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COMPARATIVE STUDY ON CO-INFECTION OF HEPATITIS B VIRUS AND BLOOD GROUP AMONG PATIENTS ATTENDING SAINT LUKE HOSPITAL WUSASA, ZARIA, KADUNA STATE

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Introduction/Abstract

HBV is a hepatotropic virus that belongs to the Hepadnaviridae family. The viral genome is a DNA of about 3.2 Kb that has four overlapping open reading frames (ORFs): S, X, P,and C. The S/preS ORF encodes the three form of hepatitis B surface antigen (HBsAg): long (HBsAg-L), medium (HBsAg-M) and small (HBsAg-S). The regulatory protein X (HBx) is transcribed from X ORF; the P ORF encodes the viral DNA polymerase; and the C ORF encodes the core protein (HBcAg) and a related protein called which is the precursor of the secreted protein known as antigen e (HBeAg)(GHSS,2021). The diagnosis of HBV infection is established by detection of the molecular and serologic markers: viral DNA, HBsAg, HBeAg, anti-HBs, anti-HBe and anti-HBc (IgM and total antibodies) (Table 1).Four routes of transmission have been described: (1) parenteral, i.e., by transfusion, reused syringes and needles and contact of blood; (2) sexual; (3) vertical; (4) horizontal, i.e., by contact with body fluids, such as saliva, shared toothbrushes and secretory skin lesions(Illiam,2017).In high endemic areas (Africa and Southeast Asia), HBV infection is acquired predominantly during the perinatal period or in early childhood (Borgia,2012). Hepatitis B (HBV) and C (HCV) viruses are responsible for the most common chronic viral infections worldwide. The prevalence of HBV and HCV infection is higher among people living with the human immunodeficiency virus (HIV) compared to the general population due to the common trans-mission routes and the overlap of behavioral risk factors for these viruses.1Guidelines for the clinical management of HIV patients recommend testing for infection markers for viral hepatitis, and clinical evidence shows that co-infections are associated with worse prognosis of the liver disease(Soriano,2011). The main aim of this study is to determine prevalence of hepatitis coinfection with Blood group among patients attending Saint Luke Hospital Wusasa Zaria. The Study only be limited to prevalence of hepatitis co-infected with blood group in the Study area.

Materials And Method

Materials

The following materials will be used for this study include blood samples, syringes and needles, sterile EDTA and plain tubes, hand gloves, tourniquet, dry and wet cotton swabs, centrifuge, refrigerator, and rapid diagnostic test (RTD) kits.

Study Area

Zaria is a metropolitan city in Nigeria, located at present time within four local government areas in Kaduna Sate. Its serve at as capital of Zazzau Emirate council and is one of the original seven

Hausa city states. It has border with Sabon Gari,Giwa,Soba,Kauna North Local government areas of Kaduna State.

Methodology

Sample Collection

The study was used adopted a hospital-based prospective record, involving patients attending Saint Luke Hospital wusasa Zaria, Kaduna State. However Venous blood samples will be collected from patients using a sterile syringe and needle; and dispensed into an EDTA or plain sample container for blood genotype and Hepatitis B tests respectively.

Statistical Analysis

The Study was analyzed using descriptive statistics(percentages).

Results And Discussion

Results

Table 1: Overall HBVand Cases Among ABO Blood Groups

Year	Total HBV+ Cases	A Cases (%)	B Cases (%)	AB Cases (%)	O Cases (%)
2019	60	20.0%	30.0%	8.3%	41.7%
2020	71	21.1%	28.2%	8.5%	42.3%
2021	67	14.9%	32.8%	10.4%	41.8%
2022	79	17.7%	31.6%	10.1%	40.5%
2023	88	18.2%	31.8%	10.2%	39.8%
2024	98	18.4%	30.6%	10.2%	40.8%

Table 2: Gender-Based HBV Prevalence by Blood Group (2019–2024)

Year	Gender	A Cases (%)	B Cases (%)	AB Cases (%)	O Cases (%)
2019	Male	58%	56%	60%	56%
	Female	42%	44%	40%	44%
2020	Male	53%	55%	50%	57%
	Female	47%	45%	50%	43%
2021	Male	60%	55%	57%	54%
	Female	40%	45%	43%	46%
2022	Male	57%	56%	50%	56%
	Female	43%	44%	50%	44%
2023	Male	56%	54%	56%	54%
	Female	44%	46%	44%	46%
2024	Male	56%	57%	60%	55%
	Female	44%	43%	40%	45%

Discussion

This study assessed the relationship between Hepatitis B Virus (HBV) infection and ABO blood group distribution between 2019 and 2024. It also evaluated gender-based variations in infection prevalence. The analysis of the data reveals distinct trends, suggesting possible biological predispositions or socio-behavioral factors influencing HBV transmission and susceptibility.

Over the six-year study period, blood group O consistently exhibited the highest HBV prevalence, accounting for approximately 40%–42% of all positive cases annually. This finding supports the hypothesis that individuals with blood group O may be more susceptible to HBV infection. This observation is in line with earlier studies, such as those by Batool *et al*. (2017) and Meo et al. (2017), which documented a statistically significant association between blood group O and elevated susceptibility to HBV and other viral infections.

Conversely, blood group AB consistently had the lowest HBV prevalence, ranging between 8.3% and 10.4% annually. This suggests a potential protective effect associated with the AB blood phenotype, though the biological mechanism remains unclear. Studies such as Lin *et al.* (2013) propose that the glycosylation patterns and antigenic properties of ABO blood group antigens may affect viral attachment, immune response, or clearance efficiency.

Blood groups B and A had intermediate and fluctuating prevalence rates. Notably, blood group B showed a slightly increasing trend in infection rates during the mid-years (2021–2023), peaking at 32.8% in 2021.The gender-based data across all blood groups and years revealed that males had consistently higher HBV infection rates compared to females. For instance, in 2024, male infection rates were 56%–60% across all blood groups, while female rates remained between 40%–45%. This gender disparity may be attributed to differences in occupational exposure, risk behaviors (e.g., unprotected sex, substance use), and lower vaccination coverage among males in some regions (Shen et al., 2019). Additionally, this male predominance in HBV infection aligns with WHO global data, which indicate that men are at greater risk of chronic HBV progression and complications like hepatocellular carcinoma (World Health Organization, 2022)

There was a gradual increase in total HBV-positive cases from 60 in 2019 to 98 in 2024. This rising trend could be attributed to improved diagnostic practices, increased testing coverage, or possibly a genuine increase in incidence, which may relate to lapses in vaccination or rising behavioral risk factors. Despite global efforts to eradicate HBV through vaccination, local contexts may present barriers such as inadequate public health education or vaccine hesitancy (Spearman *et al.*, 2017). The consistency of group O having the highest prevalence across all years highlights the need to further explore the immunopharmacological basis for HBV susceptibility in relation to blood types.

Conclusion

This six-year retrospective study establishes that HBV infection prevalence is significantly associated with ABO blood group types. Blood group O was consistently the most affected, followed by groups B and A, while group AB recorded the least infections. The results also confirm

a gender disparity in HBV prevalence, with males showing higher infection rates than females across all years and blood groups.

These findings suggest that certain blood groups may have intrinsic susceptibility or resistance to HBV, and that gender dynamics may play a critical role in transmission patterns. This underscores the importance of tailoring public health interventions to consider these biological and social variables.

Recommendations

1. **Integrate Blood Group Screening in HBV Risk Assessment**
   Blood group typing should be considered when assessing HBV risk, especially in areas with high endemicity.
2. **Targeted Vaccination and Education Campaigns**
   Populations with blood group O and high-risk male demographics should be prioritized for HBV vaccination and sensitization programs.
3. **Encourage Routine Screening**
   Regular HBV screening, particularly for asymptomatic carriers, should be integrated into national healthcare policies to facilitate early diagnosis and management.
4. **Further Investigate Blood Group–Virus Relationships**
   There is a need for molecular and immunological research to clarify the mechanism behind ABO blood group influence on HBV susceptibility.
5. **Address Gender Disparities in Healthcare Access**
   Programs should promote equal health-seeking behavior and vaccination uptake among both males and females, with specific outreach to males who may underutilize healthcare services.

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