in children who age groups are (1 – 5) and (11– 15) years respectively, Table (2). On the other hand, and related to gender the table demonstrated that most of cases were male (70.5%).

These results corresponded to the results recorded in Pakistan by ^[17] who found that the high level of hepatitis A sero conversion was found in children and this viral infection represents practically 50% – 60% of all instances of acute viral hepatitis in children.

Different past study in Delhi,, Indian researchers demonstrated that 80% of subjects up to 5 years of age were HAV Ab positive ^[18].

On the other hand, in Syria, researchers reported that a rate of HAV infection (50.0%) and (95.0%) were found in the (1–5) year and (11–15) year age groups, respectively ^[19].

Turkey has been reported to be a middle endemic area in terms of HAV infection ^[20]. A study carry out in western Turkey reported that a prevalence rate of (44%) among (711) children and adolescents who age gathering ranging between 2 –16 years ^[21].

Laboratory liver tests are generally characterized as tests helpful in the assessment and treatment of patients with hepatic dysfunction. The liver carries out metabolism of certain substances including carbohydrate, protein and fats. The end products of the metabolic pathway and some of the enzymes which are very sensitive for the abnormality happened might be considered as biochemical marker of liver dysfunction ^[22]. Some of the biochemical markers of viral acute hepatitis such as total serum bilirubin (TSB), alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP) are considered in this study, and the rate of change in these markers helps in the investigation of the infection.

From the data recorded in this study, it was noticed that TSB, ALT, AST, and ALP levels were significantly raised in patients with viral hepatitis as compared to healthy control. This study also confirmed that among patients of viral hepatitis ALT level is greater than AST level (Table 3). These findings are consistent with an investigation done by ^[23] who detailed that AST, ALT ALP levels were significantly raised in viral hepatitis, and ALT level is greater than AST level.

REFERENCE

- 1- Lankarani, K.B., Mahmoodi, M., Honarvar, B., Nematollahi, P., Zamiri N, and Ghaffarpassand, F. (2014). Determinants of poor outcome in patients with hepatitis A infection: a four-year retrospective study in Shiraz, Southern Iran. *Arch. Virol.*, 159(8):1901-1907.
- 2- Wu, D., and Guo, C.Y. (2013). Epidemiology and Prevention of Hepatitis A in Travelers, *J. Travel. Med.*, 20(6):394-399
- 3- Jamali, R. (2014). Epidemiologic Studies on Viral Hepatitis: A Short Review. *Thrita.*, 3(1).
- 4- CDC. (2013). Hepatitis A. Atlanta: Centers for Disease Control and Prevention , Available from:<http://wwwnc.cdc.gov/travel/yellowbook/2014/chapter-3/infectious-diseases-related-to-travel/hepatitis-a>.
- 5- Hall, G.F. (2007). Hepatitis A, B, C, D, E, G: An update, *Ethnicity & Disease.*, 17(2):40-45.
- 6- Daniels, D., Grytdal, S., and Wasley, A. (2009). Surveillance for Acute Viral Hepatitis -United States, Centers for Disease Control and Prevention., 58 (SS-3): 1-27.
- 7- Roushen, M., Bijani, A., Sagheb, R., and Jazayer, O. (2007). Prevalence of hepatitis A IgG in individuals with chronic hepatitis B infection in Babol. *Eastern Mediterranean Health Journal*, 13(5).

- 8- Turkey, A.M., Akram, W., Al-Naaim, A., Omer, A.R., and AL-Rawi, J.R. (2011). Analysis of Acute Viral Hepatitis (A and E) in Iraq, *Global Journal of Health Science*, 3(1):70-76.
- 9- Chaudhry, S.A., Verma, N., M., and Koren, G. (2015). Hepatitis A infection during pregnancy, *Canadian Family Physician*, 61(7):607-608.
- 10- Wheeler, C., Vogt, T.M., Armstrong, G.L., Nainan, O.V., Dato, V., Xia, G., Waller, K., Amon, J., Lee, T.M., et al. (2005). An Outbreak of Hepatitis A Associated with Green Onions, *N. Engl. J. Med.*, 353(9):890-897.
- 11- Collier, M. G., Khudyakov, Y. E., Selvage, D., Adams-Cameron, M., Epton, E., Cronquist, A., et al. (2013). Outbreak of Hepatitis A Associated with Frozen Pomegranate Arils Imported from Turkey—Multiple U. S. States, *Centers for Disease Control and Prevention*.
- 12- Rafeey, M., and Shoaran, M. (2014). Prevalence and risk factors of Hepatitis A in children in Tabriz, Iran, *JARCM*, 2(4):183-186.
- 13- Shavakhi, A., Somi, M.H., Farhang, S., Majidi, G., Majidi, T., and Pouri, A.A. (2008). Prevalence of hepatitis A in Iranian patients with chronic liver disease, *Iranian Journal of Clinical Infectious Diseases*, 3(4):189-192.
- 14- Acheson, D., and Fiore A.E. (2004). Hepatitis A transmitted by food. *Clin Infect Dis.*, 38(5):705-715.
- 15- Moghaddam, M. A. (2005). Hepatitis A virus: a major global public health problem, especially in developing countries. *Hepat Mon.*, 5(4):145-149.
- 16- Alavian, S.M. (2005). Iraq: a hot zone for HAV infection? *Hepat Mon.*, 5:53-56.
- 17- Shah, U., Habib, Z., and Kleinman, R.E. (2000). Liver failure attributable to hepatitis-A virus infection in a developing country. *Pediatrics.*, 105: 436-438.
- 18- Dutta, A.K., Aggarwal, A., Kapoor, A.K., Ray, G.N., Batra, S. (2000). Seroepidemiology of hepatitis A in Delhi. *Indian J Pediatr.*, 67:77-79.
- 19- Antaki, N., Kebbewar, M.K. (2000). Hepatitis A seroprevalence rate in Syria. *Trop. Doct.*, 30:99-101.
- 20- Erdogan, M.S., Otkun, M., Tatman-Otkun, M., Akata, F., and Ture, M. (2004). The epidemiology of hepatitis a virus infection in children, in Edirne, Turkey. *Eur. J. Epidemiol.*, 19:267-273.
- 21- Yapicioglu, H., Alhan, E., Yildizdas, D., Yaman, A., and Bozdemir, N. (2002). Prevalence of hepatitis A in children and adolescents in Adana, Turkey. *Indian Pediatr.*, 39:936-941.
- 22- Gowda, S., Desai, P.B., Hull, V.V., Math, A.A., Vernekar, S.N, and Kulkarni, S.S. (2009). A review on laboratory liver function tests. *Pan Afr Med J.*, 22:3-17.
- 23- Hyder, A., Hasan, M., and Mohieldein, A.H. (2013). Comparative levels of ALT, AST, ALP and GGT in liver associated diseases. *Eur. J. Exp. Biol.*, 3(2):280-284.