

## Incidence rate of positive HIV discovered in pre-operatively tests at AL-Yarmouk Teaching Hospital during 2020 to 2024

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### ABSTRACT

**Background:** Human immunodeficiency virus (HIV) has resulted in 40.1 million fatalities worldwide; it may cause acquired immunodeficiency syndrome (AIDS). Its commonly transmitted to susceptible individuals especially health workers by several procedures, including transfusion of blood and its products; various surgical procedures; dialysis etc., the probability of male-to-female transmission HIV sexually is usually higher than the vice versa. Happening of HIV infection in the whole age groups, however, in males over 40 and below, while in females over 40-year-old only. HIV has been found in each Arab state and these prevalence of virus as a result of heterosexual relationship and/or drug injection. Some independent factors could associate with HIV prevalence like: season, climate and residence.

**Methods:** present study was conducted on total (75,702) pre-operative(pre-surgical) blood sample were collected from both genders (38,681 male, 37,021 female) 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 January 2020 to December 2024. The laboratory testing method was Enzyme Linked Immunosorbent Assay (ELISA) BioTek /REF (50TS8) -USA, to detect HIV Ab-Ag in serum specimens.

**Results:** from 75,702 total blood samples ,HIV infection was 39(0.05%) patients during 5 study years , 35 males (89.7%) and 4 females (10.2%), the highest rate of HIV infection of pre-operative patients was equally in 2024 and 2022(12/16307) and (12/13884) respectively, and the age ranged between 18-50 years old , when recorded highest percentage of HIV incidence in age group 30-49(53.8%), also high percentage of HIV infection (P-value = 0.574) in (Summer and Autumn) seasons (61.5%) when comparable with (Winter & Spring) seasons results (38.5%).

**Conclusion:** The incidence of HIV in Baghdad during the five years of this study was low 39 (0.05%) from 75,702 patients, and the incidence of HIV infection wasn't significantly influenced with factors like: seasonal climate (seasons of the year), age and gender. It's necessary to include a screening HIV 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 evolve and support vaccine programs to apply it on the community and increased consciousness of the risks and methods of transmission of HIV

especially in adolescents and adult's category with confirmed to use a combination drug of HIV to allows the immune system to repair itself and prevent further damage

**Keyword:** *HIV, surgical procedures, climate and health, gender*

## 1. INTRODUCTION

The HIV human immunodeficiency virus was started in 1981 and is still a worldwide public health problem, despite major advances in prevention and therapy sciences, still HIV transmission common (Sabin and Lundgren, 2013), (Mekki et al., 2023). To date, the human immunodeficiency virus (HIV) has resulted in 40.1 million fatalities worldwide (Cui et al., 2024). Untreated HIV replication causes to loss progressive CD4+ T cell and then may contributes to several other common morbidities (Sabin and Lundgren, 2013).

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, in the same year found , 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 revealed, most new HIV infections were caused via unprotected sex(66.8%) , while less than percentage was found mother-to-child, also intravenous drug abuse and via blood transfusion, in spite of 17.4% may unknown causes(Moradi et al., 2016), (Al Awaidy and Sharanya, 2019). In contrast, 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).

In Ethiopia study 2018 found, far higher HIV infection among adult women than men, especially adolescent as well as young women age group, while the program of treatment and HIV care is equal among both genders, (Girum et al., 2018), and this were confirmed by study in 2022,2023,2024 when 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), furthermore, 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),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 and are more likely than women to die of AIDS-related illnesses, which may reflect men's lower life expectancies and thus may encouraged them to improve the comprehensive HIV prevention programming , particularly for men most at risk( Al Awaidy and Sharanya, 2019), (Liu et al., 2021) , (Gottert et al.,2022).

Every effort must be made to ensure decreased HIV-1 acquisition rates among females at risk and improved health programs, and, minimize invasive procedures in HIV positive patients (Addo and Altfeld,2014), (Mitha et al.,2014), especially when study in 2024 found more than triple hospital mortality are symptomatic patients with HIV (Cui et al., 2024)

At present, there is no evidence confirmed that HIV itself is a climate-sensitive infectious disease (CraigO ,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), all this disruptions conditions may increase community transmission and could affect quality and coverage of treatment, as well as, care and support to HIV patients (Al Awaidy and Sharanya 2019) , (Samano et al.,2021)

### Aim of this study

1.Study rate incidence of HIV 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
- Seasonal factors Extreme weather events (EWE): this study was to identify the association between EWE and HIV-clinic attendance rates at a large academic medical system serving the Miami-Dade communities.

## 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 January 2020 to December 2024.

### Sample collection

According to standard procedures (WHO, 2011) and (Altamimi et al, 2018), total blood samples (75,702) from both genders (38,681 male, 37,021 female) were collected from the pre-operative (pre-surgical) patients, as a part of laboratory tests, and all age groups, as well as, in the different seasons from each year.

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

### Apparatus used for HBV:

-The laboratory testing method was Enzyme Linked Immunosorbent Assay (ELISA) to detect HIV Ag in serum specimens.

- ELISA System / BioTek /REF (50TS8) -USA-
- Incubator/JRAD-Syria-
- HIV-Ag kit/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).

## 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 who were undergoing at least two HIV tests were included. A total of 75,702 specimens were tested, of which 38,681 male and 37,021 female (51.1% and 48.9%) respectively.

As shown in figure -1-, there was a significant relationship between gender and the year of study ( $p$ -value = 0.0000), from 75,702 the highest number of blood tests pre-surgical in 2021 (26.8%) followed by 2024 (16307/21.5%) then 2022 and 2023 (21.1% and 18.3%) respectively, while the lowest in 2020 (12.2%). Results in Fig-1- showed that total HIV infection was 39 (0.05%) out of 75,702 patients during 5 study years, the highest rate of HIV infection of pre-operative patients was equally in 2024 and 2022 (12/16307) and (12/13884) respectively, followed by 7/20292 in 2021. On the other hand, the highest incidence of HIV infection from 12 cases was (11/91.6%) male in 2022, which exceeded that of female who revealed (2/16.6%) highest percentage in 2024 from 12 positive cases. There was no relationship between positive result and gender across the study years of HIV infection (Chi-sq test is not applicable).

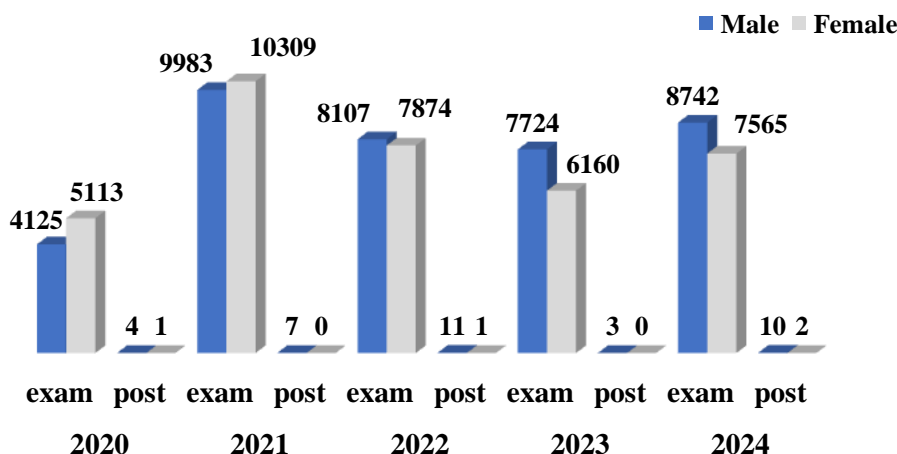


Figure 1: Examined people distributed with positive cases reported according to the gender across the five-year study period. (Exam: examined people, Post: positive cases.)

Table 1:

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

In table 1, a cumulative annual number of 39 newly HIV cases were recorded for Baghdad from 2020 - 2024. There were 35 males (89.7%) and 4 females (10.2%). Their age ranged between 10 - 50 years old. The highest percentage of HIV incidence in age group 30-49 (53.8%), then 18-29 (28.2%), while the lowest HIV cases were scored in  $\geq 50$  age group (17.9%) only. There was no relationship between positive result and age group across the study years of HIV infection (Chi-sq test is not applicable).

Table 2: 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

In present study, table 2 revealed, from the total of 75,702 blood specimen's pre-operative were tested only 39 case positive HIV infection. The high percentage of HIV infection in (Summer and Autumn) seasons (24/61.5%) when comparable with (Winter & Spring) seasons results (15/38.5%), furthermore, in this five study years, higher percentage revealed in 2024 (8/20.5%) of HIV positive results in second half followed by (7/17.9%) in 2022, on the contrary to, 2022 record higher percentage (5/12.8%) in first half study years, followed by (4/10.2%) in 2024, however, all result was non-significantly ( $p$ -value = 0.574)

#### 4. 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 Human Immunodeficiency virus (HIV) transmission which may prevalence in all age groups of both gender and a knowledge how to: prevent, treat, and recover (Abdulsada et al., 2021), (Barr et al., 2024).

Our results in figure- 1, was recorded 39 newly HIV cases were recorded for Baghdad from 2020 - 2024 and there were 35 males (89.7%) and 4 females (10.2%), and 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 man (Girum et al., 2018) (Barr et al., 2024) however, other Iraqi studies favorable with our results about high incidence of HIV infection in male than female, but Saleh and et al study in Baghdad, when data collected from the Central Public Health Laboratory (CPHL) for ten years (2010-2019), registered higher percentage than our results, in males 227(79.1%) and 60 females (20.9%) from 287 of HIV positive case (Saleh et al, 2021), while, in ThiQar city, Mekki team scored low percentages when comparable with our results, from 500 adult, 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) (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 contribute to a lower rate of HIV transmission (Addo and Altfeld, 2014) (Torralba, 2023). Furthermore, two studies in South Africa, in Zimbabwe 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 contribute 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).

According to our results in table-1-, it was not acceptable with two studies in Tehran and Ethiopia when reached, HIV prevalence in female more than male, and associated either with female sex workers (FSW) less than 25 years or adult females (age 15+) accounted 61.5% to 68% of new infection in their age category, even yet Iran country has a highly-educated project about HIV prevalence and performance many research studies to resolve HIV infection problem (Massah et al, 2016) (Girum et al., 2018), however, our results was agreement with other studies, like study by Al Awaidy and Sharanya in Oman when they stated, from 2879 people known to be living with HIV, males notably more affected than females ( $p < 0.001$ ) 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)

The HIV propagate was affected by both age and gender throughout life because, both gender has different risk factors, especially promote unsafe sex, as well as, different innate and adaptive anti-HIV immune responses and the antiretroviral drugs effectiveness, which requirement to concern and access the typical health services for viral infection with a particular affirmation for adolescents and young women. (Addo and Altfeld, 2014) (Girum et al., 2018). One of the important studies in Iraq at 2021, referred, sociodemographic variables significantly associated with degree knowledge HIV and AIDS, some inappropriate practices and poor knowledge about the condom role in preventing 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), these results supported by other studies one in Malawi and two others in USA, furthermore they added, women appeared more motivated to start HIV treatment after diagnosis, to be more healthy and could to take care of their family, whereas men were less disposed for that, and they explained that, different opportunities occupations for men often require prolonged absences from households during planting season, lake fishermen and so on, also these studies were surprised when know, these men believed their wives' HIV test results could be reflect their men status (Camlin et al., 2018), (Katirayi et al., 2023), (Barr et al., 2024)

This study we investigated how the seasonal variation may affect the incidence number of individuals who are tested for an HIV antibody pre-operatively patients, and presented results was non-significantly ( $p$ -value = 0.574) as in table 2, and this results consistency 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 days when the heat index was extreme comparable to days with a relatively low heat index ((Samano et al., 2021)(Craig O ,2023),), this is supported by editorial paper of -The Lancet HIV- when published in 2024, that interactions between climate seasonal changes and HIV incidence are complex and not fully elucidated completely, but still people at risk of and living with HIV are already experiencing the climate effects(Lancet HIV, 2024), whereas China study in 2024 hypothesized, seasonality movement from rural to urban with a good health access availability could be potential factors to reducing infection rates ((Zhang et al., 2024)., other factors related to populations displacement and migration like poor adherence to treatment, poor nutrition, and reduced immunity may effect on HIV program of prevention and treatment services, (Lancet HIV, 2024), 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 these 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) and this coincides with a previous study in 2013 manifested that some individuals could able to maintain high CD4 cell counts in circulation which may suppressed viral load even the absence of ART (Sabin and Lundgren, 2013) which may enhances the action national programs to control of HIV prevalence.

Finally in Iraq Baghdad and Nasiriya cities scored area of low HIV prevalence when comparably with other Iraqi cities, as well as, among many others neighboring countries when demonstrated the high sexual practices and ignorant of HIV/AIDS disease transmission, 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)

## 5. CONCLUSION

- 1- The incidence of HIV in Baghdad during the five years of this study was very low 39 (0.05%) out of (75,702) 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 support the National Institute of Health (NIH) programs that working to develop vaccine which may offers lifelong immunity, was the best approach for reduction and prevention from HIV infection.
- 3- The incidence of HIV infection was non-significantly influenced with three risk factors include: gender, seasonal climate (seasons of the year) and age group, that proofed each one may exposure to HIV infection unconditionally.

## Recommendation

- 1-It's necessary to include a screening HIV as laboratory test within the regular 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 HIV infection, and may helped to reduce incidences percentages.
- 2- Attempt to evolve and support vaccine programs to apply it on the community with increased consciousness of the risks and methods of transmission of HIV especially in adolescents and adult's category.
- 3-Should confirmed to use a combination drug of HIV which can quickly adapt and become resistant, which work by stopping the virus replicating in the body. This allows the immune system to repair itself and prevent further damage

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## Conflicts of interest

All authors report no conflicts of interest relevant to this article

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