

A Comparative Analysis of Seroprevalence of HBV and HCV Between Elective and Emergency Surgical Cases at a Tertiary Level Health Care Facility

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ABSTRACT

Background: HBV and HCV are two of the major bloodborne pathogens that surgeons encounter in their professional lives. Out of these two, HBV is not only the most transmissible, but also the only one that is preventable by vaccination. This study focuses on the amount of exposure encountered by the surgeon and the healthcare staff concerned with operative interventions in elective as well as emergency setup.

Objective: To determine the seroprevalence of HBV and HCV in patients undergoing surgical interventions in a tertiary healthcare facility located in Northern India and their comparison.

Methods: A serological analysis of 1695 patients was undertaken for detection of HBV and HCV.

Results: Overall Prevalence of hepatitis C antibody was 3.1% and that of Hepatitis B surface Antigen was present in 1.6%. There were 4 cases of coinfection; therefore, there was a combined prevalence of blood-borne pathogens of 4.36%. The prevalence of HCV and HBV in elective cases were 2.85% and 1.46% respectively. The prevalence of HCV and HBV among emergency cases were 3.54% and 2.02% relatively.

Conclusions: The combined prevalence of blood-borne pathogens of 4.36% supports previous recommendations of universal precautions, particularly in emergency settings where the overall prevalence was observed to be higher and may still be underestimated.

Keyword: Hepatitis B, Hepatitis C, Seroprevalence, Bloodborne.


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INTRODUCTION

Hepatitis B and C present among the major public health problems in India and other developing countries. There is a wide variation in the prevalence of these diseases in different geographical regions in India and the world.¹ The World Health Organisation estimates that over 250 million people are currently infected with HBV and more than 70 million with HCV², but these figures are a gross underestimation of the actual brunt of diseases prevalence due to limited disease awareness and testing especially in developing and low-income countries. Hepatitis B and C are one of the leading causes of chronic liver disease worldwide and associated disease morbidity, with the healthcare workers being at a very high risk of disease transmissibility. Amidst the two, hepatitis B is much more transmissible, though being preventable by vaccination. In view of Inadequate awareness, risk stratification and lack of reporting, testing, vaccination and poor post exposure management, hepatitis B and C have become a major occupational hazard for health care workers.

HBV is the most stable of the blood-borne viruses and can be transmitted by a minute amount of blood. The risk of acquiring HBV from an occupational needle stick injury when the source is Hepatitis B surface antigen (HBsAg)-positive ranges from 2% to 40%, depending on the source's level of viremia.³ Occupational transmission of HCV infection is largely confined to health care workers who have sustained contaminated needle-stick injuries. Average incidence of anti-HCV seroconversion from an HCV-positive source is 1.8% (range: 0%-7%)⁴ with one study reporting that transmission occurred only from hollow-bore needles compared with other sharps.⁴

METHODOLOGY

In this study, patients undergoing surgical interventions in the department of general surgery of a tertiary level health care facility in urban India were analysed for a period of 6 months from March through August 2019. A Prospective, Cross-sectional study of HBV and HCV seroprevalence was conducted.

Inclusion Criteria

- Patients of age 15 and above undergoing surgical interventions
- Patients who gave written informed consent

Exclusion Criteria

- Patients younger than 15 years
- Patients not undergoing surgical interventions
- Duplicate patient entries
- Patients who did not give consent for inclusion in the study

A routine blood specimen for preoperative work-up along with seromarkers for HCV and HBV was obtained from all included patients. Duplicate patient entries were excluded. The study design was for epidemiologic purposes, without the use and availability of patient specific test results. Patients under the age of 15 were excluded from the study. Patients with conditions not warranting operative interventions were excluded; also, not included were patients who died before any surgical intervention could be performed. Hepatitis C status was assessed by detection of anti-HCV antibody. Hepatitis B status was determined through detection of Hepatitis B surface antigen (HBsAg). These serological tests were conducted as a routine preoperative requisite. HBsAg and anti-HCV antibodies were detected by performing Hepacard test and Tridot test respectively supplied by CTK biotech. Technique and interpretation were followed according to the instructions and methodology supplied by the manufacturer.

RESULTS

A total of 1695 patients were operated during the study. Of these, 783(46.2%) were men and 912(53.8%) were women. Thirteen hundred (76.7%) patients were operated as elective cases and 395 (23.3%) as emergency cases.

Seroprevalence of HCV and HBV

A total of 74 patients tested positive for at least one serological marker [4.36%, CI: 3.4%–5.3%]. Out of these, 41 (55.4%) were men and 33 (44.6%) were women. Fifty-one patients tested positive for HCV [3.01% CI: 2.2%–3.9%], 47 for HCV alone and 4 positive for both seromarkers. Twenty-seven tested positive for HBV [1.6%, CI: 1.0%–2.1%], 23 for HBV alone and 4 for both seromarkers. Four patients tested positive for both HCV and HBV [0.23%, CI: 0.01-0.45%].

Seropositivity in Elective Cases

Out of the 1300 patients operated as elective cases, 53 [4.07%, CI: 3% to 5.1%] tested positive for at least one seromarker. Thirty-seven patients tested positive for HCV [2.85%, CI:1.9% to 3.7%], 34 for HCV alone and 3 for both seromarkers. Nineteen patients tested positive for HBV [1.46%, CI: 0.8% to 2.1%], 16 for HBV alone and 3 tested positive for both HBV and HCV. Three patients tested positive for both HCV and HBV [0.23%, CI: 0%-0.49%]

Seropositivity in Emergency Cases

Out of the 395 patients operated as emergency cases, 21 [5.32%, CI: 3.1% to 7.5%) tested positive for at least one seromarker. Fourteen cases were positive for HCV [3.54%, CI: 1.7% to 5.4%], 13 for Anti-HCV alone and 1 positive for both Anti-HCV Ab and HBsAg. Eight patients tested positive for HBV [2.02%, CI: 0.6% to 3.4%], 7 for HBV alone and 1 positive for both HBV and HCV. One patient tested positive for both seromarkers [0.25%, CI: 0%-0.74%]

Table 1: Overall prevalence results

	No. tested	No. positive	%	Confidence interval
HCV	1695	51	3.01	2.2 - 3.9
HBV	1695	27	1.6	1.0 - 2.1
Co-infection	1695	4	0.23	0.01 - 0.45

Table 2: Prevalence results in elective cases

	No. tested	No. positive	%	Confidence interval
HCV	1300	37	2.85	1.9 - 3.7
HBV	1300	19	1.46	0.8 - 2.1
Co-infection	1300	3	0.23	0 - 0.49

Table 3: Prevalence results in emergency cases

	No. tested	No. positive	%	Confidence interval
HCV	395	14	3.54	1.7 – 5.4
HBV	395	8	2.02	0.6 – 3.4
Co-infection	395	1	0.25	0 – 0.74

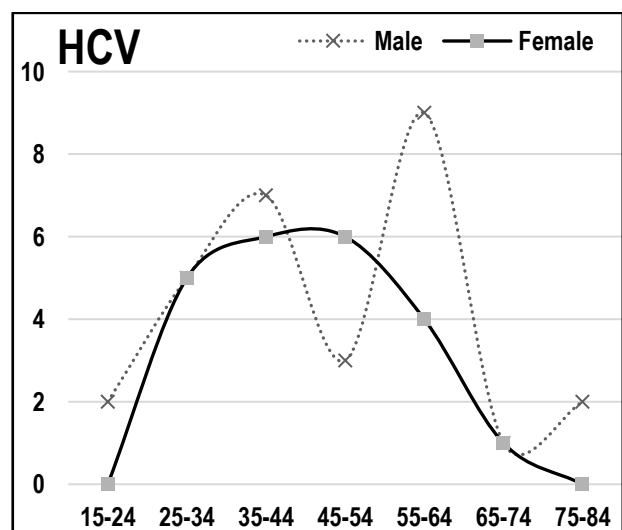


Figure 1: Smoothed seroprevalence curves for Anti-HCV Antibodies among surgical patients

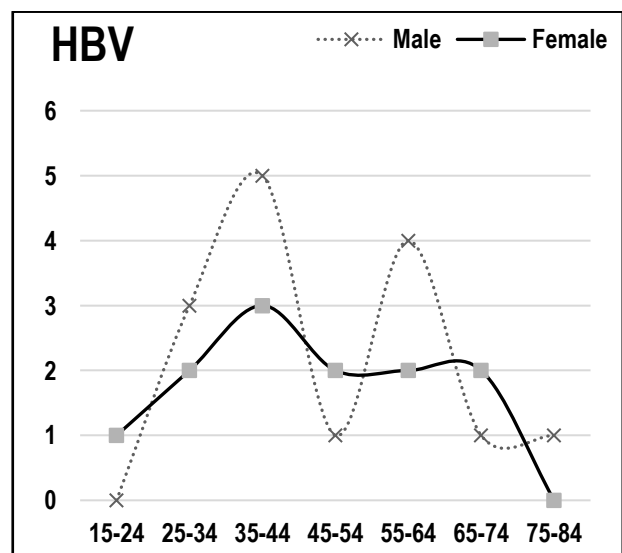


Figure 2: Smoothed seroprevalence curves for HBs Antigen among surgical patients

DISCUSSION

The high overall prevalence of these blood-borne pathogens, 4.36%, is of particular interest to the department of general surgery, emergency care and other providers who are routinely exposed to unrecognized blood-borne pathogens. Additionally, most previously described studies focused on specific populations, which may be less generalizable to many practice settings. In this study, hepatitis C was the dominant blood-borne infection, the overall prevalence much higher than the general population i.e, 0.5-1%.

It has been speculated that 55– 85% of people infected with hepatitis C virus become chronically infected, frequently progressing to cirrhosis or hepatocellular carcinoma.⁵

It remains a leading cause of chronic liver disease and subsequent liver transplant, despite treatment advances shown with pegylated interferon and ribavirin.⁶

Although the prevalence of hepatitis B antigen is lower in this study, its high transmissibility (6 –31%) still brings significant risk after an exposure. The rate transmission of hepatitis C virus after a high-risk needle-stick injury is 1.8%.⁷ There was a definite higher prevalence of these blood borne pathogens among emergency patients amounting to an overall higher exposure. The high prevalence among emergency patients unambiguously poses a much higher threat to healthcare workers owing to the obligation of swift response and time restraint for life saving procedures.

LIMITATIONS

This study had several limitations. The study used rapid serological tests for detection of the said blood-borne pathogens, bearing in mind other more sensitive tests; thus, inadvertently underestimating the actual case burden. Samples were selected on the basis of age, with those younger than 15 years excluded, although posing an equal threat. The study doesn't include patients who present to the emergency department with trauma and other conditions not warranting a major surgical. These patients do pose a substantial threat to the involved healthcare workers of needle-stick or mucocutaneous transmission through blood and bodily fluids.

CONCLUSION

The risk of a surgeon acquiring the HCV and HBV through occupational exposure is dependent on the prevalence of the infection in the patient population, the probability of a percutaneous injury transmitting the virus, and the incidence of percutaneous injury during surgery. Leaving aside the clinical sequelae, infection with this blood borne pathogens may pose professional constraints for healthcare providers further debilitating them socially and financially. This study buttresses the continued consistent adherence to universal precautions as a cornerstone in surgical practice, particularly in emergency settings where the overall prevalence was observed to be higher and may still be underestimated.

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