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Patterns of Hepatitis B and C viruses Infections by Gender, Age, and Monthly Distribution in Baghdad–Al-Karkh, 2024

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ABSTRACT

Background: Viral hepatitis remains a major public health concern in Iraq, with hepatitis B virus (HBV) and hepatitis C virus (HCV) constituting the predominant types. Gender-based differences in infection patterns are well recognized, with HBV more commonly reported among males and HCV among females. Understanding these variations is essential for creating effective prevention and control strategies.

Aim of the Study: To examine the epidemiological determinants of viral hepatitis infection by assessing the association between sex, age distribution, and monthly/seasonal variations in relation to HBV and HCV prevalence.

Methods: A cross-sectional study was conducted using confirmed HBV and HCV cases registered in the viral hepatitis control unit of Bagdad Al-Karkh Health Directorate. Data were analysed using SPSS v.26. Chi-square tests were used to assess associations between infection type and gender, age group, and month of detection at a significance level of $p < 0.05$.

Results: A total of 996 confirmed cases were included. Males represented 61% of all cases. The highest proportion of infections occurred in the 20-39 year age group (42%), followed by 40–60 years (27%), while only 1% were below one year of age. March had the highest detection rate (27%). Statistically significant associations were observed between infection type and sex ($p = 0.024$), age group ($p < 0.001$), and month of detection ($p = 0.014$).

Conclusion: The study demonstrates clear epidemiological differences in HBV and HCV distribution by gender and age in Bagdad Al-Karkh Health. HBV was more prevalent among males, whereas HCV showed a higher prevalence among females. Monthly variations in detection highlight the influence of healthcare access and seasonal screening practices.

INTRODUCTION

Viral hepatitis is a major global health challenge, contributing significantly to chronic liver disease, cirrhosis, and hepatocellular carcinoma (HCC). HBV and HCV infections account for the majority of hepatitis-related morbidity and mortality worldwide (WHO, 2024). Both viruses may remain asymptomatic for long periods, leading to delayed diagnosis and increased transmission (WHO Guidelines, 2024).

HBV is a highly infectious DNA virus capable of surviving outside the body for several days. An estimated 254 million individuals were living with chronic HBV infection in 2022 (Stroffolini, 2023). Its transmission varies by region: perinatal infection is dominant in high-endemic areas, while sexual and percutaneous exposures are predominant in low-endemic countries.

HCV is an RNA virus primarily transmitted through exposure to infected blood. Unlike HBV, most HCV infections become chronic, and no vaccine is currently available (Mayo Clinic, 2023). Coinfection with HBV and HCV worsens clinical outcomes and significantly increases the risk of HCC (WHO, 2017). Early detection and epidemiological understanding are therefore crucial for prevention.

Epidemiology of Viral Hepatitis

In the Middle East and North Africa (MENA) region:

The Middle East and North Africa (MENA) region carries one of the world's highest burdens of HCV, representing nearly 30% of global incident infections (Mahmud et al., 2022). Contributing factors include historically unsafe medical injections and inadequate blood-transfusion screening. HCV genotypes 1 and 4 are predominant across the region (Athamneh et al., 2023). HBV prevalence in MENA varies by country. Despite the expansion of infant HBV vaccination programs, gaps in coverage persist, particularly in rural and underserved populations (WHO Hepatitis Data, 2024).

In Iraq:

Iraq is generally classified as having low-to-moderate HBV prevalence and low HCV prevalence in the general population. National surveys and multiple provincial studies estimate HBsAg prevalence between 0.5% and 2%, while HCV prevalence remains below 1% in most healthy populations (Tarky et al., 2013 & Thamir, 2019). Higher HCV prevalence is documented among high-risk groups such as thalassemia and multi-transfused patients. Recent surveillance data show a downward trend in HBV and HCV among blood donors from 2019 to 2021, reflecting improved infection-control and screening practices (Khairallah et al., 2023).

METHODOLOGY

Study Design: A descriptive cross-sectional epidemiological study was conducted using retrospective data from individuals diagnosed with HBV or HCV in Baghdad Al-Karkh during 2024.

Study Setting: Data were collected from different screening centers are (premarital testing centers, infectious disease word of hospital and preoperative intervention, antenatal units at healthcare centers and blood banks) within the Al-Karkh Health Directorate.

Inclusion Criteria: Confirmed positive HBsAg or anti-HCV antibody, All age groups including infants and Residents at Baghdad Al-Karkh

Exclusion Criteria: Incomplete records of investigation forms, non-residents at Baghdad Al-Karkh and Co-infected HBV/HCV cases

Data Collection: Data were obtained from electronic Excel records within the hepatitis control unit

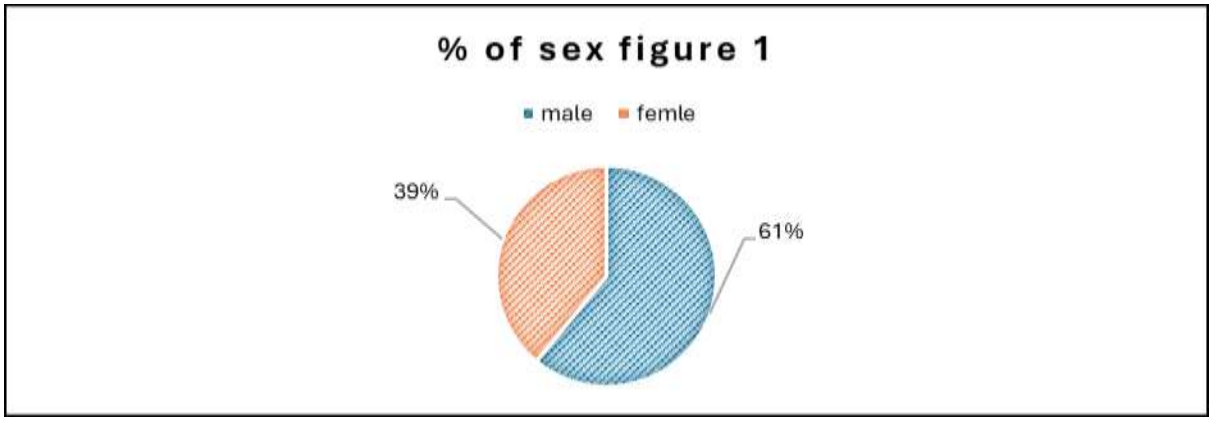
Statistical Analysis: Analysis was performed using SPSS v. 26:

- Frequencies and percentages for categorical variables
- Chi-square test for associations between infection type with (Gender, Age groups and Detection month) at Significance level: $p < 0.05$
- Bar and pie charts for summarized the data.

Results: A total of 996 patients were included. Of these, 63% had HBV and 37% had HCV.

Gender Distribution

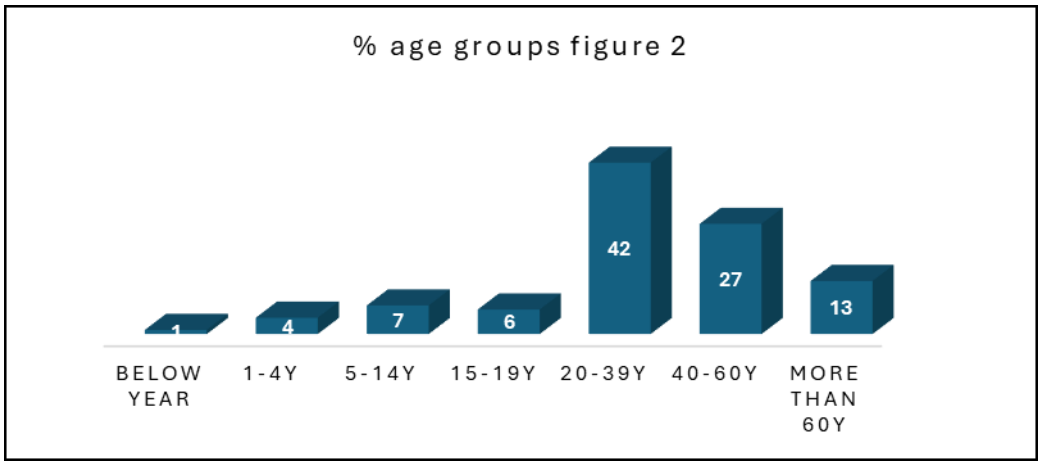
Nine hundred and ninety sex Patients were approved to have HBV, 611, HCV, 377 cases and only 4 cases with mixed infection (HB and HC) were attending different screening centers. After confirming the diagnosis, about 61% of all cases are male and 39% female, as illustrated in Figure 1



- The Chi-square test: $\chi^2 = 7.44$, df = 2, **p = 0.024,** There is a statistically significant association between gender and hepatitis viruses.

Age Distribution

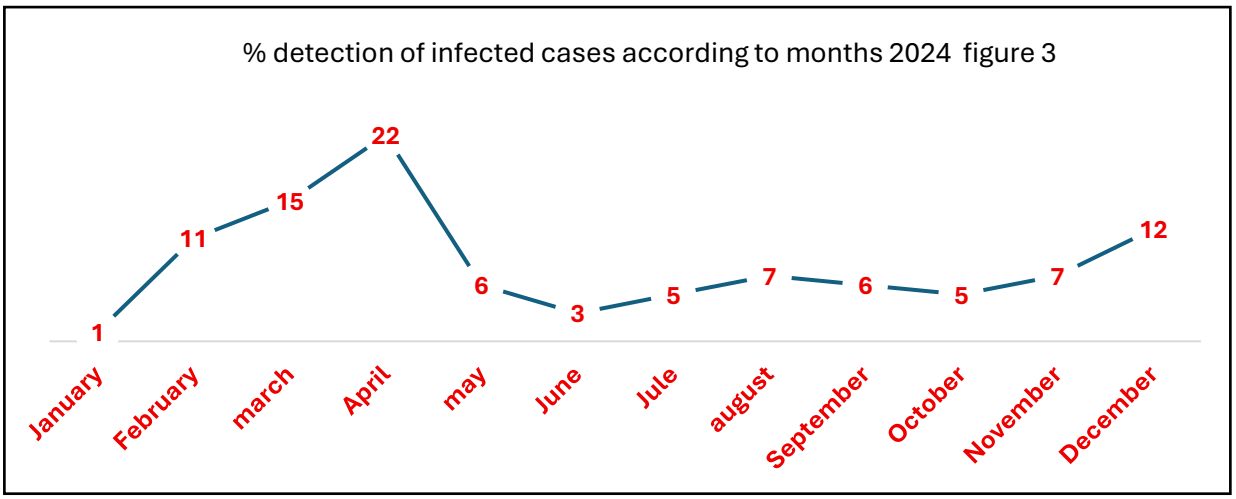
Regarding the age of infected cases, with a mean age of 37 years, as shown in Figure 2, the most infected cases are in the age group (42% : 20-39) years, then the age group (27%: 40-60) years, and the least in the age group below one year at 1%



- Chi-square: $\chi^2 = 87.88$, df = 12, **$p < 0.001$,** There is a statistically strongly significant association between the age group and hepatitis virus.

Month of Detection

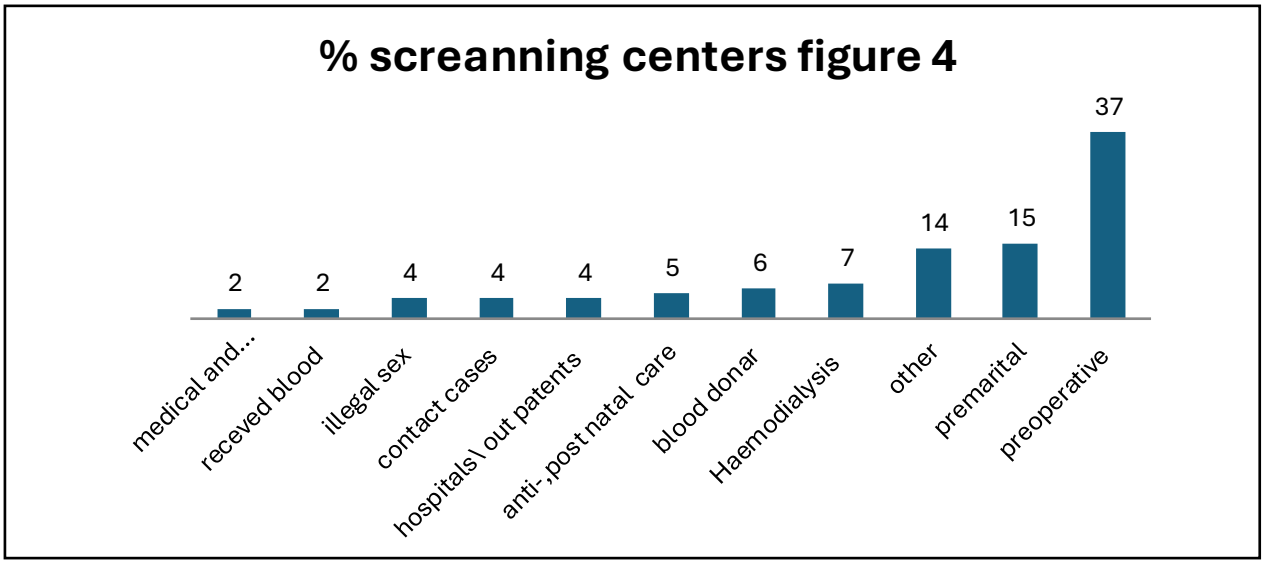
Figure 3 illustrates the percentage of case detection according to time (months) maximum of case detection in April, 22% then again increasing the case detection again during December, 12%



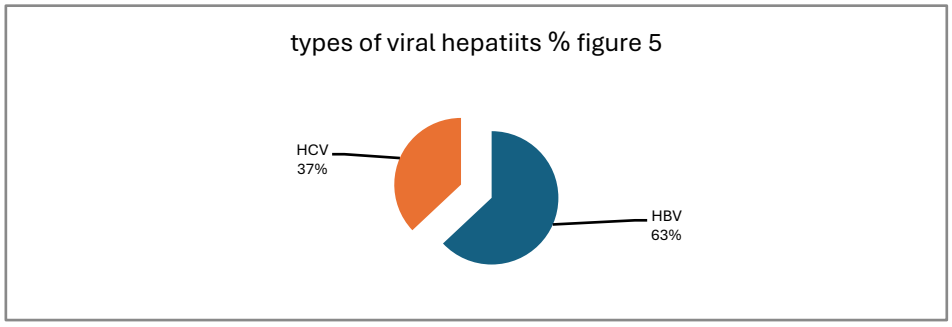
- Chi-square: $\chi^2 = 39.036$, df = —, **$p = 0.014$,** Month of diagnosis is significantly associated with infection type.

Clinical Context of Detection (screening centers)

Most of the detected cases in the screening centers were either HBV or HCV in hospitals during the postoperative period before surgical intervention was 37%, premarital state at 15% and less in primary health care centers during antenatal care was 2% as in figure 4



In other side figure 5 shown the types of viral hepatitis , 63% with HBV and 37% with HCV



DISCUSSION

Gender-Based Variations: Male predominance in hepatitis cases (61%) matches regional and global data. Occupational exposure, increased contact with community grooming (barbers), risk-taking behaviors, and lower health-seeking behavior contribute to this pattern (Alavian et al., 2013 and CDC, 2022). Similar trends have been reported in Egypt, Iran, Turkey, and Saudi Arabia (Abdel-Gawad et al., 2023 and Alghamdi et al., 2023).

Age Distribution: The highest infection burden among adults aged 20–39 years reflects increased healthcare interaction, tattooing, dental procedures, and surgical exposure (Blach et al., 2017). The 40–60-year group likely reflects chronic HCV acquired decades earlier before improved sterilization and blood-safety measures (Mohd Hanafiah et al., 2013). The very low infection rate in infants (<1%) reflects successful HBV vaccination programs implemented across Iraq and globally (WHO, 2023).

Preoperative Detection: Nearly one-third of infections were discovered during preoperative evaluation, consistent with literature showing that hepatitis infections are frequently asymptomatic and often diagnosed incidentally (Lavanchy, 2011). This underscores the importance of universal infection screening before procedures.

Monthly Distribution: Monthly variation showed significant association with infection type. Peaks in March–April and December may reflect:

- Increased health-seeking behaviour after winter
- Preoperative evaluations
- Seasonal screening demands
- Dialysis cycles (for HCV)

These findings align with other studies in Iraq and the region (Fathalla et al., 2021and Al-Hamadani, Abdul-Latif, 2022).

Comparison With Regional & Global Studies: Overall, the study findings align with MENA epidemiology, where HBV is more common in younger adults and males, while HCV peaks in older individuals due to historical medical practices (Alavian et al., 2013; Merzah et al., 2019).;

Conclusion: HBV and HCV remain significant public health issues in Baghdad Al-Karkh. HBV is more common in males, while HCV disproportionately affects older adults. Detection peaks during specific months reflect healthcare practices rather than seasonal virus transmission. Strengthening screening, vaccination, and infection-control measures is essential for reducing hepatitis burden.

RECOMMENDATIONS

1. Expand HBV vaccination, especially among high-risk groups.
2. Improve infection-control measures across all healthcare levels.
3. Increase population-level HCV screening in adults >40 years.
4. Implement health education programs on transmission prevention.
5. Enhance monthly and seasonal surveillance to improve early detection.

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