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Prevalence of hepatitis b virus surface antigen by using (ELISA) technique in Duhok Governorate, Kurdistan Region/Iraq

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***Abstract*---Purpose:** Hepatitis B virus (HBV) infection is a public health problem such as chronic liver diseases, it belongs to family "Hepadnaviridae", It mostly affects humans and a small number of other primates, with a limited host range. Therefore, controlling this harmful virus requires quick detection with great specificity and precision. To assess the ELISA Technique's specificity and accuracy to isolates and Prevalence of Hepatitis B Virus. **Methods**: The study will be performed during the period from January 2024 to January 2025 for collecting samples(serum) from patients of both sexes and different ages visiting or attending Eyes Teaching Hospitals in Duhok city. **Results**: Out of 11396 specimens, 0.7% (81/11396) of the isolates were identified as Hepatitis B Virus, isolated from patients with chronic liver diseases. Regarding isolate rates among specimens, the highest rate (2.2 %) was from Male, with a highly significant (P< 0.001) difference from other sources. **Conclusion**: This discovery will aid in the detection and identification of the Hepatitis B virus using the proper ELISA technique, which increases the probability of pathogen diagnosis.

***Keywords*---**Hepatitis B Virus, ELISA, Serum, Antigen, Liver disease.

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Introduction

HBV is a hepatotoxic virus that belongs to the "Hepadnaviridae", it mostly affects humans and a small number of other primates, with a limited host range (Dane *et al.,* 1970). The mature and infectious HBV particle is spherical in form has a diameter of 42 nm, also known as the Dane particle (Dane *et al.,* 1970). Hepatitis B virus (HBV) infection is a public health threat, like chronic liver disease, and it can be fatal for the patient (El-Serag, 2012; Hou and Liu, 2005). The antigen found at that time, referred to as "Australia antigen" and currently known as HBV surface antigen (HBsAg), was often seen in patients with leukemia (Dane *et al.,* 1970).

The World Health Organization reports that the hepatitis B virus is a prevalent illness, with over 254 million individuals globally exposed to HBV in 2022, resulting in an anticipated 1.1 million deaths, primarily due to fibrosis and hepatocellular carcinoma, also known as primary liver cancer (WHO, 2022). The primary risk factors for HBV transmission include blood transfusions, pregnant women, healthcare professionals, tattoos, substance abuse, and high-risk sexual behavior (Amiri *et al.,* 2010).

The virus is most typically passed from mother to child during birth and delivery, early infancy, and by contact bodily fluids during sex with an infected incorrect injection, or cutting instrument exposure (WHO, 2022). Vaccination program in Iraq is important part that designed to protect newborns as well as other groups are encouraged to take the vaccine, so it is required to design a public health plan for combating HBV infection and to recognize the risk variables correlated with virus transmission, nevertheless there is no coordinated and scientific program for vaccine registration and monitoring (Amiri et al.,2010). This study will investigate the distribution of HBV risk factors among blood donors in Duhok City, Kurdistan Region, northern Iraq, due to the significant public health concern arising from insufficient knowledge on the prevalence of these risk factors.

Materials and Methods

2.1. Sample collection:

The current study was performed in Eyes Teaching hospitals in Duhok city. Eleven thousand and three hundred ninety-six specimens from different sources were analyzed from Jan 2024 to January 2025. Use a serum separator tube (SST) from patients of both genders and various ages (1 months - > 50 years), and Before centrifugation at 1000 x g for 15 minutes, let samples clot for 30 minutes at room temperature, assay was done as soon as possible after removed the serum, or samples stored at -20 °C. (20, WHO 2024). Furthermore, an ethical approval to perform the study was obtained from Duhok General Directorate of Health (No.25092024-8-13). All specimens were put in sterile Jell tubes immediately, clearly labeled with the required information according to a questionnaire designed for the study, kept in microbiology laboratory for further processing.

2.2. Isolation and identification of Hepatitis B Virus by using ELISA kit.
The optimal technique for detecting the Hepatitis B virus is ELISA, a kind of solid phase immunoassay in which antigens or antibodies are covalently bound with appropriate enzymes that can catalyze the conversion of a substrate into colored products, it is an established technique for identifying various serological markers with present numerous ELISA kits that are sold commercially (21, Maity et al, 2012) as Table 1.

Table (1): Components of ELISA Kits made in China

Name	Company	Origin
ELISA	In Tec Products	China

The samples processing procedure were observed to the flowchart provided below (Figure 1).

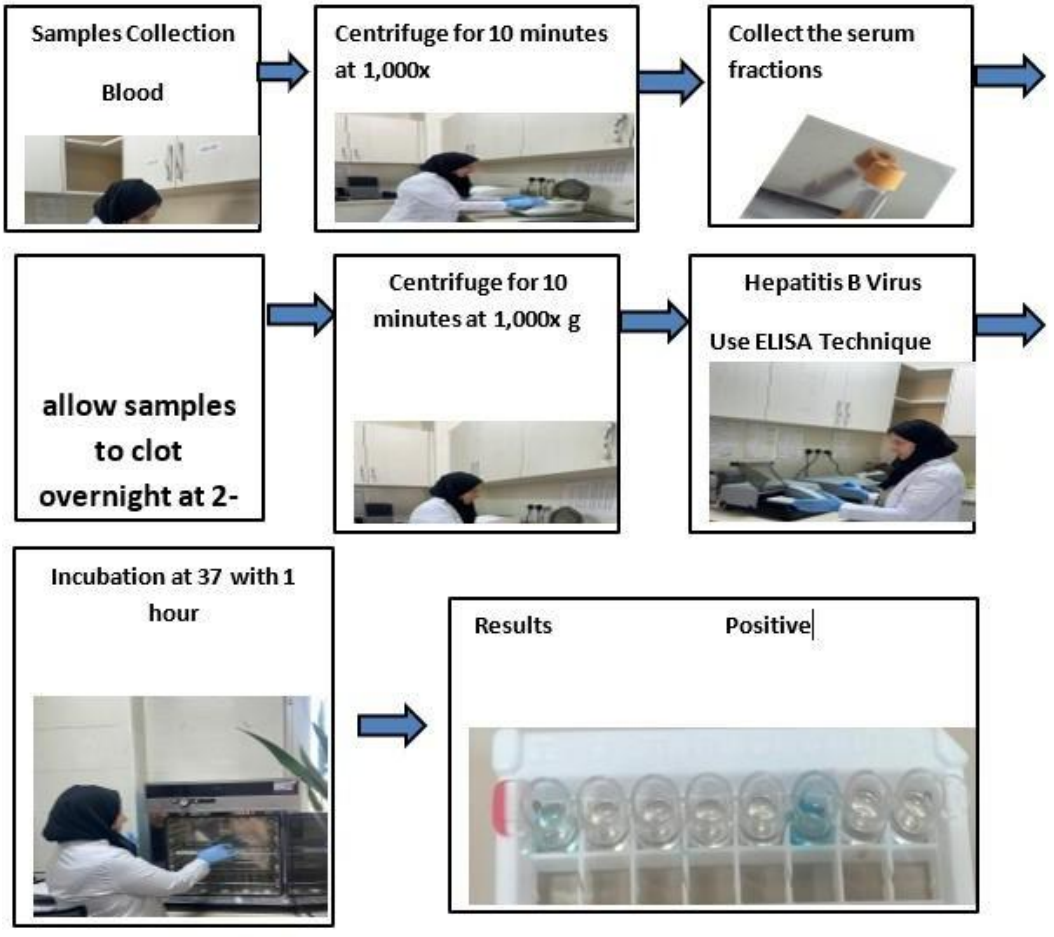

Figure 1: Flowchart for processing procedure of samples collection.

Results and Discussion

Prevalence of Hepatitis B Virus in patients' specimens

The results of this study showed that 0.7 % (81 / 11396) of the patients' specimens had positive Hepatitis B Virus. Males showed the highest rate as compared to females (2.2 % vs 0.31 %), and this difference was statistically highly significant (P<0.001) (Table 2).

Table 2: The correlation between the number and rates of Hepatitis B Virus among both genders and various ages in this study

Variables	No. Examined	No. Infected (%)	*P* value
Gender			*P* value < 0.001 X^2 =96.88
Males	(2396)	53(2.2)	
Females	(9000)	28 (0.31)	
Age			*P value* =0.17 X^2 =3.54
Children	1000	3/1000(0.3)	
Adult	9100	71/9100 (0.8)	
Elderly	1296	7/1296(0.5)	
Total	11396	81(0.7)	

In this study the totals examined about 11396, the highest rate isolated (2.2 %) from males but the lowest rat isolated from females (0.31%) as a compare with the result data which obtained from laboratory in eyes teaching hospital from January2023 to January2024 which observed in Table 3.

Study in Duhok was reported that males were showed the highest rate compare to females (67.9% vs32.1 %) (Abdulla and Goreal,2016). Su and his colleagues were reported that chronic HBV infection is more common in males compared to in females with (10.7% *vs* 4.4%) among those who receive a vaccination at birth and are monitored for more than 18 years (Su *et al.,* 2007). According to a study conducted in China, men's patient outcomes were significantly higher than those of women with HBV- associated liver diseases (Liu et al., 2022).

Table 3: The correlation between the number and rates of Hepatitis B Virus among both genders and various ages in 2023

Variables	No. Examined	*P. aeruginosa* No. (%)	*P* value
Gender			
Males	1621	32 (1.974)	*P* value= < 0.001 X^2 =72.37
Females	8231	22 (0.267)	
Age			
Children	2000	4/2000(0.2)	*P value* =0.035 X^2 =6.685
Adult	6502	44/6502(0.67)	
Elderly	1350	6/1350(0.4)	
Total	9852	54 (0.548)	

It was proposed that different rate of gender may be related to biological, behavioral, and epidemiological aspects (Wang *et al.,* 2009). Improving the prognosis of people with HBV, understanding the several clinical factors associated of deferent males from females might be due to demographical traits, psychological nature as well as Physical abilities in patients infected HBV such as drinking alcohol and smoking cigarettes (Liu *et al.,* 2022). Women are expected to exercise more self-control than males, and in many nations and cultures, women smoke and drink less than men. (Cui *et al.,* 2018).

There are multiple potential modes of transmission for the Hepatitis B virus in individuals who attended the hospital, including patient-to-patient, healthcare worker-to-patient, medical device-to-patient, and hospital environment contamination (CDC, 2023). Important strategies using for reducing HIV, viral hepatitis, and sexually transmitted illnesses by the global health sector for the years 2022–2030 Global Health Sector which actions to combat HIV/AIDS and viral hepatitis especial chronic hepatitis B and sexually transmitted infections by 2030 (GHSSs 2022-2030).

In our study adults were showed the highest rate compare to elderly with (0.67%) elderlies were showed the lowest rate (0.29%). As recommends as (WHO, 2024) Adults should have access to HBsAg testing in order to reduce their risk of contracting the virus, as well as provide the necessary medications, also pregnant women must be tested hepatitis B virus and blood donor testing. An according to (WHO, 2024), the hepatitis B virus can remain outside the body for at least seven days, If the virus gets into the body of patient who is not get to the vaccine, it can still cause infection during this time. The hepatitis B virus can live form 30 - 180 days in patients, at which time it can be identified within 30 to 60 days after infection, but if childhood and infancy patients the virus can spread and survive easily to cause chronic hepatitis B (WHO, 2024). Due to the increased risk of chronic HBV infection and chronic liver disease that develops in children under the age of five, it is crucial to prevent HBV transmission throughout early childhood (Margoliset *et al.,* 1991). Determining the most effective pediatric vaccination plan against the hepatitis B virus is serious important (Hsu *et al.,* 2021 and Kramvis *et al.,* 2023). Despite some research, treating hepatitis B virus infection was difficult (ang *et al.,* 2021).

Conclusion

These findings will be helpful to Prevalence of Hepatitis B Virus from patents attended to eyes teaching hospital in 2025 compare with 2024 to cope with the chances of protect from pathogens.

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Declarations:

Conflict of Interest

The author declares that there are no conflicts of interest.

Ethical Approval

An ethical approval to perform the study was obtained from Duhok General Directorate of Health (No.25092024-8-13).

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