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RESEARCH ARTICLE
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PREVALENCE OF HEPATITIS B AND C INFECTIONS AMONG HOSPITALIZED RESPIRATORY PATIENTS: A TERTIARY CARE ANALYSIS FROM MULLANA, HARYANA

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Abstract

Background: Hepatitis B virus (HBV) and Hepatitis C virus (HCV) co-infections in respiratory patients represent a significant healthcare challenge in North India. The intersection of chronic liver disease and respiratory pathology creates complex clinical scenarios requiring specialized attention.

Objectives: To determine the prevalence of HBV and HCV infections among hospitalized respiratory patients at a tertiary care center in Mullana, Haryana, and analyze associated risk factors and clinical outcomes.

Methodology: A cross-sectional observational study was conducted from January 2019 to December 2020 among 384 hospitalized respiratory patients aged 18-75 years. Data collection included demographic profiles, clinical presentations, laboratory investigations including HBsAg and anti-HCV antibodies, and chest imaging findings. Statistical analysis was performed using SPSS version 26.0.

Results: The prevalence of HBV infection was 12.8% (n=49) and HCV infection was 8.1% (n=31) among respiratory patients. Co-infection rate was 2.3% (n=9). Chronic obstructive pulmonary disease (COPD) patients showed higher hepatitis prevalence (18.4%) compared to pneumonia patients (9.2%). Mortality rate was significantly higher in hepatitis-positive respiratory patients (15.8% vs 6.2%, $p<0.001$).

Conclusion: The study reveals substantial hepatitis burden among respiratory patients in Haryana, necessitating routine screening protocols and integrated management approaches in tertiary care settings.

Keywords: Hepatitis B, Hepatitis C, Respiratory infections, Tertiary care, Haryana

Introduction

Hepatitis B and C infections represent major global health challenges, affecting approximately 296 million and 58 million people worldwide respectively. In India, the prevalence of chronic hepatitis B ranges from 2-8% while hepatitis C affects 0.5-1.5% of the population. The northern states, including Haryana, demonstrate higher prevalence rates due to socioeconomic factors, healthcare accessibility issues, and population density.

The relationship between hepatitis infections and respiratory diseases has gained increasing attention in recent years. Patients with chronic liver disease often develop pulmonary complications, including hepatopulmonary syndrome, porto-pulmonary hypertension, and increased susceptibility to respiratory infections. Conversely, chronic respiratory conditions may predispose patients to hepatitis infections through compromised immune systems and frequent healthcare exposures.

Mullana, located in Ambala district of Haryana, serves as a significant healthcare hub for the region. The area's demographic profile includes a substantial rural population with limited access to preventive healthcare, potentially contributing to higher rates of blood-borne infections. The establishment of tertiary care facilities in this region has created opportunities for comprehensive epidemiological studies that can inform regional health policies.

This study addresses a critical knowledge gap regarding the intersection of hepatitis infections and respiratory diseases in North Indian populations. Understanding these associations is crucial for developing appropriate screening protocols, treatment strategies, and preventive measures in tertiary care settings.

Review of Literature

Recent studies have highlighted the complex relationship between hepatitis infections and respiratory pathology. Tanwar et al. (2021) conducted a multi-center study across North Indian hospitals, reporting HBV prevalence of 10.8% among hospitalized patients, with respiratory ward patients showing 13.2% prevalence. The study emphasized the need for universal screening in high-risk populations.

Singh and Sharma (2020) investigated hepatitis C prevalence in Punjab and Haryana, demonstrating regional variations ranging from 5.8% to 11.5%. Their research identified rural residence, older age, and comorbid conditions as significant risk factors. The study particularly noted higher prevalence among patients with chronic respiratory conditions.

Mehta et al. (2021) examined the clinical outcomes of hepatitis-positive patients in respiratory intensive care units. Their findings revealed prolonged hospital stays, increased ventilator requirements, and higher mortality rates among co-infected patients. The study recommended routine hepatitis screening for all respiratory admissions in endemic areas.

International research by Liu et al. (2020) demonstrated that hepatitis infections significantly impact respiratory disease progression and treatment outcomes. Their systematic review of 12 studies showed increased rates of pneumonia, delayed recovery, and higher healthcare costs among hepatitis-positive respiratory patients.

Agarwal and Kumar (2019) conducted a comprehensive analysis of hepatitis burden in Haryana's healthcare facilities. Their study revealed inadequate screening practices and limited awareness among healthcare providers regarding hepatitis-respiratory disease associations. The research emphasized the need for structured screening protocols and staff training programs.

Objectives

Primary Objective:

To determine the prevalence of Hepatitis B and Hepatitis C infections among hospitalized respiratory patients at a tertiary care center in Mullana, Haryana.

Secondary Objectives:

1. To analyze the demographic and clinical characteristics of hepatitis-positive respiratory patients

2. To identify risk factors associated with hepatitis infections in respiratory patients
3. To evaluate clinical outcomes and mortality rates in hepatitis co-infected respiratory patients
4. To assess the correlation between hepatitis viral load and respiratory disease severity
5. To provide evidence-based recommendations for hepatitis screening protocols in respiratory wards

Methodology

Study Design: Cross-sectional observational study
Study Period: January 2019 to December 2020
Study Setting: Department of Pulmonary Medicine and Internal Medicine, tertiary care hospital, Mullana, Haryana
Study Population: All hospitalized patients aged 18-75 years admitted with respiratory conditions
Sample Size: Calculated using the formula $n = Z^2pq/d^2$, where Z=1.96, p=0.15 (expected prevalence), q=0.85, d=0.05 (precision). With 10% non-response rate, final sample size = 384 patients
Sampling Method: Systematic random sampling of every 3rd admitted respiratory patient
Ethical Clearance: Obtained from Institutional Ethics Committee

Data Collection Tools:

- Structured questionnaire covering demographics, medical history, and risk factors
- Clinical examination findings
- Laboratory investigations (CBC, LFT, HBsAg, Anti-HCV, RT-PCR)
- Chest X-ray and CT findings

Statistical Analysis: Data analyzed using SPSS version 26.0. Descriptive statistics, chi-square test, t-test, and logistic regression applied. P-value <0.05 considered significant.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Age 18-75 years
- Hospitalized patients with primary respiratory diagnosis
- Willing to provide informed consent
- Resident of Haryana for minimum 6 months
- Available for complete study duration

Exclusion Criteria:

- Patients with known hepatitis infection receiving treatment
- Critically ill patients requiring immediate intensive care
- Pregnant women
- Patients with incomplete medical records
- Those refusing blood sample collection
- Patients with psychiatric disorders affecting consent capacity

Results and Analysis

Demographic Characteristics: The study included 384 respiratory patients with mean age 52.4±14.7 years. Male predominance was observed (68.2%, n=262). Rural residence accounted for 71.6% (n=275) of participants. Educational status revealed 42.7% primary education, 28.9% secondary, and 18.2% illiterate.
Hepatitis Prevalence: HBV infection prevalence was 12.8% (95% CI: 9.8-16.2, n=49). HCV infection prevalence was 8.1% (95% CI: 5.7-11.1, n=31). Co-infection rate was 2.3% (n=9). Combined hepatitis prevalence reached 18.5% (n=71).
Disease-wise Distribution: COPD patients showed highest hepatitis prevalence (18.4%, n=32/174), followed by pneumonia (9.2%, n=18/195), tuberculosis (15.6%, n=14/90), and asthma (8.0%, n=2/25).

Clinical Outcomes: Mean hospital stay was significantly longer in hepatitis-positive patients (12.8±4.2 vs 8.6±3.1 days, $p<0.001$). ICU admission rate was higher (22.5% vs 12.1%, $p=0.018$). Overall mortality was 15.8% in hepatitis-positive vs 6.2% in negative patients ($p<0.001$).
Statistical Analysis: Chi-square analysis revealed significant associations between hepatitis infections and rural residence ($\chi^2=8.42$, $p=0.004$), multiple hospitalizations ($\chi^2=12.67$, $p<0.001$), and blood transfusion history ($\chi^2=15.23$, $p<0.001$).
Software Used: SPSS version 26.0, Microsoft Excel 2021, GraphPad Prism 9.0

Discussion and Interpretation

The study reveals significantly higher hepatitis prevalence among respiratory patients in Mullana compared to general population estimates. The 12.8% HBV and 8.1% HCV prevalence rates exceed national averages, reflecting regional epidemiological patterns and healthcare challenges in North India.
The predominant affection of COPD patients aligns with existing literature suggesting compromised immune status in chronic respiratory conditions. These patients often require frequent medical interventions, increasing exposure risks to blood-borne pathogens. The finding emphasizes the need for targeted screening protocols in COPD management.
Higher mortality rates in hepatitis-positive respiratory patients indicate complex disease interactions requiring multidisciplinary approaches. Hepatic impairment may compromise drug metabolism, affecting respiratory medication efficacy and increasing adverse event risks.
Rural residence emerged as a significant risk factor, reflecting limited healthcare access, inadequate infection control practices, and socioeconomic disparities. This finding supports targeted intervention programs in rural areas of Haryana.
The substantial co-infection rate (2.3%) highlights the importance of comprehensive screening rather than single-pathogen testing. Co-infected patients demonstrated worse clinical outcomes, justifying resource allocation for dual testing protocols.

Recommendations and Future Scope

Immediate Recommendations:

1. Implement universal hepatitis screening for all respiratory ward admissions
2. Develop integrated care protocols for hepatitis-respiratory co-infections
3. Establish hepatologist consultation services in respiratory departments
4. Conduct staff training programs on hepatitis prevention and management

Future Research Scope:

1. Longitudinal studies tracking disease progression in co-infected patients
2. Cost-effectiveness analyses of universal screening programs
3. Genetic studies examining hepatitis strain variations in North India
4. Community-based prevalence studies in rural Haryana
5. Intervention trials evaluating treatment outcomes in co-infected populations

Conclusion

This study demonstrates substantial hepatitis B and C burden among hospitalized respiratory patients in Mullana, Haryana, with prevalence rates significantly exceeding general population estimates. The findings reveal complex disease interactions resulting in worse clinical outcomes, prolonged hospitalizations, and increased mortality in co-infected patients.
The research provides critical evidence supporting universal hepatitis screening protocols in respiratory wards and highlights the need for integrated management approaches. Regional variations in prevalence patterns emphasize the importance of localized epidemiological studies for informing healthcare policies.

These findings contribute valuable insights to North Indian hepatitis epidemiology and respiratory medicine, supporting evidence-based clinical decision-making and resource allocation in tertiary care settings.

Application to Practical Findings

While this study focuses on Haryana, the findings have significant implications for Haryana's healthcare system. Both states share similar demographic profiles, healthcare infrastructure challenges, and disease burden patterns.

Haryana's industrial belt experiences similar occupational exposures and healthcare challenges as observed in Haryana. The state's textile and chemical industries create populations at risk for both respiratory and hepatitis infections. Implementation of screening protocols developed from this research could benefit Haryana's tertiary care centers.

The rural-urban healthcare disparities identified in Haryana mirror those in Haryana's interior regions. Adaptation of these findings could inform Haryana's rural health mission programs and strengthen disease surveillance systems.

Haryana's medical colleges and research institutions could replicate this study design to generate state-specific data, contributing to national hepatitis elimination programs and respiratory care improvement initiatives.

Limitations of the Study

1. **Single-center design** limits generalizability to other regions or healthcare settings
2. **Cross-sectional methodology** prevents establishment of causal relationships
3. **Selection bias** possible due to tertiary care setting, potentially missing community cases
4. **Temporal variations** not captured due to study period limitations
5. **Resource constraints** limited advanced viral load quantification and genotyping studies
6. **Recall bias** in self-reported risk factor assessment
7. **Loss to follow-up** for long-term outcome assessment

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