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Incidence Rate of Positive HBV Discovered in Pre-Operatively Tests at AL-Yarmouk Teaching Hospital during 2020 to 2024

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ABSTRACT

Background: HBV may cause a liver infection that is acute or chronic infection and have a higher prevalence type of hepatitis in developed Countries and in male were more frequently exposed to the risk factors as compared to female. It is a risk factor for hepatocellular carcinoma (HCC), it is commonly transmitted to susceptible individuals especially health workers by several procedures, including transfusion of blood and its products; various surgical procedures; dialysis etc., in addition, some independent factor of age, gender, season and residence could associate with HBV prevalence.

Methods: present study was conducted on total (75,702) pre-operative(pre-surgical) blood sample were collected from both genders (38,681 male, 37,021female) with all age groups, were referred to the Department of Teaching Laboratories in AL-Yarmouk Teaching Hospital at Baghdad / Iraq, as a part of procedures of laboratories tests, which covered a period of five years from January2020 to December 2024. The laboratory testing method was Enzyme Linked Immunosorbent Assay (ELISA) BioTek /REF (50TS8) -USA, to detect HBsAg and anti-HBc Ab in serum specimens.

Results: from 75,702 total blood samples ,HBV infection was 323(0.4%) patients during 5 study years , 205 males (63.4%) and 118 females (%36.5), the highest rate of HBV infection of pre-operative patients was 95/16307 in 2024 and the age ranged between 10 - 65 years old, when recorded highest percentage of HBV incidence in age group 30-39 (28.7%), also high percentage of HBV infection (ρ-value = 0.00001) in (Summer and Autumn) seasons (51.3%) when comparable with (Winter & Spring) seasons results (48.6%),furthermore ,there was a significantly relationship (ρ-value < 0.00001) between positive result of HBV infection 294 (91.0%) and residency in Baghdad which divided to AL-Karkh 280 HBV infection while Al-Rusafa 14 case (86.6% and 4.3%) respectively.

Conclusion: The incidence of hepatitis B in Baghdad during the five years of this study was low 323 (0.4%) from75,702 patients, and the incidence of HBV infection was significantly influenced with two factors include: residential areas and seasonal climate (seasons of the year), while the age and gender factors weren't. It's necessary to include a screening HBV as laboratory test within the ordinary tests to all patients, to protect the health workers, and confirmation to use the Personal Protective Equipment (PPE) and attempt to improve vaccines programs applied and increased consciousness of the risks and methods of transmission of HBV especially in adolescents and adult's category.

Keyword: *HBV, surgical procedures, climate and health, gender.*

1. INTRODUCTION

Hepatitis B virus (HBV) infection is, a serious health problem around the globe and widespread in the developing countries (Khan et al., 2011), Despite the availability of vaccination, infections with hepatitis B virus (HBV) , World Health Organisation (WHO) estimates about 240-257 million to ~2 billion people had been trapped by this virus(Steinmann et al.,2020) (Ahmad et al.,2021) (University Hospitals Sussex ,2023) ,when recorded Africa as the second highest number of HBV infection after Asia(Kafeero et al.,2021), (Onwuegbuna et al., 2021), the importance of this infection being a major risk factor for deaths as a result of cirrhosis and liver cancer. (Ott et al.,2012).

Several recent studies showed, Iraq country is representing a low to intermediate zone of HBV infection, when the prevalence counted between (0.7- 1.37) % endemic comparing to neighbors (Othman & Abbas, 2020) (Hussein et al., 2021) (Salman et al., 2022). (Abdulqadir et al.,2023).

Highest concentrations of infectious HBV are in blood, serum and any other body fluids, also dental or biopsy equipment, dialysis units, contaminated fingerstick devices, anesthesia, micro−surgical instruments and endoscopes (Tarky et al.,2013), (Than et al., 2018). Therein of hepatitis B virus risk when it still lives for several days in dried blood on table surfaces, needles, syringes and razors, and direct contact with all these above could transmitted viral infection, specificity among hospital-based health care workers as well as surgeons and other surgical team members at mammoth risk (Ravikiran and Rao, 2020) (Onwuegbuna et al., 2021).

Three studies two previously and one recently suggested, sex differences, age group, seasons and residential areas may play a role in the acquiring of HBV infection when rise gradually with age and higher prevalence rates in males than in females, moreover, higher incidences worldwide in a particular month throughout the year and it observed in geographical areas of low economic status (Tarky et al., 2013), (Fares ,2015) , (Wang et al., 2022),while in Nigeria study published that among patients on different age groups and either pre-surgery or surgery was not affected the prevalence of HBV by their rural residence (Onwuegbuna et al., 2021).

The comprehensive understanding of all these factors and related with viral infection will be helpful to reduce disease risk, to improve early diagnosis and could offer to developed programs of practical applications. (Wang et al.,2015) , (Abdul-Rahman et al., 2022), (Hamilton et al., 2023).

Aim of Study

The objectives of the present work which performed in the Baghdad governorate -Capital of Iraq was designed to:

1. Study the rate incidence of HBV infection in all blood samples obtained from patients admitted for surgical as a part of the pre-operative screening tests.
2. Study different factors that may prevalence rate of HBV include:

- Age
- Both gender
- Place according to districts in Baghdad and governorates)
- Seasonal factors

2. METHODOLOGY

AL-Yarmouk Teaching Hospital is the biggest tertiary referral hospital with a capacity of 1000 beds. It is located in West of Baghdad named Al-Karkh side; the other side is Al-Rusafa to the East. A retrograde data of this study was collected from virology unit at AL-Yarmouk Teaching Laboratories which covered a period of five years from January2020 to December 2024.

Sample collection

According to (WHO, 2011) and (Altamimi et al,2019), total (75,702) pre-operative(pre-surgical) blood sample were collected from both genders (38,681 male, 37,021female) as a part of procedures of laboratories tests, and all age groups, as well as, in the different seasons from each year.

-For each positive HBV result was sent to the Central Public Health Laboratory (CPHL), Ministry of Health/Baghdad-Iraq to prove HBV infection, confirmed by western blot technique.

Apparatus used for HBV:

-The laboratory testing method was Enzyme Linked Immunosorbent Assay (ELISA) to detect HBsAg and anti-HBc Ab in serum specimens.

- ELISA System / BioTek /REF (50TS8) -USA-
- Incubator/JRAD-Syria-
- HBsAg kit/ fortress /REF(BXE0741C)-UK-
- Anti-HBc Ab kit /fortress/UK-

-Beside to: Micropipette, disposable gloves, gel disposable tubes, filter papers bleach, distilled water and sterilizer/disinfectant.

Statistical analysis:

Analysis of data was carried out using the available statistical package of IBM SPSS-29 (IBM Statistical Packages for Social Sciences- version 29, Chicago, IL, USA). Data were presented in simple measures of frequency and percentage. A statistical test was used to find the relationships between different variables, value of less than 0.05 was considered as significant. (Daniel and Cross ,2020).

3. RESULTS

On the basis of the HBV blood test pre-operative patients in Virology unit at Al-Yarmouk Teaching Hospital during 2020–2024 years, individuals both genders were undergoing at least two HBV test were included. A total of 75,702 specimens were tested, of which 38,681 male, 37,021female (51.1%) and (48.9 %) respectively.

As shown in figure -1-, there was a significantly relationship between gender and the year of study (ρ-value = 0.0000), from 75,702 the highest number of blood test pre-surgical in 2021 (20292/26.8%) followed by 2024 (16307/21.5%) then 2022 and 2023(21.1% and 18.3%) respectively, while the lowest in 2020 (9238/12.2%).Results in Fig-1- showed that from total blood samples ,HBV infection was 323(0.4%) patients during 5 study years , 205 males (63.4%) and 118 females (%36.5), the highest rate of HBV infection of pre-operative patients was 95/16307 in 2024, followed by 80/ 20292 and 56/13884 in 2021 and 2023 respectively. On the other hand, the highest incidence of HBV infection from 95 case was (67.3%) male in 2024, which exceed that of female who revealed (40.0 %) highest percentage in 2021 from 80 positive case. There was no relationship between positive result and gender across the study years of HBV infection (p-value = 0.776).

Table 1: Patients with positive HBV reported during the five years interval distributed according to the age groups.

Age group	2020		2021		2022		2023		2024		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
10-19	3	5.8	3	3.8	4	10.0	4	7.1	2	2.1	16	4.9
20-29	9	17.2	6	7.4	5	12.5	15	26.8	21	23.1	56	17.3
30-39	18	34.6	23	28.8	10	25.0	14	25.0	28	30.7	93	28.7
40-49	8	15.4	20	25.0	6	15.0	5	8.9	24	25.3	63	19.5
50-59	7	13.5	20	25.0	9	22.5	13	23.3	12	12.6	61	18.8
60-	7	13.5	8	10.0	6	15.0	5	8.9	8	8.4	34	10.5
Total	52	100	80	100	40	100	56	100	95	100	323	100
ρ-value (Yate's correction) = 0.1209												

In table 1, a cumulative annual number of 323/ newly HBV cases were recorded in Baghdad from 2020 - 2024. The age ranged between 10 - 65 years old. The highest percentage of HBV incidence in age group 30-39 (28.7%), then 40-49, 50-59 and 20-29 (19.5% ,18.8% and 17.3%).) respectively, while the lowest HBV infection (4.9%) in 10-19 age group. There was no relationship between positive result and age group across the study years of HBV infection (ρ-value (Yate's correction) = 0.1209.

In present study, figure 2 revealed, from the total of 75,702 blood specimen's pre-operative were tested, significantly high percentage of HBV infection (ρ-value = 0.00001) in (Summer and Autumn) seasons (51.3%) when comparable with (Winter & Spring) seasons results (48.6%), furthermore , in this five study years ,the highest of HBV incidence in 2021 (46/27.7%)

of positive results from the most second half(166) , while 2024 record highest percentage (65/41.4%) from the most first half (157),in this study years.

A bar graph in figure 3 represents the rate of people blood specimen's pre-operative were tested with their distributed according to their residency. There was a significantly relationship (ρ-value < 0.00001) between positive result of HBV infection 294 (91.0%) and residency in Baghdad which divided to AL-Karkh 280 HBV infection while Al-Rusafa14 case (86.6% and 4.3%) respectively, on the other hand, others word represent: the Iraqi governorate other than Baghdad which record 29 HBV infection (8.9%) more than Al-Rusafa

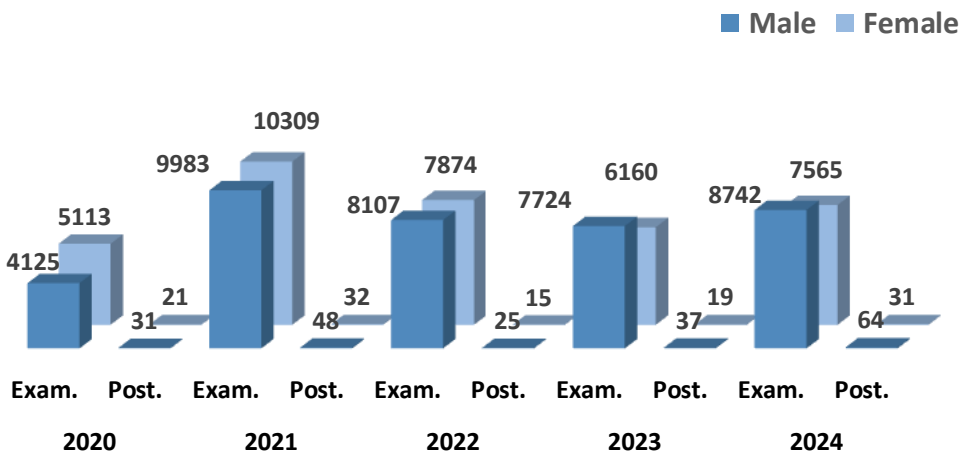

Figure 1: Examined people distributed with positive cases distributed according to the gender across the five-year study period. (*Exam: examined people, Post: positive cases*.)

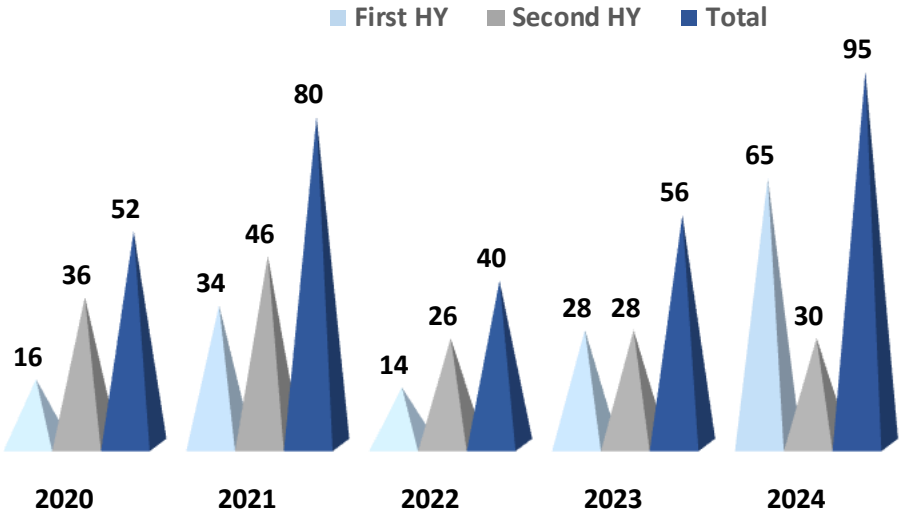

Figure 2: Distribution of HBV positive patients according to the time of the year along the five years of the study period. *HY (half of the year), First half of the year (Winter & Spring), Second half of the year (Summer & Autumn)*

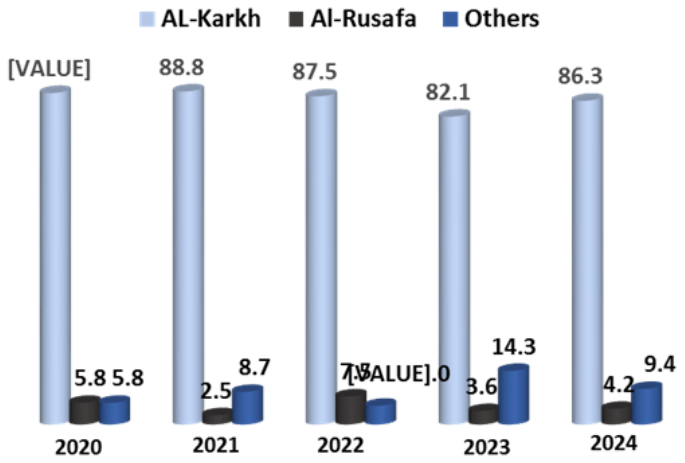

Figure 3: Total HBV infection among Baghdad-resident patients with different geographical backgrounds during five consequent years of 2020 and 2024

4. DISCUSSION

Hepatitis B virus (HBV) is one type of virus belonged to family virus causing viral hepatitis, it's mainly transmitted through contaminated blood in addition to other rout, and may infected both gender in different age groups, it may represent a risk when transmission from patient to health care worker or vice versa (Bhat et al.,2012).(Moran et al., 2020)

According to our results in figure -1-, out of 75,702 patients who were participated in this five study years 38,681 male, 37,021female (51.1%) and (48.9 %) respectively, only 323(0.4%) pre-surgical blood samples was HBV infection, 205 males (63.4%) and 118 females (%36.5), our results was approval but less low which agreement with other studies, like study in 2019 when reported 60 (1.2%) were HBV seropositive out of 4696 patients(Hussein et al., 2019), followed by study in Nigeria published , out of the 423 participants only 5 (1.2%) had HBV, (Onwuegbuna et al., 2021), in addition ,figure-1- result not correspondence with Khan and et al study when founded the higher incidence of HBV 3143(64.2%) out of 4890 ELISA test patients (Khan et al., 2011), in addition, 2021 to two studies in Pakistan and east Africa reported,44(4.4%) out of 1000 samples and (6.025%) positive for HBV ,respectively (Ahmad et al.,2021), (Kafeero et al.,2021), followed China study in 2024 when announced a total of 327,585 HBV cases were included in the15 years study, chronic hepatitis B decreased by 12.02% and 3.76%, respectively, from 2008 to 2022 .(Zheng et al., 2024).

Furthermore, our results in figer-1- was higher and not agreement than other research reported like in: 2017, when Hussein and Daniel scored from a total of 423 patients were volunteer, in their three study years, 287/423 (68%) males, 141/423 (33%) female (Hussein and Daniel 2017)

,followed that two studies one in 2021 when published ,out of 1000 sample , 646(64.4%) were male , 354(35.4%) were females and ((Ahmad et al.,2021), and in 2022 recorded, 182/634 (28.7%) female patients, but its result is higher percentage in male452/634(71%) when comparable with our result()(Liu et al., 2022), while in Taiwanese study of the 121,421 enrolled participants 43,636 (35.9%)men and 77,785(64.0%) women(Wang et al., 2022)and this finding are completely opposite percentages to our results .

In the present five study years, our results reveal high percentage male HBV infection than in female and thus favorable with formerly study in 2011 which includes 68.15% males and 31.85% females.(Khan et al., 2011), followed in 2019 study scored in male 39 (65%) than in female 21 (35%)((Hussein et al., 2019),as well as, In Karbala and Arbil studies ,they referenced HBV infection may develop hepatitis cirrhosis in males higher than females(Merzah et al., 2019), (Abdul-Rahman et al., 2022), moreover, Ahmad and et al in Pakistan reported ,male patients of HBs were 29(34.9%)and in female patients were 15(65.1%)((Ahmad et al.,2021) which acceptable with all these results.

Our study results favorable with other study in Erbil -North Iraqi Governorate - when reported HBV infections significantly lower in 2020 than the other study years. (Abdul-Rahman et al., 2022). Several study confirmed , HB-sAg positive results in male gender more than female , and epidemiologically male with age an important risk factor for HBV-induced hepatocarcinogenesis,(Wang et al.,2015) (Onwuegbuna et al., 2021)(Liu et al., 2022), in addition to, study in Duhok - North Iraqi Governorate - at 2017 by Hussein and Daniel who clarified a high risk of HBV infection result in Egypt (28%) and Iran (8.3%) , who they had history of drug use subjects and /or history of illegitimate sex (Hussein and Daniel 2017), particularly if infection continues for more than 6 months, patient considered have a chronic HBV infection, even there was not have any symptoms (University Hospitals Sussex ,2023),furthermore, China study in 2021 explained higher prevalence

of alcohol drinking and smoking among men (10.3% and 15.7%) than women (1.6% and 4.8%) respectively ,could be partly attributed to the gender disparity in liver diseases (Cao et al., 2021)

Our findings in table-1- acceptable with Khan and et al. research when published highest HBV infection was found in the age of 21-30 (34.93%) then 23.83% in 31-40 and only (13.39%) were belonging to the age group 11-20 year, while declines with increasing age as shown by age groups 41-50 and 51-60 (16.13% and 7.09%) respectively as well as in 0-10(1.49%), they clarified the HBV infection spread firstly by reuse of syringes 26.60%,secondly barber and dental risks (23.60%) ,11.20%) respectively ,while less risk factors contributing to HBV incidence rate in surgical procedure (4.26%)and blood transfusion (4.04%)(Khan et al., 2011), however, our result were not acceptable when scored lower percentage of positive HBV incidence (4.9%) in 10-19 age group while our percentage of infection was closely in age group 30-39 and 40-60 (28.7% and 19.1%) respectively, when compared with that reported in BAJOR-Pakistan study (34.1%, 36.4%and 14.5%) in age group 10-19 m30-39 and 40-60 respectively (Ahmad et al.,2021),in the same year, study in Nigeria published that the prevalence of HBV among cataract surgery patients was 5(1.2%) of the 423 participants were between the ages 15 and 90 years((Onwuegbuna et al., 2021) which favorable with our result 323(0.45 %) of 75,702 presurgical case, in spite of, study of Zheng and et al in China found the age groups (4 -24)years were a high risk groups to prevalence of HBV infection(Zheng et al., 2024)and these result was not consistence with our study, Furthermore, study in Taiwanese reported there were significant interactions between sex and age ($p < 0.001$) (Wang et al., 2022) , which is also not consistence with our results. Two studies in 2022 which accomplished in Taiwanese and Arbil, stated that women are more vulnerable than their male risk of HBV infections due to differences in X and Y chromosomes, and postmenopausal decrease in estrogen levels, and despite the availability of effective vaccines against HBV but continuously growing with the advances in population in the city. (Wang et al., 2022), (Abdul-Rahman et al., 2022)

A study in 2012 showed that the rate of HBsAg positive persons increased within the time (years), ages and geographical region, so in East Asia (8.6%) HBV incidence more than in America and Europe (2%) (AGE HBV 2012) and study in AL-Nasryia (Iraq south Governorate) which reveled most HBV infections in January(Winter) with 3.08% and regional people in AL-Nasryia city which infected with HBV was more (1.6%) than in an incoming people (0.6%) (Hussein et al., 2019) which comfortable with past study in 2012 when they established, the declines in HBV infection prevalence may be related to expanded vaccination(Ott et al.,2012) Theis findings was congruent with our study in figure 2and 3 ,in spite of percentages was more high, this could be attributed to the location of AL-Yarmouk Teaching Hospital in Al-Karkh side and hence most of visitors and patients attend the hospital were from this Al-Karkh side, there are regions in this side especially at the periphery suffer from, low level of education, financial and social problems, and in succession, Fares study in Bedburg-Germany were suggested other risk factors could represent source of transmission such as; summer travel to an endemic area, swimming habits of the population in hot months, increase sexual contact and tattoo , which may increase HBV infection(Fares ,2015),subsequently, both of studies in 2019 and 2022 recommended, more attention should be given to gender-specific treatment and prevention for the HBV infection , with prevention of infection by control systems, such as thermal disinfection for medical devices(König et al.,2019)(Liu et al., 2022)

5. CONCLUSION

1- The incidence of hepatitis B in Baghdad during the five years of this study was low 323 (0.4%) from75,702 patients, compared to the incidence rates in other governorates, as well as, in neighboring countries.

2- It's proven; the applied of the international program precautionary measures from the competent health authorities in Baghdad /Iraq, in addition to the health awareness and vaccination programs which may offers lifelong immunity, was the best approach for reduction and prevention from HBV infection

3- The incidence of HBV infection was significantly influenced with two factors include: residential areas and seasonal climate (seasons of the year), while the age and gender factors weren't.

Recommendation

1-It's necessary to include a screening HBV as laboratory test within the ordinary tests to all patients, to protect the health workers, and confirmation to use the Personal Protective Equipment (PPE) with the utmost precautions of sterilization and disinfection to prevent them to exposure to the asymptomatic carriers which might become a threat for spread of HBV infection, and may helped to reduce incidences percentages.

2- Attempt to improve vaccines programs applied and increased consciousness of the risks and methods of transmission of HBV especially in adolescents and adult's category

3- Should be confirmed to use antiviral medicines (orally) which can help fight the virus and slow its ability to damage patient's liver. This allows the immune system to repair itself and prevent further damage, as well as, should eat a healthy diet and drink plenty of liquids to prevent dehydration from vomiting and diarrhoea.

4- It is essential that HBV programs consider and monitor the potential effects of climate change

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Conflicts of interest

All authors report no conflicts of interest relevant to this article

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