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Prevalence of Hepatitis B Virus among Adolescence in Azadi Teaching Hospital in Kirkuk\Iraq

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Abstract: Hepatitis B virus (HBV) is an enveloped DNA virus which causes hepatitis B infection in the world. It is mainly passed on by coming in contact with infectious body fluids especially blood and mucosal secretions. Hepatitis B is a systemic infection; its main location of viral replication is the liver; the disease is characterized by fever, jaundice, and the gastrointestinal tract.

The major aim of the current research is to evaluate prevalence and distribution of HBV among adolescent population.

Ninety-seven samples were collected among adolescent patients in Azadi Teaching Hospital between the months of June and October 2025 to identify the prevalence of HBV.

Serological analysis of blood was done to identify hepatitis B surface antigen (HBsAg) by enzyme linked immunosorbent assay (ELISA). Out of the 97 sample in study, 26 were positive in HBsAg, which was a prevalence of 26.8. Most of the carriers were male (64⁝¹) and a significant percentage 83.5 was metropolitan. The age of the participants was between 11-19 years. The statistics show that the risk of someone to contract hepatitis B is statistically significant among male population than it is among women, which could be explained by cultural-oriented activities that expose more men to outdoor activities and consequently to potentially contaminated objects or infected people.

Most of the subjects of this study were urban residents, a trend that accounts to similar studies that have been done in other places. Despite the fact that blood transfusion is one of the unavoidable aspects of modern healthcare, blood transfusion is not always free of any infectious agents which can be transmitted. The use of non-sterile injection needles and exposure to risky tattooing or piercing activities also increase the prevalence rates of hepatitis B among the adolescents. Therefore, the effectiveness of preventive strategies can be undermined when the target population is not properly informed on the risks of acquiring hepatitis B virus (HBV) that are associated with it.

In order to curb the prevalence of HBV, it is of urgent importance that all people should be properly vaccinated and be well aware of the potential dangers of the virus.

Keywords: Hepatitis B, adolescence, DNA virus, blood transfusion.

Introduction

Hepatitis is a systemic pathology, in which liver forms the main site of viral replication (1). Hepatitis B virus (HBV) is a double stranded DNA virus, which belongs to the family of Hepadnaviridae (2). Its genomic composition is partly double-stranded, surrounded by a

nucleocapsid that harbours hepatitis B surface antigen- the major diagnostic host in active infection (3). The replication of HBV is limited to hepatic tissue only; therefore, any exposure of even small amounts of blood or body fluids can predispose an infected person to infection in the mucosa or through parenteral routes (4). The main points of infection include unprotected sex, intravenous drugs, transfusion of blood products, dialysis, tattooing, needlestick injuries, and mother-to-child transmission (5).

Most immunocompetent adults who contract the hepatitis B virus (more than 95 percent) clear the infection by themselves. As a clinical presentation, these patients can either develop an acute and symptomatic disease or all but asymptomatic with infection only being diagnosed during a regular HBV screening. The clinical presentation range is both acute and chronic. During the acute stage, patients can develop subclinical/anicteric hepatitis, icteric hepatitis or, but rarely, fulminant hepatitis. The disease can be either an asymptomatic carrier state in chronic setting, chronic hepatitis, cirrhosis or hepatocellular carcinoma (6).

In the infection of the hepatitis B virus (HBV), the pathogenesis of hepatocellular disease is mainly due to the action of immune mechanisms; however, in some situations HBV may also cause direct cytotoxic effect on the tissue of the liver. The expression of hepatitis b surface antigen (HBsAg) and other nucleocapsid proteins on the surface of the infected hepatocytes are antigens inducing cytotoxic T lymphocyte to carry out T cellular lysis of HBV-infected cells (7). In response, hepatitis clinical diagnosis is determined by an extensive biochemical examination of liver functioning. A baseline laboratory test might include total and direct bilirubin, alanine aminotransferase (ALT), aspartate aminotransferase(AST), alkaline phosphatase (ALP), serum total protein, albumin, globulin, a complete blood count, erythrocyte sedimentation rate (ESR), and coagulation profile.

Diagnosis of viral hepatitis B is done by identifying specific serological antigens or antibodies in the serum of the affected patients (1).

The diagnosis of the chronic hepatitis B infection begins with the systematic review of the medical history of the patient, and the physical examination and in-depth examination of the hepatic disease activity occur. Besides this, serological hepatitis B markers must be interpreted with care, including hepatitis B surface antigen (HBsAg), core antigen (HBcAg), e antigen (HBeAg), surface antibody (anti -HBs or HBsAb), core antibody (anti -HBc), IgM anti -HBc, and e antibody (anti -HBe). The detection and differentiation of these antigens and antibodies should be paid special attention as it is on the basis of these biomarkers that the accuracy of diagnosis and treatment monitoring are established in managing hepatitis B virus infection (8).

The most frequently used screening test of hepatitis B virus (HBV) is the identification of hepatitis B surface antigen (HBsAg). On the contrary, the monitoring of immunity after recovery or vaccination is optimally indicated by the hepatitis B surface antibody (HBsAb) measurement. The loss of serum HBsAg may be explained by the occurrence of immune containment and prolonged suppression of HBV replication, whereas qualitative identification of HBsAg remains an omnipresent approach to screening and diagnosis of HBV infection (9)(10).

Although active and passive immunization programs are used through an effective vaccine and hepatitis B immunoglobulin, respectively, in control of hepatitis B transmission, the situation has remained a challenge in developing countries due to the lack of a standardized program in the delivery and management of these immunization strategies (11)(12). The hepatitis B vaccine is suggested in the prevention of active infection with the hepatitis B virus (13). The vaccine provides life time immunity; the early estimates put at between eight years the duration of the protection, but more recent research has shown a minimum of 25 years in those individuals who developed a strong immunologic response to the vaccination series (14).

Material and methods

Data collection

A cross-sectional study sample of 97 adolescents recruited in June and October 2025 at Azadi Teaching Hospital was used to determine the prevalence of hepatitis B virus infection. The written informed consent was given by each participant before enrolment. Each subject was interviewed using a structured questionnaire that he or she completed. Face to face interviews were used to collect data and they covered age, sex, residence, and clinical history variables such as previous blood transfusion, dental procedures, general surgery, and tattooing.

Sample collection

A total of 5mL of venous blood was collected in 97 participants and then the samples were centrifuged at 1500 rpm over a period of 3min to separate sera. These serums were either directly assessed to hepatitis B surface antigen (HBsAg) or frozen at -20 o C until further analysis. The serology was then performed on the blood samples to identify HBsAg by a serology test, which was an enzyme-linked immunosorbent assay (ELISA).

Enzyme-linked Immunosorbent Assay (ELISA). The presence of HBsAg was detected in serum samples by an ELISA test using a commercial HBsAg ELISA (BIOVANTION,Beijing,China) kit.

Hepatitis B surface antigen enzyme immunoassay (HBsAg EIA) is a simultaneous sandwich immunoassay, carried out on the solid phase. Coating of the microtiter wells with monoclonal antibodies specific to HBsAg is done. It is then followed by the addition of a serum specimen in the antibody-coated wells, in the presence of enzyme-conjugated polyclonal antibodies. An antibody-HBsAg-antibody-enzyme complex will occur in case of the presence of HBsAg. The plate is then washed until it is free of free material. Lastly, substrate solution is added to the wells and incubation is performed to cause a measurable signal to be elicited.

The concentration of HBsAg in the specimen will be proportional to a blue coloration. This enzymatic substrate reaction can be stopped and the resultant signal may either be observed using the naked eye or measured by using an EIA plate reader at an absorbance wavelength of 450nm (or 630nm) which is directly proportional to the antibody titer in the specimen.

Result

Of the 97 students who were involved in the study, 26 people were positive in the testing of HBsAg and this translates to a prevalence of 26.8 percent. The cohort was male dominated with 64 00 percent of the sample and a high percentage (83.5 00 percent) were living in urban places. The ages of the participants were between 11 and 19 years.

The research included the features and possible risk factors of the subjects in the case of infection with HBV, and the findings were provided in Table 1.

Table 1: Participants characteristics.

Variable	Category	Number (n)	Percentage (%)
Residency	Urban	81	83.5%
	Rural	16	16.5%
Gender	Male	62	64%
	Female	35	36%
Blood transfusion	Yes	12	12.4%
	No	85	87.6%
Dental process	Yes	33	34%
	No	64	66%
General operation	Yes	11	11.3%
	No	86	88.7%

History of tattoos	Yes	6	6.2%
	No	91	93.8%

Positivity was also noted amongst the participants with 17 males (17.60.9) and 9 females (9.40.9). Also, 5 (5.15) individuals have a history of blood transfusion, six (6.20‘) of them had undergone a surgery, nine (9.30‘) of them had their teeth removed, and three (3.10) people had tattoos as shown in Table 2.

Table 2: positivity among participants.

Variables	Positive
Male	(17.6%)
Female	(9.4%)
History of blood transfusion	(5.15%)
Operation	(6.2%)
dental procedures	(9.3%)
Tattoos	(3.1%)

Discussion

Any liver infection is referred to as hepatitis; it has the power to cause serious health issues and in severe cases is fatal. These infections differ in their modes of transmission which eventually result in the deaths relating to cirrhosis and hepatocellular carcinoma. The prevalence of hepatitis B virus (HBV) infection is rather high in Iraq; it is estimated that it is between 0.67 and 1.37 percent (17)(16)(15). In this study prevalence among adolescence male 64% more than in female 36% similar to study performed in Duhok city (18), disagree with (19) in Kurdistan and (20) in Iran in which number of infected adolescence female is higher.

Males were observed to be at a significantly higher risk of having Hepatitis B infection as compared to females which can be assumed to be the result of culturally approved practices that allow men more chances to interact with extramural activities and thus exposing them to contaminated substances or infected people. Also, a greater proportion of HBV among males could be a result of a combination of genetic and hormonal factors such as, it has been established that men are mostly prone to viral infections as compared to women (21).

The majority of participants in our study resided in urban areas as rather than those in the countryside comparable to the research carried out in (19). This fact might be because most of the participants in our study were from urban areas.

Blood transfusion are irreplaceable in modern clinical practice by the reason of their life-saving power, however, the blood used in this kind of practice does not always stay unaffected by transmissible pathogens (22). In this respect, pre-transfusion screening is critical since there is the increased risk of hepatitis B virus infection with dental procedures, surgeries, and tattooing. Since it is virtually impossible to identify all carriers of the asymptomatic HBV and there are natural difficulties in identifying healthcare professionals with the anti-HBs positivity, it is reasonable to introduce a set of strict precautions that would offset the possible transmissions of HBV(23).

Drug use and exposures to subcutaneous piercings or tattoos are two of the behaviors that can be attributed to the prevalence of hepatitis B virus (HBV) in adolescents. These risk factors tend to be revealed in the adolescence period, and, therefore, the preventive actions might not be as effective when young people have insufficient information about the risk of having HBV.

Existing HBV vaccination efforts largely focus on infants and neonates, thus the adolescents who missed the opportunity to be vaccinated at early stages of their lives might still remain unvaccinated.

Even though the conventional perspective puts the highest risk of chronic HBV infection in young children, cases of horizontal infection at younger ages might elude the observation process until later adolescence. Unless such transmission is curbed at an early stage of infancy, the viral burden is most likely to move to the adolescent or early adult phase (24). By increasing the intensity of diagnostic work, the goal of eliminating viral hepatitis can be achieved, which will provide an opportunity to conduct timely tests and holistic care and treatment (25)

Finally, hepatitis B infection is also considered to be one of the major etiological factors that support chronic liver disease in the global perspective. The gamma of the transmission pathways of HBV is multifactorial and a number of modalities are still subjects of scholarly discussion.

Conclusion

As per the current study, the adolescent group was majorly made up of males who lived in urban centers and there were relatively fewer people who had undergone blood transfusion, surgery, dental and tattooing procedures.

In order to develop clinical outcomes and contribute to setting policy-making and management procedures, we need to fill critical gaps in knowledge about prevention, treatment, and management of HBV infection; otherwise, adolescents will be fairly beneficiaries of the proliferation of testing and treatment facilities in the world. Conclusively, to integrate these findings into an effective healthcare system of HBV screening, additional population-based research with larger sample sizes is needed.

Reference

1. Al-Salih M, Abed RE, Samsudin S. Biochemical Assessment as Markers for Diagnosis and Evaluation Hepatitis B Virus (HBV). Al-Qadisiyah J Pure Sci. 2021;26(4):156–68.
2. Saini R, Saini S, Sugandha R. Knowledge and awareness of Hepatitis B infection amongst the students of Rural Dental College, Maharashtra, India. Ann Niger Med. 2010;4(1):18.
3. Gasim GI, Murad IA, Adam I. Hepatitis B and C virus infections among pregnant women in Arab and African countries. J Infect Dev Ctries. 2013;7(08):566–78.
4. Radcliffe RA, Bixler D, Moorman A, Hogan VA, Greenfield VS, Gaviria DM, et al. Hepatitis B virus transmissions associated with a portable dental clinic, West Virginia, 2009. J Am Dent Assoc. 2013;144(10):1110–8.
5. Li C, Wei C, Yang X. Hepatitis B virus: modes of transmission, immune pathogenesis, and research progress on therapeutic vaccines. Explor Dig Dis. 2024;3(6):443–58.
6. Mishra N, Mishra A, Gupta R, Misra BR, Singh R, Behera SP, et al. Evaluation of Viral Hepatitis Prevalence and Associated Risk Factors in a State Prison in India. The Microbe. 2025;100552.
7. Chisari F V, Isogawa M, Wieland SF. Pathogenesis of hepatitis B virus infection. Pathol Biol. 2010;58(4):258–66.
8. Guvenir M, Arikan A. Hepatitis B virus: from diagnosis to treatment. Polish J Microbiol. 2020;69(4):391.
9. Sonneveld MJ, Zoutendijk R, Janssen HLA. Hepatitis B surface antigen monitoring and management of chronic hepatitis B. J Viral Hepat. 2011;18(7):449–57.
10. Larsson SB, Eilard A, Malmström S, Hannoun C, Dhillon AP, Norkrans G, et al. HBsAg quantification for identification of liver disease in chronic hepatitis B virus carriers. Liver Int. 2014;34(7):e238–45.
11. Pattyn J, Hendrickx G, Vorsters A, Van Damme P. Hepatitis B vaccines. J Infect Dis. 2021;224(Supplement_4):S343–51.

12. Hussein NR. Risk factors of hepatitis B virus infection among blood donors in Duhok city, Kurdistan Region, Iraq. Casp J Intern Med. 2018;9(1):22.
13. Hodgens A, Marathi R. Hepatitis B vaccine. In: StatPearls [Internet]. StatPearls Publishing; 2023.
14. Gabbuti A, Romanò L, Blanc P, Meacci F, Amendola A, Mele A, et al. Long-term immunogenicity of hepatitis B vaccination in a cohort of Italian healthy adolescents. Vaccine. 2007;25(16):3129–32.
15. Hussein NR, Musa DH, Hawezy D, Ahmed F, Khalid FK, Naqid IA, et al. A study on the prevalence and the risk factors of Hepatitis B Virus infection in Kurdistan Region, Iraq: a multicenter study. J Contemp Med Sci. 2021;7(5):282–5.
16. Othman RA, Abbas YA. Prevalence of Hepatitis B and C in Thi-Qar province-Iraq from 2015-2019. Eur J Mol Clin Med. 2020;7(2):43–8.
17. Babanejad M, Izadi N, Najafi F, Alavian SM. The HBsAg Prevalence among blood donors from Eastern Mediterranean and Middle Eastern countries: a systematic review and meta-Analysis. Hepat Mon. 2016;16(3):e35664.
18. Abdulrahman M, Shahab F, Khaleel BB, Abdullah IM, Abdulkarim N, Abdulrahman Sr M, et al. Viral hepatitis B and C prevalence and related risk factors among prisons in Duhok City, Kurdistan Region, Iraq. Cureus. 2024;16(11).
19. Hussein NR, Abozait HJ, Naqid IA, Ibrahim NMR, Khalid FK, Musa DH, et al. Risk factors of hepatitis B virus infection in the Kurdistan region of Iraq: A Cross-Sectional Study. Mediterr J Hematol Infect Dis. 2025;17(1):e2025018.
20. Roushan N, Toosi MN, Meysamie A, Esteghamati AR, Hajrassuliha H. Hepatitis B knowledge among Iranian adolescents: a national survey. Iran Red Crescent Med J. 2013;15(12):e11558.
21. Jaillon S, Berthenet K, Garlanda C. Sexual dimorphism in innate immunity. Clin Rev Allergy Immunol. 2019;56(3):308–21.
22. Seo DH, Whang DH, Song EY, Han KS. Occult hepatitis B virus infection and blood transfusion. World J Hepatol. 2015;7(3):600.
23. Lutwick LI. The prevention of hepatitis B transmission in dental practice Larry I. Lutwick, MD.
24. Hussein AH, Ajil ZW. Adolescents' Attitudes Towards Viral Hepatitis Transmission at Secondary Schools. J Curr Med Res Opin. 2024;7(05):2510–20.
25. Kumar M, Pahuja S, Khare P, Kumar A. Current challenges and future perspectives of diagnosis of hepatitis B virus. Diagnostics. 2023;13(3):368.