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Study positive incidence of viral Infections in preoperative patients

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Abstract:
Background: (HBV) infection and (HIV) virus are a serious health problem around the globe and widespread in the developing countries, it may contribute to several common morbidities. Some independent factors, age, gender, season and residence could associate with viruses' prevalence. **Methods**: present study was conducted on total (75,702) pre-operative(pre-surgical) blood sample were collected from both genders with all age groups, which covered a period of five years. The laboratory method was (ELISA). **Results**: from 75,702 total blood samples, HBV and HIV infections was (0.4%) and (0.05%) patients respectively, the highest rate of HBV and HIV infections was in male, and in age group 30-39, and (Summer and Autumn) seasons. **Conclusion**: The incidence of HIV and HBV in Baghdad during this study was low and prevalence of HBV and HIV infection was significantly influenced with several factors. It's necessary to include a screening HIV and HBV as laboratory test within the ordinary tests to all patients, to protect the health workers.
Key words: HIV, HBV, surgical procedures, climate and health, gender

Introduction:
Despite major advances in prevention and therapy sciences, still human immunodeficiency virus (HIV) transmission common (Mekki et al., 2023), and in spite of the availability of vaccination, infections with Hepatitis B virus (HBV), World Health Organization (WHO) estimates about 240-257 million people had been trapped by this virus(Steinmann et al.,2020), (Ahmad et al.,2021)and(University Hospitals Sussex ,2023) ,the importance of this infection being a major risk factor for deaths as a result of cirrhosis and liver cancer. (Ott et al.,2012), as well as, in the (HIV) has resulted in 40.1 million fatalities worldwide (Cui et al., 2024), however, untreated HIV replication causes to loss progressive CD4+ T cell and then may contributes to several other common morbidities (Sabin and Lundgren, 2013).
Iraq was little research on HIV problem attributed to the instability of political events since the first Persian Gulf war (Massah et al,2016), and for implement appropriate programs to ameliorate the spread of HIV infection in Iraq, it's essential to assess the knowledge and attitude of the Iraqis concerning related to this subject (Abdulsada et al.,2021). 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) and (Abdulqadir et al.,2023). Review in 2016 indicates that HIV has been found in each Arab state and these prevalence of virus as a result of heterosexual relationship and/or drug injection, as well the HIV knowledge and education are poor, also Qatar is only Arabic country voluntary HIV counseling and testing and its only has paid for the treatment of Qatari and non-Qatari HIV-infected patients, however, in 2019 study in Oman reveled, most new HIV infections were caused via unprotected sex(66.8%) , while less than percentage was found mother-to-child, in addition, intravenous drug abuse and via blood transfusion, in spite of 17.4% may unknown causes(Moradi et al., 2016), (Al Awaidy and Sharanya, 2019).
Past studies in 2014 and 2018 have shown that young women aged 15–24 years accounted 61.5% of the HIV cases when compared with the other age groups, as a result of rape, sex with older men, and unequal access to education and economic opportunities when compared with the among males of the same age, (Addo and Altfeld,2014), (Girum et al., 2018),other recent studies reported, women represent (50 to 53) % of the global population living with HIV, unprotected sex most common risk factor among women (Moran et al., 2022), (Torralba ,2023), (Barr et al., 2024),while other studies confirmed that significantly ($p < 0.001$)HIV incidence peak in males were in aged 20–35 and 20-49 years more than female (Al Awaidy and Sharanya, 2019), (Liu et al., 2021) and (Gottert et al.,2022), and more than triple hospital mortality are symptomatic patients with HIV (Cui et al., 2024). Meanwhile, HBV could transmit and causing infraction by direct contact dry blood on table surfaces (live for several days), syringes and razors, dental or biopsy equipment, dialysis units, contaminated fingerstick devices, anesthesia, micro−surgical instruments and endoscopes, which 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). At present, there is no evidence confirmed that HIV itself is a climate-sensitive infectious disease (Craig ,2023), but analysis in 2024 suggested, that the seasonal characteristics of the HIV epidemic in China can be attributed to host behavior (Zhang et al., 2024). A recent Frontline AIDS report discusses the complex interconnectedness of climate change and HIV, specially 3.6 billion people live in regions highly susceptible to climate, as well as, global warming, anthropogenic climate change and temperature rise, effects for human health (Lancet HIV,2024), in the same context, 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) and(Wang et al., 2022). 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. (Samano et al.,2021) , (Abdul-Rahman et al., 2022) and (Hamilton et al., 2023).
The objectives of the present work which performed in the Baghdad governorate -Capital of Iraq was designed to:
1. Study rate incidence of HBV and HIV infections 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 and HIV include: Age, Both gender, Place according to districts in Baghdad and governorates and Seasonal factors.

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; while 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 at least two HBV and HIV test were collected and tested 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 and HIV result was sent to the Central Public Health Laboratory (CPHL), Ministry of Health/Baghdad-Iraq to prove HBV and HIV infection, confirmed by Enzyme Linked Immunosorbent Assay, Enzyme Linked fluorescence Assay and Real-Time PCR.
Apparatus used for virus:-The laboratory testing method was Enzyme Linked Immunosorbent Assay (ELISA) to detect HBs Ag, anti-HBc Ab and HIV Ag -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-
- HIV Ab-Ag kit/ 4th Gen -fortress /REF (BXE0792C)/ 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).
Results: On the basis of the HBV and HIV blood test pre-operative patients in Virology unit at Al-Yarmouk Teaching Hospital during 2020–2024 years. A total of 75,702 specimens were tested, 38,681 male, 37,021female (51.1%) and (48.9 %) respectively
As shown in figure -1-2, there was a significantly relationship between gender and the year of study (ρ-value = 0.00001), from 75,702 the highest percentage of blood test pre-surgical in 2021 (20292-26.8%) ,while the lowest in 2020 (9238/12.2%), However, total positive of HBV 323(0.4%) and HIV 39(0.05%) ,and the highest rate of HBV infection was 95 in 2024, while the highest rate of HIV infection (12) was equally in 2024 and 2022. On the other hand , according to gender the positive HBV was 205 males (63.4%) and 118 females (%36.5) , whereas in HIV positive infection was 35 males (89.7%) and 4 females (10.2%), in the same context , the highest incidence of HBV and HIV infection in male was 64 case (67.3%) in 2024 and 11 case (91.6%) in 2022 respectively, which exceed that of female who revealed 32(40.0 %) highest percentage of HBV in 2021 and 2(16.6 %) in 2024 of HIV. There was no relationship between positive result and gender across the study years of viral infections (Chi-sq test is not applicable).

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In table 1 and 2, the age ranged between 10 - 65 years old. The highest percentage of HBV incidence in age group 30-39 (28.7%), while the lowest HBV infection (4.9%) in 10-19 age group. In HIV the highest percentage of infection was 30-49 (53.8%) and the lowest HIV cases were recorded in ≥ 50 age group (17.9%) only. Statistically, all these results significantly were not acceptable.In current study, figure- 3 and table- 3 revealed, significantly high percentage of HBV and HIV infections (ρ-value = 0.00001) in (Summer and Autumn) seasons 166 from 323(51.3%) and 24 from 39(61.5%) respectively , when comparable with (Winter & Spring) seasons results (48.6%) and (38.5%) respectively, furthermore , in this five study years ,the highest of HBV incidence in second half year at 2021 46(27.7%),while HIV reveled in 2024 8(20.5%) , on the contrary, from the first half 2024 record highest percentage 65(41.4%)of HBV, whereas, 2022 record higher percentage 5(12.8%) of HIV.

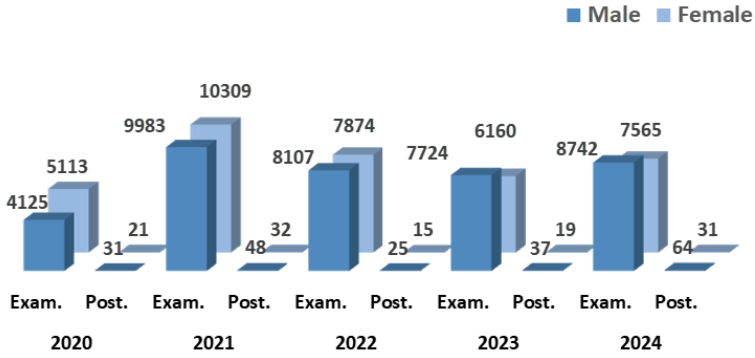

Figure 1: Examined people distributed with HBV positive cases reported according to the gender across the five-year study period. (*Exam: examined people, Post: positive cases*.

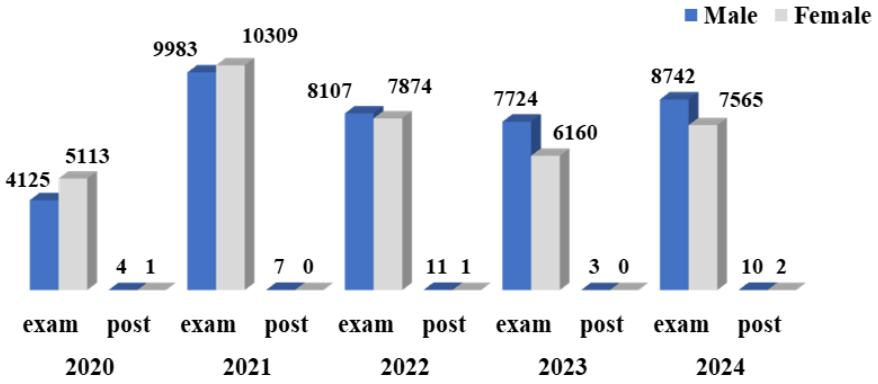

Figure 2: Examined people distributed with HIV positive cases reported according to the gender across the five-year study period. (*Exam: examined people, Post: positive cases*.)

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
(Chi-sq test is not applicable)												

Table 2: Patients with positive HIV 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	%
18-29	2	40	1	14.3	3	25.1	1	33.3	4	33.4	11	28.2
30-49	4	80	4	57.1	7	58.3	-	-	7	58.3	21	53.8
50-	-	-	2	28.6	2	16.6	2	66.7	1	8.3	7	18.0
Total	5	100	7	100	12	100	3	100	12	100	39	100
(Chi-sq test is not applicable)												

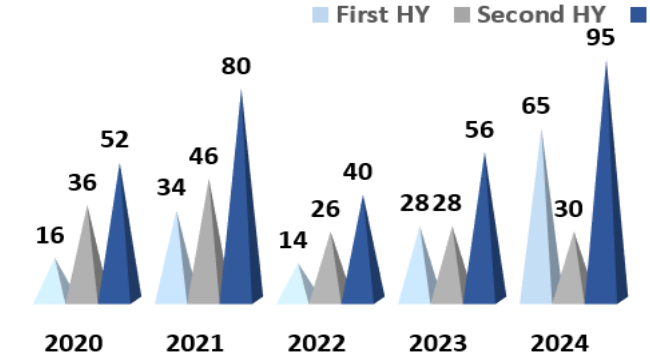

Figure 3: Distribution of HBV positive patients according to the time of the year along the five years of the study period. *HY (half of the year), First half of the year (Winter & Spring), Second half of the year (Summer & Autumn)*

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Table 3: Distribution of HIV 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)*

Time	2020		2021		2022		2023		2024		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
First HY	2	40.0	1	14.3	5	41.7	2	66.7	4	33.3	15	38.5
Second HY	3	60.0	6	85.7	7	58.3	1	33.3	8	66.7	24	61.5
Total	5	100	7	100	12	100	3	100	12	100	39	100

A bar graph in figure- 4 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 (86.6%) HBV infection while Al-Rusafa14 case(4.3%),on the other hand, the Iraqi governorate other than Baghdad which record 29 HBV infection (8.9%)

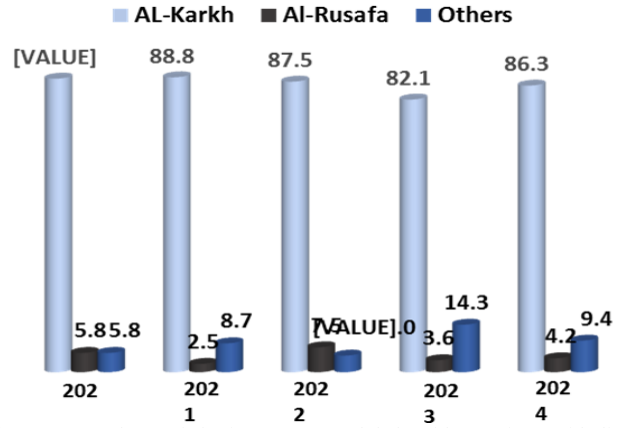

Figure 4: Total HBV infection among Baghdad-resident patients with different geographical backgrounds during five consequent years of 2020 and 2024

Discussion: Each one in the community either health workers, researchers and clinicians in health sciences or any other persons, have a responsibility for acculturation about the method of (HIV) and HBV transmission which may prevalence in all age groups of both gender which mainly transmitted through contaminated blood in addition to other rout (Moran et al., 2020), (Abdulsada et al.,2021) and (Barr et al., 2024).According to our results in figure -1-, out of 75,702 patients male(51.1%) and female (48.9 %) only (0.4%) pre-surgical blood samples was HBV infection, (63.4%) and (%36.5), our results was higher with others, when reported (1.2%) had HBV (Hussein et al., 2019),(Onwuegbuna et al., 2021) and (4.4%) ,(6.025%) respectively (Ahmad et al.,2021), (Kafeero et al.,2021), followed by (Zheng et al., 2024) (3.76%).In the present study, results reveal high percentage male HBV infection than in female and thus favorable with formerly study in 2019 scored, male(65%) and female (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 (34.9%)and female (65.1%) (Ahmad et al.,2021) which acceptable with our 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 , HBs Ag positive results in male more than in female , and epidemiologically male with age acquired hepatocarcinogenesis,(Wang et al.,2015), (Onwuegbuna et al., 2021 and Liu et al., 2022)**.**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 results in figure- 2, was recorded 39 HIV cases were 35 males (89.7%) and 4 females (10.2%), these results was unacceptable with the other global studies in 2018 and 2024 when mentioned that women 1.62 times more prevalent HIV infection than men (Girum et al., 2018), (Barr et al., 2024)however ,other Iraqi study favorable with our results about high incidence of HIV infection in male than female , study in Baghdad registered HIV in males(79.1 %) and females (20.9%) (Saleh et al,2021), study in ThiQar city scored low percentages when comparable with our results only 6(1.2%) males and 2(0.4%) females were HIV positive(Mekki ,et al 2023)

Several factors may play an important role in HIV prevalence ,some of them related to the social and behavioral influences factors such as injection drug users and sex workers other related to the biological factors comprehensive ,i.e., anatomical , physiologic, hormonal, and genetic differences in sex chromosomes ,in addition to the alteration in the immune status(Mitha et al., 2014), (Deeks et al., 2015) and (Moran et al., 2022), so , when women have up to 40% lower HIV loads with higher CD4+ T-Helper cell counts more than men that could may contribute to a lower rate of HIV transmission (Addo and Altfeld,2014)(Torralba ,2023). Furthermore , two studies in South Africa at 2019 and in Malawi at 2023 confirmed , both gender concerns about stigma and privacy may prevent them to non-participation in national strategy plans on HIV/AIDS which lead to delayed diagnosis (Mantell et al., 2019),(Katirayi et al., 2023), previous studies in 2015 and 2023 cleared, many states may widespread lack of HIV testing ,the costs and toxicities of antiretroviral drugs, in addition ,there was no appropriate national strategy plans on HIV/AIDS implemented, which may contributes and affects to continued increased spread of HIV infection (Deeks et al., 2015) (Mekki ,et al., 2023). A study published in China at 2024 showed, a drug can not completely cure HIV infection but used as intervention strategy which can significantly reduce the infectivity of infected individuals and to achieve the maximize the benefits of treatments (Zhang et al., 2024).Our findings in table-1- acceptable with Khan and et al. research, clarified less risk factors contributing to HBV incidence rate in surgical procedure (4.26%)and blood transfusion (4.04%)(Khan et al., 2011), and study in Nigeria published that the prevalence of HBV among cataract surgery patients was 5(1.2%) between the ages 15 and 90 years (Onwuegbuna et al., 2021) ,however, our result were not acceptable when scored lower percentage of positive HBV incidence 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), and 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). Study in 2022, stated women are more vulnerable 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).According to our results in table-2- was agreement with study of Al Awaidy and Sharanya in Oman when they stated, males notably more affected of HIV infection than females in aged 20–49 years (Al Awaidy and Sharanya ,2019),in the same context, two other studies in 2021 one of them in Iraq other in China showed, the majority incidence rate of HIV infection and increasing spread remarkably in males was higher than females in aged 20–35 years and 50 years old(Saleh et al,2021)(Liu et al., 2021)Several studies referred, sociodemographic variables significantly associated with degree knowledge HIV and AIDS, some inappropriate practices and poor knowledge sexual transmitted disease (STD), also study added, is still people had misconceptions about manner of HIV transmission and some of them thought that infected persons should be segregated from the community (Abdulsada et al.,2021), (Katirayi et al., 2023) and (Barr et al., 2024).

Study in AL-Nasryia (Iraq south Governorate) which reveled most HBV infections in January(Winter) with 3.08% (Hussein et al., 2019) ,this finding was congruent with our study in figure -3and 4- ,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 Al-Karkh side , and 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 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).

Our study investigated seasonal variation effect with the incidence of HIV pre-operatively patients, and presented results was non-significantly(p-value = 0.574) as in table 3, which non-consistence with other studies in Miami/USA and Philippines when considered like these state are not only a hotspot for HIV and AIDS, but it's also a climate hotspot, they also added that the number of new HIV infections are more than tripled with different percentages (10%-14%) increase observed on

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days when the heat index was extreme comparable to days with a relatively low heat index(Samano et al.,2021),(Craig ,2023), and this is supported with (Lancet HIV, 2024)which showed ,populations displacement and migration and poor adherence to treatment, poor nutrition, and reduced immunity may effect on HIV program of prevention and treatment services. Two studies published in USA had reported, the antiretroviral therapy (ART) of international program highly effective at inhibiting HIV replication and promise to prolong lifelong of patient in addition to the flexibility hours to applied this test at late evening and weekend which may convenient with people's working hours and that encouraged infected persons to participate like these programs (Deeks et al., 2015) (Camlin et al., 2018) .

Baghdad and Nasiriya cities scored area of low HIV prevalence, in spite of Baghdad in future may complain increased number of HIV infected persons mainly through heterosexuals which represent the major route of HIV transmission (Saleh et al,2021,) (Mekki et al., 2023)

Conclusion: The incidence of HBV and HIV in Baghdad during the five years of this study was low compared to the incidence rates in other governorates, as well as, in neighboring countries, in addition, incidence of HBV infection was influenced with two factors: residential areas and seasonal climate, while the incidence of HIV infection was not influenced with any factors and that proofed each one may exposure to HIV infection unconditionally.

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