



Molecular and Serological Evaluation of

OCCULT HEPATITIS B VIRUS INFECTION

among Patients Undergoing Maintenance Hemodialysis at a Tertiary Teaching Hospital of Bangladesh

Presented by

Dr. Sheikh Jannatul Ferdousi Mim

Lecturer
Department of Microbiology



Authors

- Nishad Sultana
- Pompy Dey
- Ayesha Ahmed Khan
- Tabassuma Rahman
- Masuma Jannat
- Nusrat Fatema



Learning Objectives

- What is Occult Hepatitis B Virus Infection (OBI) ?
- Prevalence of OBI in a Tertiary Care Hospital in Bangladesh.
- Why Molecular Test is necessary in case of OBI ?

Introduction

- Hepatitis B virus (HBV), a 42-nm DNA virus, is among the most prevalent and infectious blood-borne pathogens globally.
- HBV can lead to both acute and chronic liver disease, a particularly elusive and clinically significant form is *Occult Hepatitis B Infection (OBI)*.

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- ❖ The presence of HBV DNA in the liver and or serum without detectable hepatitis B surface antigen which is characterized by low levels of replication-competent HBV DNA, particularly covalently closed circular DNA (cccDNA), in liver tissues, often below 200 IU/mL in serum, with undetectable HBsAg using current assays.

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- It may occur in both seropositive and seronegative individuals.
- Poses a risk of transmission via blood transfusion, organ transplantation, and hemodialysis.
- Among patients *undergoing maintenance hemodialysis (MHD)*, HBV prevalence is estimated at 7.32% globally, with OBI rates ranging from 0% to 58%, reflecting geographic and diagnostic variability.

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- **MHD patients are particularly susceptible to OBI due to....**
- Immunosuppression.
- Repeated blood transfusions.
- Poor vaccine responsiveness.
- Prolonged exposure to dialysis procedures.

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- While HBsAg is the standard screening tool, the CDC recommends a full panel-HBsAg, anti-HBc, and anti-HBs-to better capture past or ongoing infection.
- Serological testing alone may miss OBI, especially in seronegative individuals.

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- Therefore, nucleic acid testing (NAT) for HBV DNA is considered the **Gold Standard**, particularly in clinical contexts where transmission risks are high.

Study Objectives

- To determine the prevalence & serological pattern of OBI among CKD patients receiving MHD in Bangladesh.

Rationale

- In many developing countries, including Bangladesh, data regarding the prevalence of OBI among hemodialysis patients remain limited.
- Routine screening in most healthcare settings relies primarily on HBsAg testing, individuals with OBI may remain undiagnosed, posing a significant risk of HBV transmission and disease progression.

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- ➡ The study findings will provide valuable **epidemiological data** , improve understanding of OBI in this **high-risk population**, & support the development of **evidence- based screening strategies & infection control policies** to reduce HBV transmission in dialysis units.

Materials & Methods (Study Design)

➤ Type of Study

➤ Cross-sectional study

➤ Duration

➤ January-December 2024

➤ Study place

➤ Chittagong Medical College Hospital, Bangladesh.

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- ➡ **Sample size**
- ➡ 176 patients undergoing maintenance hemodialysis
- ➡ **Age** $\geq$ 15 years.

Inclusion Criteria

- Patient with **CKD** undergoing MHD > 3 months.
- Negative for **HBsAg** by **ELISA** within the proceeding 3 months.
- With provided **informed written consent**.

Exclusion Criteria

- ➡ HBV positive CKD patients .
- ➡ Patients on immunosuppressive therapy or chemotherapy.

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Procedures:

- ➡ HBsAg was checked using immunochromatographic tests(ICT).
- ➡ Anti-HBc & anti-HBs antibodies were detected by enzyme-linked immunosorbent assay(ELISA).
- ➡ HBV DNA was quantified using real-time polymerase chain reaction (qPCR).

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➤ **Software:**

- SPSS Version (26.0)
- Descriptive statistics (frequencies & percentages) were used to summarize demographic & clinical variables.
- Associations between OBI & risk factors were evaluated using **Chi-square tests**.
- A p-value <0.05 was considered statistically significant.

Results

- Study participants (N)= 176.
- Positive for HBsAg = 0.
- Anti HBs positive 96 (54.55%).
- Anti-HBc positive 53 (30.11%).
- Both Anti-HBs & anti- HBc positive 37 (21.02%).
- Both negative 64 (36.36%).

Quantitative HBV DNA levels detected by qPCR in study participants (N=176)

Viral load Category	Number of cases n(%)
< 200 IU/ml (True OBI)	6 (3.41)
≥200 IU/ml (False OBI)	3 (1.70)
Undetected (<10 IU/ml)	167 (94.89)

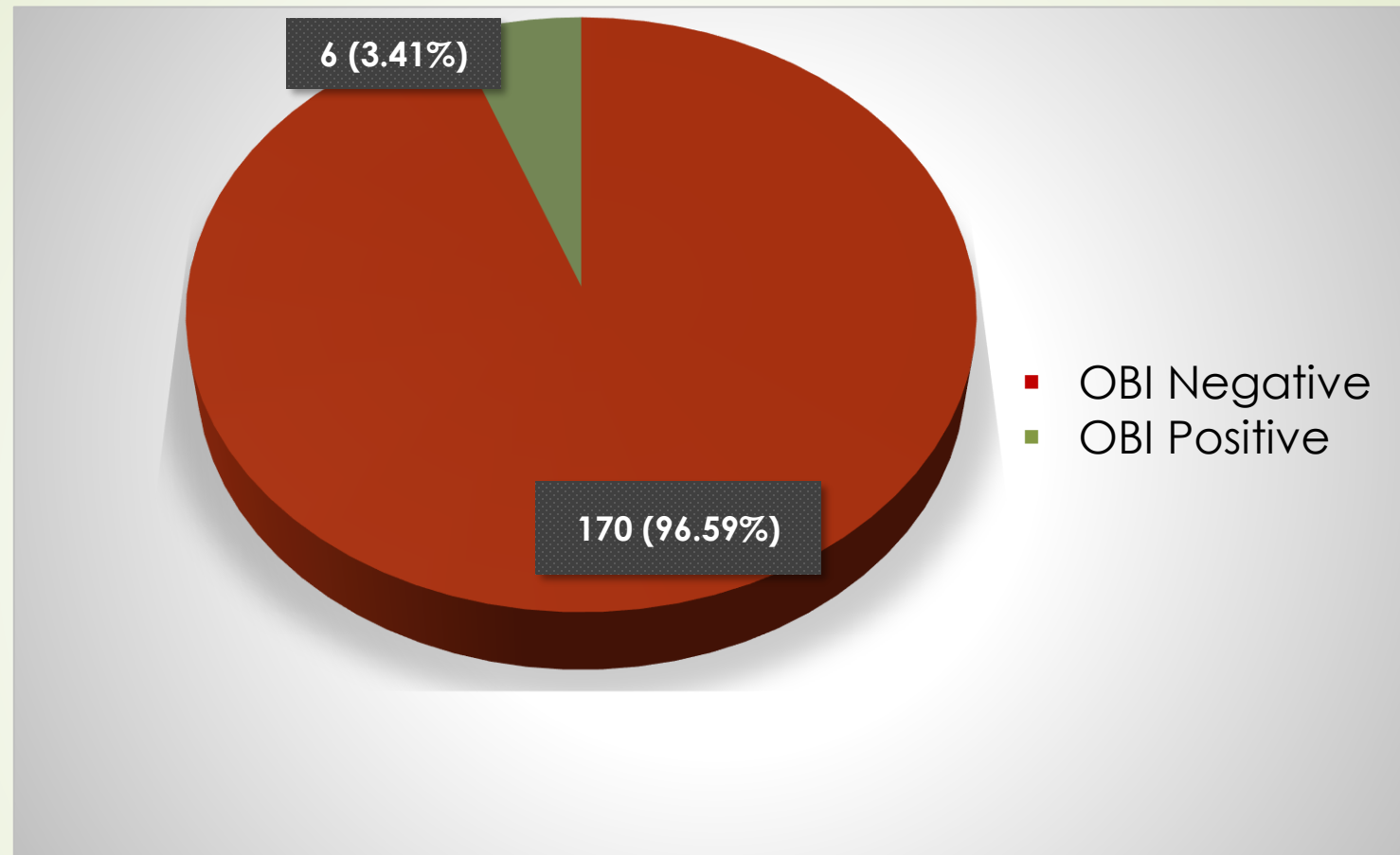


Figure : Frequency of occult HBV Infection Among Study Participants (n=176).

Distribution of anti-HBc total & anti-HBs serostatus by OBI detection (N-176)

Serostatus	OBI Detected	OBI Undetected	Total	P value
Anti-HBs positive	3 (1.75%)	56 (31.8%)	59 (33.5%)	0.529
Anti-HBc total positive	1 (0.57%)	15 (8.5%)	16 (9.1%)	
Both positive	0 (0.0%)	37 (21.0%)	37 (21.0%)	
Both negative	2 (1.1%)	62 (35.3%)	64 (36.4)	

Discussion

- ➡ This study investigated the prevalence of occult hepatitis B virus infection (OBI) among chronic kidney disease (CKD) patients undergoing maintenance hemodialysis (MHD) at a tertiary hospital in Bangladesh.

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- ➡ Among the 176 HBsAg-negative participants, 30.11% were anti-HBc total positive, & 54.5% were anti-HBs positive. These figures are consistent with previous studies, reported anti-HBc total & anti-HBs positivity rates of 23.5% and 66.3%, respectively among Iranian MHD patients 30, 43% anti-HBs, 3.0% anti-HBc total, and 35% double positivity in Brazil.

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- ➡ Six participants (3.4%) were identified as OBI cases, with HBV DNA levels ranging from 11 to 94 IU/ml. This is similar with studies from Ghana (7.3%) and Nepal (8.0%). Three additional patients exhibited viral loads ≥ 200 IU/ml despite negative HBsAg.

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- A similar result was found in a study of Iran, where one true OBI and four false OBI cases were found among 118 participants.
- The OBI prevalence in this study (3.4%) is comparable to 4 to 8% reported in similar populations across Iraq, Iran, and Nepal.

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- Variability may stem from differences in population demographics, diagnostic methods, and the sensitivity of molecular assays.

Limitation

- ➡ The detection of HBV DNA in both seropositive & seronegative individuals underscores the limitations of relying solely on serological assays for HBV surveillance.
- ➡ HBsAg testing was conducted using an immunochromatographic test (ICT) rather than ELISA or chemiluminescence assays, which may have reduced sensitivity.

Recommendation

- Incorporation of HBV DNA PCR into routine screening of hemodialysis patients is essential for early detection of occult hepatitis B infection (OBI), complimented by **booster vaccination programs** for individuals with suboptimal anti- HBs titers.

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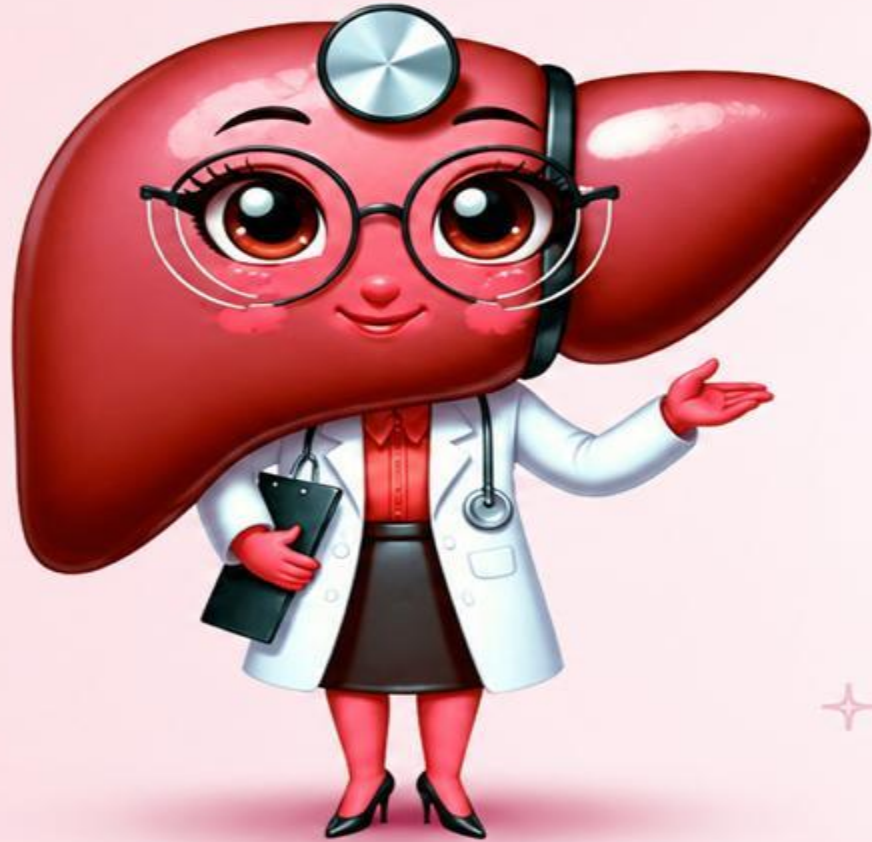
- To identify immune escape variants full-length HBV genome sequencing in OBI cases is highly recommended.

Conclusion

- This study reveals a notable prevalence of occult hepatitis B virus infection among hemodialysis patients in Bangladesh, despite negative HBsAg results by routine screening.

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- Integration of HBV DNA testing into routine screening protocols is essential for early detection, improved clinical management, & reduction of HBV transmission risks in dialysis units.

**OBI**

OBI PRESENTATION

Thank YOU!

Thank you for your time,
attention, and valuable input.
**Together, we care for better
liver health.**

♥ Healthy Liver, Healthier Life.

