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Seroprevelance of Blood Borne Viruses among Patients Attending Hospital for Surgery in Najaf

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Annotation: The current study is hospital based descriptive cross sectional one and conducted during the period of 1/1/2023 to 1/11/2023 among patients attending to the Al-Sadir teaching hospital of Najaf, Iraq. To estimate the prevalence of the blood borne viruses like Hepatitis B virus ,Hepatitis C virus and human immune deficiency virus. Blood samples were taken from the patients as a routine laboratory viral pre-surgical management screening tests by ELISA. Data were analyzed and exhibited in that hepatitis B virus is more prevalent among the positive results in addition with Hepatitis C virus and Human immune deficiency virus. The results are representing the cumulative number of cases covering the period of 10 months in only one hospital of Najaf in regardless to the ages. The majority of the positive cases are males distributed as 64(56.6%)HBV, 60 (55%) HCV and 7(70%) HIV compared to the positive cases of females as 49(43.4%),42(45%) and 3(30%) respectively. Evenmore the such viral screening tests were reported as 225 positive out of 19925 blood samples.

Keywords: Seroprevalence, blood-

borne viruses, hepatitis B, hepatitis C, HIV, ELISA, Iraq, public health.

1.1 Introduction

Infections with different types of microorganisms like bacteria, virus, fungi, and parasites are common everywhere among those infections with blood borne viruses in that some people carry them in their blood and can be spread from one person to another. Those infected with a Blood Borne Viruses may show little or no symptoms of serious disease, but other infected people may be severely ill . Blood borne viruses include Hepatitis B virus {HBV}, Hepatitis C virus {HCV} that cause hepatitis (inflammation of liver) and Human Immunodeficiency Virus HIV that cause acquired immune deficiency syndrome (AIDS), has emerged as a leading cause of morbidity, also the fact that Hepatitis B, HCV virus and the HIV share similar routes of transmission. Hepatitis B virus (HBV) and hepatitis C virus (HCV) share common route of infection and have high degree of epidemiological similarity with respect to high-risk groups with concomitant human immunodeficiency virus (HIV)[1].

Health care workers representing the continuous risk to acquire such viruses via contact with patients and clinical material under term of occupational exposure particularly in operating room this subject has given much less attention. Despite the major risk factors for blood borne viruses is the reuse of contaminated surgical instrument and blood products.[2]

1.2- aim of the study

The study aims to explore the rates of hepatitis B ,HCV and HIV among patients attending al-Najaf hospital for surgical managements conducting pre-operating viral screening tests of blood.

2.1- Hepatitis B&C viruses

Hepatitis B Virus is a small, enveloped, hepatotrophic virus with a partly double-stranded, relaxed circular DNA genome[3]. It is the prototype member of the hepadnaviridae family [4].

HCV belongs to Flaviviridae family of viruses and is enveloped small positive stranded RNA virus[5]. E1 and E2 are heterodimers which plays important role in entry in cell, HCV contains dual layered wrapped nucleocapsid with lipid bilayer [6]. HCV infection often leads to Hepatocellular Carcinoma because viral replication occur in liver cell. Therefore, to start the process Hepatitis C virus has to cross the plasma membrane to access the cytosol[7].

2.1.1-Transmission of hepatitis B&C viruses

The main routes of transmission for Hepatitis B &c viruses include:

1. contaminated blood products
2. sharing injection equipment
3. sexual intercourse
4. mother-to-child transmission
5. travel to the infecd area
6. contaminated beuaty center's equipment
7. occupational exposure

2.1.2-Diseases of Hepatitis B&C viruses

HBV & HCV infection leads to a wide spectrum of liver disease ranging from acute hepatitis (including fulminant hepatic failure) to chronic hepatitis, cirrhosis, and hepatocellular carcinoma

(HCC)[8]

Hepatitis B virus (HBV) and Hepatitis C virus (HCV) are responsible for considerable amount of liver disease globally, and both the viruses have same mode of transmission, the co-infection of these viruses happens but is considered as uncommon[9].

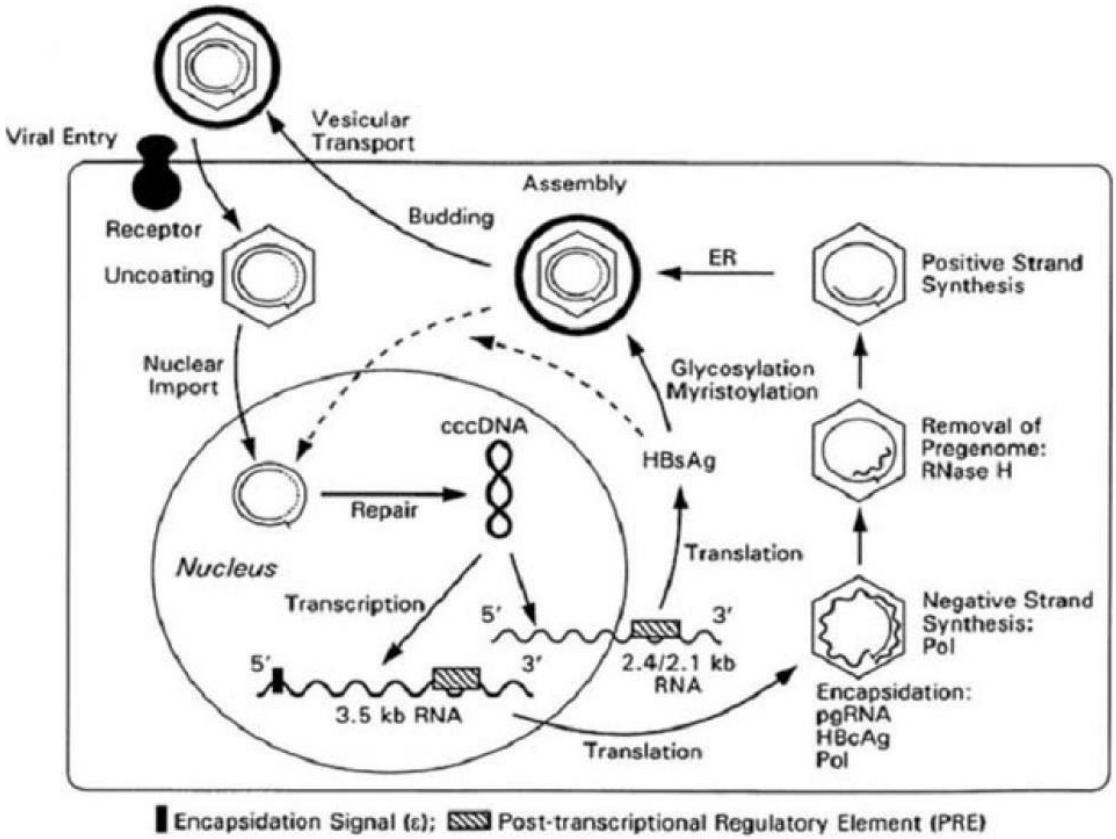

FIGURE 2.1: Hepatitis B Virus, Replication Cycle. (farooq , *et al* 2017)

The liver becomes tender and swollen, may permanent damage occur, such as scarring or liver cancer. Symptoms may include pale colored feces, jaundice, fatigue that may prolong weeks or may be months. Gastrointestinal symptoms such as loss of apetite, nausea, vomiting, weight loss, and fever may occur. HCV cause the Hepatitis C infection. This damages the liver and it may take years. Acute liver infection may occur to people and they get recovered and feel better, this is acute type of Hepatitis C. But, in some indivivduals it may persists and go on to develop long term infection, resulting cirrhosis of liver ultimately resulting in liver carcinoma[10].

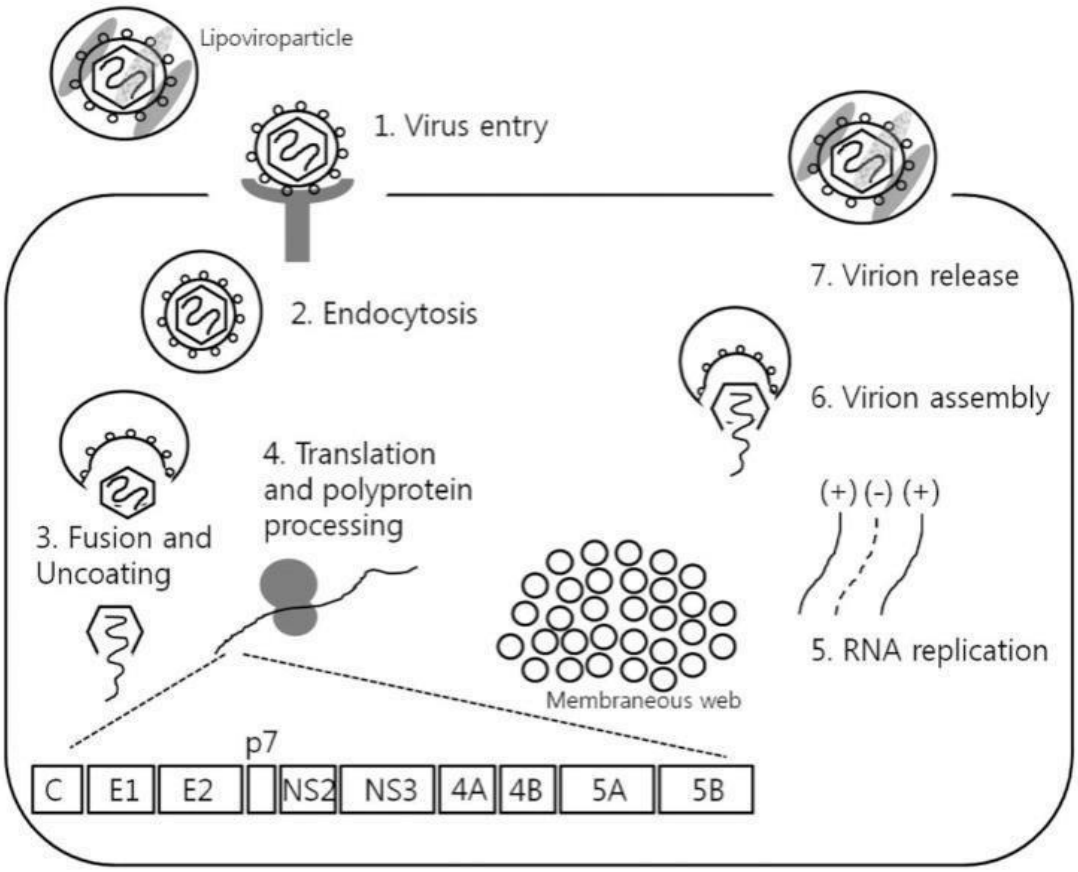

FIGURE 2.2: Schematic representation of HCV life cycle

In 1989, HCV was first discovered as a causative agent of hepatitis, and it belongs to a family of viruses named Flaviviridae, and its characteristic feature is positive- stranded RNA virus. The number of individuals that are getting infected with this virus globally is almost about 200 million. This is almost 3.3% of the whole world's population. The percentage of infections of HCV that may lead to the chronic liver disease is in almost 50-80% of individuals. According to the WHO report of 2004 the annual mortality rate due to liver cirrhosis & liver carcinoma are 308000 and 785000 respectively.

Blood transfusion and blood products, risky dialysis, oral surgery & clinical instruments, and other infections due to medical procedures are the most common cause of the HCV infection worldwide. In several regions of world the infection rate along the susceptibility rate decreased relevantly after the adoption of preventive measures and control strategies. In most countries which or developing the spread of Hepatitis C virus infection is due to lack of awareness regarding used syringe disposal, multiple uses of a syringe, and specialized blood bags, among other factors.

Risk factors associated to HCV infection may vary region-region. Countries which are developed, hepatitis C infection spread is usually through injectable drug use and treacherous sexual practices. Whereas, in developing countries like Malaysia, Pakistan, India, and Nepal the infection is caused by risky clinical practices and unhealthy blood and blood products. Other factors like demographic characteristics such as age, gender, ethnicity, marital status, and economic status along lifestyle and religious beliefs e.g. tattooing, ectodermal & endodermal punctures, barbering practices, tooth-brushes and shaving instrument sharing, circumcision & rituals etc., health care and cosmetology like oral treatments, plastic surgeries, cosmetic implants, acupuncture, and cupping etc., with social and economic conditions such as local medical facilities, salary/income, and health conditions.

2.1.3 Sign and symptoms of hepatitis B&C infection

Many people do not have any symptoms when they are first infected with hepatitis B&C.

People who do have symptoms or signs may get:

1. yellowing of the skin and eyes (jaundice)
2. dark urine
3. extreme fatigue
4. nausea and vomiting
5. muscle and joint pain
6. abdominal pain
7. loss of appetite
8. rashes
9. pain in the right-hand side of the abdomen
10. fever

Literature Review

2.1.4 Hepatitis B & C Diagnosis

There are three standard approached to detect HBV. HBsAg (surface antigen test) a part HBV found in the blood of Hepatitis B patient. In response to HBV or vaccine, anti-HBs a surface antibody is produced.

Diagnosis of HCV depends on detection of HCV by an Enzyme Immune Assay. Initially Anti-HCV is not detectable in patients but RT-PCR can be helpful in the detection of HCV in early onset of infection. Ideal approach, population based surveillance data, is used to monitor the spread and prevalence of disease, high risk identification and design the control strategies for HCV & HBV as well. However, public awareness, significant technical and logistical resources allocation, in developing countries which is not very easy.

In case of Acute HCV infection, clinical symptoms are silent but 16-20% individuals may develop symptoms like fever, nausea, loss of appetite, loss of weight, fatigue, vomiting and abdominal pain. Chronic HCV infection is often asymptomatic, and HBV or HCV may remain undiagnosed. HBV incidence has been reduced remarkably due to large scale vaccination but HCV is still a global public health concern. Being blood borne and same transmission process, HBV & HCV are distinct endemics[10].

2.1.5 Prevalence of Hepatitis Worldwide

Hepatitis C virus, identified as major causative agent of non A or non B hepatitis in 1989. 200 million people are effected by HCV worldwide that is 3.3% constitute of world's population Along with viral infection alcohol abuse plays major role in liver cirrhosis and a leading cause of Hepatocellular Carcinoma globally with combined effects of HBV or HCV infection.

The clinical results and sequels of chronic liver infection may differ among individuals but infection with hepatitis B virus causes wide spectrum clinical occurrences, that may be asymptotic-acute carriers with self-limiting or wholely hepatic failure, with progressive liver cirrhosis leading chronic hepatic infection to hepatocellular carcinoma

Chronic infection due to HBV & HCV are the leading cause of HCC (hepatocellular carcinoma). According to WHO, about 350 million individuals are infected with chronic liver infection caused HBV and 170 million with HCV.

2.1.6 Preventions from Hepatitis B & C viruses

Public health care services are more focused on donation of blood, blood transfusion, preoperative HBV&HCV screening, and safe injection practices, injection drug use reduction, and high risk sexual behaviors

The implementation of these measures requires public health care officials to work together with relevant third party organization for the improvement detection, monitoring and preventive measures for the treatment of Hepatitis B&C infection.

2.1.7 Risk factors of Hepatitis B & C

Risk factors related to blood borne Hepatitis vary from region to region in different countries. In developed countries, it may be caused by Injection Drug Use and high-risk sexual behavior, whereas, in developing countries it may be caused by unsafe medical practices and contamination on blood and contaminated blood products. Demographic characteristics (age, gender, ethnicity, marital status, occupation, etc.) life styles and religious beliefs (tattoos, piercing, hairdressing, circumcisions and rituals, sharing of toothbrushes and shaving razors etc.) oral treatment and cosmetology and socioeconomic conditions.

2.1.7.1-Injecting Drug Use

As hepatitis C virus and hepatitis B virus are blood borne and are transmitted via blood contact of infected individuals. About 8-10 million IDUs worldwide are suffering with HCV acute or chronic may be[1]

2.1.7.2-Blood Transfusion

Patients with thalassemia and hemophilia timely need to be transfused with fresh blood and source of that blood must be reputable, as multitransfused patients are more prone to blood borne diseases

2.1.7.3-Genetically Transmitted

HCV is not genetically transmitted[2]. But it is transmitted by members of family may be by blood contact or through bruises or injection syringes used by HCV/HBV patients. [2].

2.2 human immunodeficiency virus

The human immunodeficiency virus is single-stranded RNA molecules grouped to the genus Lentivirus within the family of Retroviridae, subfamily Orthoretrovirinae . On the basis of genetic characteristics and differences in the viral antigens, HIV is classified into the types 1 and 2 (HIV-1, HIV-2) The mature HIV particle is round, measures approximately 100 nm in diameter, with an outer lipid membrane as its envelope[3].

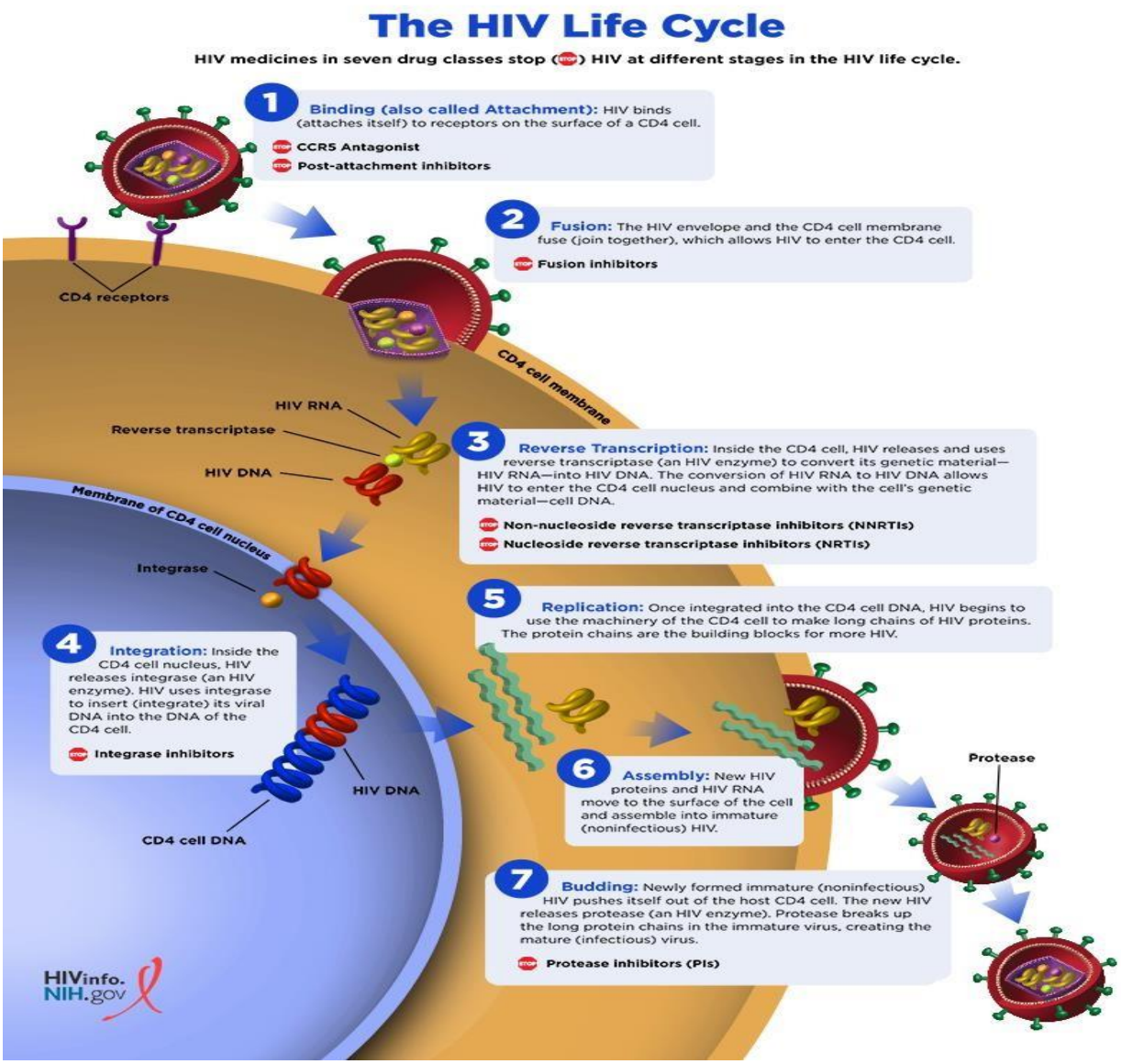

Figure 2.3 Schematic representation of HIV life cycle

2.2.1-Diseases related to HIV

large number of patients may only have an asymptomatic infection after the exposure. The usual time from exposure to onset of symptoms is 2 to 4 weeks, although, in some cases, it can be as long as 10 months.

1-acute retroviral syndrome, may appear acutely. Although none of these symptoms are specific to HIV, their presence of increased severity and duration is an indication of poor prognosis. These symptoms, in the order of decreasing frequency, are listed below:

- ✓ Fatigue
- ✓ Muscle pain
- ✓ Skin rash
- ✓ Headache
- ✓ Sore throat
- ✓ Swollen lymph nodes
- ✓ Joint pain

- ✓ Night sweats
- ✓ Diarrhea(Brew , Garber ,2018).

2-Chronic HIV infection can be characterized by either without AIDS or with AIDS and can progress to advanced HIV infection:

A-Chronic HIV infection without AIDS

B-Chronic HIV infection with AIDS: AIDS is defined as a CD4 cell count <200 cells/microL or the presence of any AIDS-defining condition regardless of the CD4 cell count. AIDS-defining conditions relate to those opportunistic illnesses and malignancies that occur more frequently or more severely as a result of immunosuppression.

C-Advanced HIV infection: is defined as a CD4 cell count <50 cells/microL.

2.2.2-Transmission of HIV

- ✓ Sexual contact
- ✓ Blood transfusion
- ✓ Sharing of sharp object
- ✓ Sharing of plates and spoons
- ✓ Sharing drinking cups with infected person
- ✓ Sharing toothbrush with others
- ✓ Sharing barber's clippers with others
- ✓ Mosquito bites
- ✓ Through Handshake/hugging
- ✓ Through mother-child during birth
- ✓ Through mother-child during breastfeeding
- ✓ Through kissing
- ✓ Use of non-sterile dental instrument

2.2.3-Diagnosis of HIV

1-Antibodies: HIV antibody screening tests are used for the primary diagnosis followed by a confirmation test in the case of a reactive result in the screening assay. In addition to the ELISA (enzyme linked immunosorbent assay) or variants of this test system, particle agglutination tests are used

2-Confirmatory Test (Western blot, Immunoblot)

Because ELISAs were developed also for the detection of low antibody levels with the highest sensitivity, (Gürtler , *et al* 2016)false-positive results occur, especially when immune complexes are present in the serum, e.g., if individuals had been infected with other pathogens at the time of serum collection, were recently vaccinated or had a strong stimulation of the immune system. Furthermore, false-positive results were reported for individuals with autoimmune diseases or allergies and for pregnant women. Mistakes in pre-test conditioning can lead to false-positive screening tests, e.g., in the case of incomplete coagulation of the test specimen.

3-Virus Detection Virus isolation in cell culture takes approximately 6 weeks and is often unsuccessful and costly[4]. For diagnostics in blood establishments virus isolation is of no relevance

4-Nucleic Acid Amplification Technology.

2.2.4-Prevelance of HIV

The global burden of HIV/AIDS was 36.9 million cases in 2019, corresponding to 0.5% of the world's population, with a prevalence rate of 476 cases per 100,000. Global HIV prevalence showed a peak in 2005, decreasing for 5 years and then re- gaining a rising trend since 2010 (possibly due to increased survival with ART). Currently, prevalence is rising globally as well as in countries such as South Africa, Portugal, Brazil, Mexico, Peru, Spain, Germany and the United States. Both gross and age-standardized rates are rising in these countries indicating that this is well in excess of natural increase due to population growth. Portugal stands out with a rapidly rising prevalence rate, from 86 to 370 per 100,000 (from 1990 to 2019 respectively). However, this pales in comparison to South Africa's meteoric rise from 354 to 14,251 per

100,000 over the same period. Regional distribution of the burden of HIV/AIDS is heavily concentrated in central and southern African countries such as Lesotho, Mozambique, South Africa, Zimbabwe and Namibia.

2.2.5-Preventation of HIV

1-Barrier protection. Numerous prevention measures have been encouraged by public health and infection control authorities around the world; these techniques demonstrate varying levels of efficacy. For example, the use of latex condoms in conjunction with lubricants, also known as barrier protection, has been highly effective in preventing the transmission of HIV.

2-Circumcision: circumcised men have a 57% to 61% decreased risk of HIV transmission during heterosexual intercourse.

3-Needle and syringe exchange. Although HIV is classified as an Sexual Transmitted Infection it can be transmitted by contaminated blood as well as through sexual intercourse. The most common exposure to blood is through shared needles and syringes via intravenous drug use

3.1-Materials and method

This was a cross-sectional 11month descriptive study of patients attending the teaching hospital for pre surgical management screening tests covering the period from 1 January 2023 to 31 November 2023. The study was conducted at the most hospitals in al Najaf city/Iraq

The Obtained data was statistically analysed in that conducted by canva software and Chi- sequere test.

A total of 19925 patients who undergo surgical procedure (16–63 years) were included in this study. The serum samples of all patients were screened for viral infections including hepatitis B surface antigen (HBsAg), antibodies to a hepatitis C antigen (anti-HCV), antibodies to HIV using the ELISA kit (BioKits), following manufacturer’s instructions.

3.2-Apparatus and instrument

1- ELISA plate reader

2- Micropipette

3- Tips for micropipette

Figure 3.1 ELISA PLATE READER Device

3.3-Reagent

1- HBV diagnostic kit

2- HCV diagnostic kit

3- HIV diagnostic kit

Figure 3.2 HBV diagnostic kit from intec products inc company in china

Figure 3.3 HCV dignostic kit from Qingdao hightop biotechnology company in china

Figure 3.4 HIV diagnostic kit from AB DIAGNOSTIC SYSTEM company in Germany

Each kit of them contain:

1- Antigen coated plate
2- Enzyme conjugate
3- Washing buffer
4- Sample dilution liquid
5- Substrate A
6- Substrate B
7- Stop solution
8- Negativ control
9- Positive control

3.4-procedures

5 ml of venous blood was taken from each person and a test tube was placed, then the serum was separated from the blood by a centrifuge 3000 rpm for 3 minutes and then placed in marked appendroff test tube and stored at 20°C.

Procedure of Hepatitis B virus diagnosis:

1. In A1 well add 0.05ml of control positive.
2. In B1 well add 0.05ml of control negative.
3. In C1 well add 0.05 ml serum.
4. Add 0.05ml of conjugated of each well.
5. Covered by plate sealer and incubate at 57C for 60 min.
6. Wash by washing solution (1:20) for 5 times,
7. Add 0.05 ml of substrate A and 0.05 ml of substrate B of each well.
8. Incubate at 37C' in dark for 30 min.
9. Stop the reaction by adding 0.05ml of stop buffer of each well.
10. Read at 450 nm.

Procedure of Hepatitis C virus diagnosis:

1. Add 0.1ml of specimen diluents of each well
2. In A1 well add 0.01 ml of control positive.

3. In B1 well add 0.01 ml of control negative.
4. In C1 well add 0.01 ml of serum.
5. Covered by plate sealer and incubate at 370 or 30 min.
6. Wash by washing solution (1:20) for 5 times
7. Add 0.1 ml of conjugate of each well.
8. Covered by plate sealer and incubate at 370 for min.
9. Wash by washing solution (1:20) for 5 times
10. Add 0.05 ml of substrate A and 0.05 ml of substrate B of each well.
11. Incubate at 37C' in dark for 30 min.
12. Stop the reaction by adding 0.05 ml of stop buffer of each well.
13. Read at 450 nm.

Procedure of Human immunodeficiency virus diagnosis:

1. In A1 well add 0.1 ml of control positive.
2. In B1 well add 0.1 ml of control negative.
3. In C1 well add 0.1 ml of serum.
4. Covered by plate sealer and incubate at 37C for 30 min.
5. Wash by washing solution (1:20) for 5 times.
6. Add 0.1 ml of conjugate of each well.
7. Covered by plate sealer and incubate at 37C for 20 min.
8. Wash by washing solution (1:20) for 5 times.
9. Add 0.05 ml of substrate A and 0.05 ml of substrate B of each well.
10. Incubate at 37C' in dark for 10 min.
11. Stop the reaction by adding 0.05 ml of stop buffer of each well.
12. Read at 450 nm.

4.1-Results

A cross sectional observational project was performed in Al-Sadir teaching hospital of Najaf, Iraq from 1/ Jan 2023 to 1 Nov. 2023 for blood samples were collected and were tested for HBsAg, anti HBC and HIV kit Used in standard laboratory techniques as routine screening for patients prior to surgiend any surgery so as Called (pre-surgical operations) Out of 19925 different patients by physical examination infected HBV,HCV and HIV were the most incidences with 113 patient (50.2%) with HBV while, there were 102 patients (45.3%) with HCV ,and there was10(4.5%) patients with HIV results can be interipretate by the following:

Table 4.1 distribution of blood borne viruses in general

Patients	**Number**	Rate
Total	19925	**100%**
Positive	225	**1.1%**
Negative	19700	**98.9%**

Table 4.2 distrbution of blood borne viruses between positive male and positive female

Patients	HBV	HCV	HIV
Male	64(56.6%)	60(55%)	7(70%)
Female	49(43.4%)	42(45%)	3(30%)
Total	113(100%)	102(100%)	10(100%)

Table 4.3 final statistics of prevalence of blood borne viruses

Final statistics	Rate
HBV	50.2%
HCV	45.3%
HIV	4.5%

5.1 Discussion

The positive result of the current study reveals that the prevalence of hepatitis B virus(50.2%) hepatitis C virus(45.3%) and human immune virus (4.5%) respectively. This study showed higher prevalence for hepatitis B virus and low prevalence for hepatitis C virus and human immunodeficiency virusRisk factors significantly associated with hepatitis B virus hepatitis C virus and human immune virus were may found due to got piercing by needle, have tattoing (hijama), have touched someone else's blood, contact with someone who used needles for drug abuse or steroid and have an incidental piercing.

The presented results evenlycome in line to those of saudi Arabia which reveales higherpr evalence of HBV than HCV. Also another study, has been stated that the ovarall prevalence of HBV is 2.3% and no significat in previous study difference between males & females in a previous study conder fanalised over the period of 12 months 1 Jan to 31 Dec. 2013 in Basra.

In Diyala, Iraq, the study by Al-Taie et al., showed that there is a 0.65% of total isolates were positive to HBV and HCV viruses (Al-Duliami and Al-Jebori, 2010). The result of study proved that the male patients were 95 patients (74%) infected with HBV and 33 patients (26%) infected with HCV, while the females were 43 patients (64%) infected with HBV and 24 patients (36%) infected with HCV. The result of present study was in agreement with the study by (AL-Hawaz *et al*,2014) in Basra,Iraq, that showed there is a high prevalence of hepatitis viruses in males (59.7%) than females (40%)(AL-Hawaz *et al*., 2014). Also in agreement with the study in Syria by (Yazaji *et al*,2016.) that showed the HBV infection was distributed in males (55%) more than females (45%). The study in Egypt by Mahmoud et al., (2016) was in agreement with this study result that showed that the prevalence of HCV infections in males was 75% and females was 25%

The current study come in agreement with the study of Thualfakar 2020 The higher prevalence of HBV and HCV was in Alnajaf city in male with age groups between 21-60 years old, this rate of incidence is in increasly and it is make a concern to health sector.

This project will provide a ground for comparison in future studies as the large-scale study to examine the prevalence of seromarkers in Najaf . However, there are some limitations to this study, due to the lack of information such as the history of blood transfusion, dental extraction, surgical operation, cupping and tattooing. Future studies will be needed to explore these areas.

5.2 Conclusion

Najaf still represents an area of the lower HIV prevalence as well as HBV & HCV Compared to others despite the numbers of new Cases increased with the time and may be changed with marital states, sexual behavior and whether the previously registered cases are still alive or dead. with such heath & socioeconomic risk Viral diseases.

5.3 Recommendations

1. Contral & preventive stratigies for hepatitis HCV and HIV reflect an importance since their Vaccines an Unavailable.
2. Avaiding Nosocomial exposure, sharing barber tools Unsafe injections, piercing , tattoes, adultery or non protective sexual contact.
3. Vaccine far HBV is of great importance especially for health staff and for poeple who are at risk of such infection.
4. The involvement of educational programmes related such viral diseases

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