

Frequency of Hepatitis B and C Viruses in Patients with Malignancies in a Tertiary Care Hospital, Karachi, Pakistan



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Abstract

Background: Hepatitis, a viral infection affecting the liver, can progress to cirrhosis or cancer. Hepatitis B and Hepatitis C, distinct viral strains, induce acute or chronic liver inflammation. Individuals with chronic hepatitis face an elevated risk of extra-hepatic cancers. Various hypotheses explore the mechanisms of Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) in tumorigenesis. This study aims to ascertain the prevalence of hepatitis B and C viruses among patients with malignancies in a tertiary care hospital in Karachi.

Methods: We conducted a cross-sectional study, data were collected from Dr. Ruth Pfau Civil Hospital, Karachi, a tertiary care facility, between May 2020 and July 2020. Out of 257 cancer-diagnosed patients, informed about and assured of the questionnaire's confidentiality, data were collected and analyzed.

Results: Among the 257 patients, 56.42% were females and 43.57% males, with a mean age of 47.5 years. Breast cancer was the most common type, identified in 20.2% of patients. Overall, 36.96% of patients had either HBV or HCV, with no instances of coinfection. Positivity rates were 21.4% for HBV and 15.56% for HCV. No significant associations were observed between cancer types and Hepatitis B Surface Antigen (HBsAg) or Anti-Hepatitis C Antibodies (Anti-HCV Ab).

Conclusion: Close surveillance of cancer patients is crucial, monitoring HBV antibody titers, and enrollment in hepatitis B immunization programs are recommended. Additionally, monitoring Anti-HCV status is advised.

Keywords: Hepatitis B, Hepatitis C, oncology, blood transfusion, patients, HCV, HBV

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Introduction

Hepatitis is an inflammatory viral infection resulting in gradual development of hardening of liver tissues, also known as cirrhosis or cancerous tumors. Its most common cause is due to viruses, while other exogenous agents being alcohol, poison and autoimmunity (1). Hepatitis B (HBV) and Hepatitis C (HCV) are prevalent forms of hepatitis with the infection resulting in acute and chronic forms liver disease (2). Based on World Health Organization (WHO) statistics, HBV is accountable for one million deaths every year and carriers of the disease are approximated to be 350 million individuals (3).

Research indicates that the Pakistani population impacted by HBV and HCV is estimated to be 24% and 58%, respectively (4). According to an international survey, approximately 231,000 new viremic HCV cases were discovered solely in Pakistani within a year (5). Data from a five-year study conducted at Dr. Ruth Pfau Civil Hospital, Karachi, a total 156,990 patients were tested for HCV, with 23,511 (14.98%) patients were detected to be positive (6).

In approximately 80% patients with hepatocellular carcinoma, viral hepatitis (HBV and HCV) lead to chronic liver disease and ultimately, progression towards liver malignancy (7). A review showed carriers of HBV who experience reactivation of the virus while undergoing chemotherapy ranges from 20-36% in solid tumours (8).

Cancer patients being administered packed red blood cells (PRBCs) or other blood products have greater susceptibility for development of these infections, as a result of these viruses (9). Hepatocellular carcinoma (HCC), or liver cancer, was diagnosed in 8 (5.7%) patients with HCV-related diseases (10).

Since the figures related to asymptomatic carriers of hepatitis B and C in oncology patients is quite ambiguous among research conducted in Pakistan, this research aims to evaluate the statistically significant associate of HBV and HCV infection, to determine the correlation of incidence of hepatitis and blood transfusion in oncology patients presenting to Dr. Ruth Pfau Civil Hospital in Karachi.

The objective of the study was to determine the frequency of hepatitis B and C virus in patients with malignancies in a tertiary care hospital, Karachi.

Methodology

A cross-sectional survey was undertaken in the tertiary care facility known as Dr Ruth Pfau Civil Hospital Karachi from May 2020 to July 2020. For data collection, a semi structured questionnaire was used. A sample size of 257 patients with any cancer diagnosis were included. The questionnaires were filled by the authors according to the documented hospital data record of the patients. The designed questionnaire was divided into four components. The first one comprised of the socio-demographic information of the study participants whereas, the second, third and fourth components included dichotomous questions. In second section, type of cancer was investigated, third section consisted of hepatitis confirmation and fourth consisted of the most common risk factors for hepatitis or cancer. This included family history of either hepatitis infection or cancer, close contact with hepatitis infected patients, history of organ transplantation, blood transfusion, existence of some common non-communicable diseases, Intravenous drug history, extramarital relations, history of Sexually Transmitted Diseases (STDs), HIV co-infection. The computation of frequencies and percentage of all categorical variables was done by using SPSS-24. Sample size calculated as 257 by EpiData 3.03 and the associations among the different variables was analyzed utilizing the Pearson's chi-square test. The results were statistically analyzed at $p \leq 0.05$.

Results

Out of the total 257 patients, 131 (50.97%) were females and 126 (49.30%) were males. The mean age, in years, was 42.

The different types of cancers identified included breast cancer 52 (20.2%), lymphoma 16 (6.2%), leukemia 15 (5.8%), liver cancer 26 (10.1%), renal cancer 4 (1.6%), colorectal cancer 30 (11.7%), ovarian cancer 7 (2.7%), esophageal cancer 15 (5.8%) and head and neck cancers 45 (17.5%). In addition, 40 (15.6%) patients had lung, gynecological and genitourinary system, soft tissue, and skin cancers, along with cancers of unidentified primary localization. The mean duration of diagnosis among cases was 3 months.

Blood product transfusions were reported among 111 (43.2%) of total patients. Hepatitis viral infection was present in 78 (30.4%) cases, family history of cancer in 121 (47.1%), family history of HBV and HCV infection in 100 (38.9%), contact with hepatitis B infected patient in 64 (24.9%), health worker exposed to infected blood in 6 (2.3%), addiction in 156 (60.7%), IV drug history in 32 (12.5%), organ transplant in 12 (4.7%), extramarital relations in 5 (1.9%), history of STDs in 1 (0.4%) and HIV positive patients were present in 12 (4.7%) cases (Table 1).

Total 95 (36.95%) patients had either hepatitis B or C. Among them, 46 (17.89%) were females and 49 (19.06%) males. Among all, hepatitis B outnumbered with 55 (21.40%) patients while 40 (15.56%) patients were found with hepatitis C. No viral infection was reported in 77 (29.96%) male patients and 85 (33.07%) female patients. No patient was reported to have concurrent HBV and HCV infections. Hepatitis B was detected in 30 (11.67%) males and 25 (9.72%) females. Hepatitis C was predominant in 19 (7.39%) males and 21 (8.17%) females. HBsAg was detected

positive in 53 (20.6%) individuals, Hepatitis C virus-ribonucleic acid (HCV RNA) was positive in 38 (14.8%). No patient had isolated IgM antibody to hepatitis B core antigen (anti-HBc Ig-M) and antibody to hepatitis B surface antigen (anti-HBs Ab) positivity. Hepatitis B "e" antigen (HbeAg) was not positive in any case while HBV Deoxyribonucleic acid (HBV DNA) was found positive in just 1 (0.4%) patient.

Table 1. Socio-demographic factors of study participants

		Frequency	Percent
Hepatitis Viral Infection	No	179	69.6
	Yes	78	30.4
Family History of Cancer	No	136	52.9
	Yes	121	47.1
Family History of Hepatitis B & C Infection	No	157	61.1
	Yes	100	38.9
Contact with Hepatitis B Infected Patients	No	193	75.1
	Yes	64	24.9
Health Worker Exposed to Infected Blood	No	251	97.7
	Yes	6	2.3
Addiction	No	101	39.3
	Yes	156	60.7
IV Drug History	No	225	87.5
	Yes	32	12.5
Blood Transfusion	No	146	56.8
	Yes	111	43.2
Organ Transplant	No	245	95.3
	Yes	12	4.7
Extramarital Relations	No	252	98.1
	Yes	5	1.9
History of Sexually Transmitted Diseases	No	256	99.6
	Yes	1	.4
HIV Positive Patient	No	245	95.3
	Yes	12	4.7

Table 2. Blood transfusion and HBs Ag

			HBs Ag		Total
			Positive	Negative	
Blood Transfusion	No	Count	36	110	146
		% within Blood Transfusion	24.7%	75.3%	100%
	Yes	Count	17	94	111
		% within Blood Transfusion	15.3%	84.7%	100%
Total	Count	53	204	257	
	% within Blood Transfusion	20.6%	79.4%	100%	

Table 3. Blood transfusion and HCV RNA

			HCV RNA		Total
			Positive	Negative	
Blood Transfusion	No	Count	20	126	146
		% within Blood Transfusion	13.7%	86.3%	100%
	Yes	Count	18	93	111
		% within Blood Transfusion	16.2%	83.8%	100%
Total	Count	53	38	219	
	% within Blood Transfusion	20.6%	14.8%	85.2%	

Out of 53 (20.6%) patients positive for HbsAg, 17 (15.3%) had a past history of blood transfusion (Table 2). Similarly, out of 38 (14.8%) patients positive for HCV RNA, 18 (16.2%) were having a previous history of blood transfusion (Table 3). Our study found a statistically significant association depending at 10% level of significance between HBV positivity and blood transfusion (p value=0.067). No significant correlation was seen between HCV positivity and blood transfusion. Additionally, no significant association was found among various forms of cancers and HbsAg or anti-HCV Ab.

Discussion

HBV and HCV infections have contributed to high morbidity and mortality rates globally, with rates rising in the Southeast Asia region particularly. The clinical trajectory of manifestations and complications associated with ascites, hepatic encephalitis, and esophageal varices, ultimately leading to cirrhosis and liver failure. Contamination or transmission of the hepatitis virus involves coming into contact with infected blood and bodily secretions. The most predominant source of transmission of the hepatitis virus involves utilization of previously used and uncleaned syringes or instruments, particularly dealing with dental procedures, or through unscreened blood transfusion products, vertical transfer from mother to child, or sexual abuse (11,12).

In patients being administered chemotherapy, delays in treatment, reduction in dosage, even treatment disruption or development of fulminant hepatitis have been noted due to reactivation of the hepatitis virus (13-15). In this study, positivity in HBsAg was determined to be 20.6% and anti-HCV positivity as 0.8% of the total patients. No patients were identified to be positive for Anti-HBc total among the sample size. In our study, no patient had anti-HBs positivity.

Prevalence of HBV in pediatric oncology patients was investigated and it was determined that 17.09% of HBV infected children during immunosuppressive therapy lost their protective HbsAb they had before treatment and safeguard measures must be taken, such as vaccination of these children immediately following treatment (16).

Monthly monitoring of HBV DNA viral load has been recommended to be beneficial for deterring HBV reactivation-related hepatitis among B-NHL patients with resolved HBV infection (17). Studies conducted in Egypt proved occult hepatitis B infection found 31% of the pediatric cancer patient population to be HCV-positive (18). In a study conducted to assess the seroprevalence of HBV, HCV or HIV in patients with diffuse B cell lymphoma and Hodgkin's lymphoma, statistically significant association was found among the disease groups in terms of hepatitis B surface antigen (HBsAg), hepatitis B core (HBc) IgG antibody, hepatitis B e antigen (HBeAg), and anti-HBe seropositivities. A statistically significant link was also observed among the disease groups in terms of anti-HCV seropositivity.(19).

A cohort of children with cancers in Turkey showed nil seroprevalence of anti-HBsAg, anti-HCV, and anti-HIV which is very encouraging. This progress is linked with the advancement in donor screening systems in blood

banks along with uncompromised hygiene practices and national free hepatitis B vaccination program in Turkey (26).

A study conducted in Turkey elucidated significantly higher HBsAg positivity rates in patients with head and neck, rectum, and gastric and esophagus cancer than control groups. Anti-HCV positivity rate was ominously higher in lung cancer (20). RP Myers et al. among 483 patients screened for colorectal cancer reported 3 as anti-HCV positive (0.6%, 95% CI 0.1%–1.8%) rendering the acceptance of HCV screening high among patients undergoing colorectal cancer screening (21).

Eren and colleagues analyzed 4,400 medical records retrospectively of patients receiving chemotherapy over a 3-year period and found 1,826 patients had evidence of HBV serology (22). They established HBsAg seropositivity (about 5%), which is very close to the estimated sero-prevalence of hepatitis B in Turkey. Hepatitis B reactivation occurred in 15% of patients being administered chemotherapy (22).

This study revealed the sero-prevalence of HBV was greater than HCV. The high seroprevalence of HBV in cancer patients could be due to the cost, risk of quality assurance and requirement of booster doses as concluded by Muneera Naz et.al (23).

No significant association was noted among different forms of cancer and HBsAg or anti-HCV. HBsAg assay is highly recommended in every patient prior to commencement of chemotherapy or immunosuppressive treatment. As these patients regularly go through procedures that are invasive and require blood product transfusions, consequently, hepatitis seropositivity develops over time. This scenario could lead to a greater threat of reactivation and fulminant hepatitis following chemotherapy. Seronegative patients are thus advised to immunize against HBV (15).

The data from "National Health Insurance Research Database" about patients who had received systemic chemotherapy for solid or hematologic cancers, exhibited HBV screening rate before cancer chemotherapy had augmented over time. This improvement was noticed after government/hospital-based strategies which might have improved awareness of HBV screening and taking prophylactic antiviral therapy preceding to cancer chemotherapy (24).

Prior to initiation of chemotherapy, screening for HBV is obligatory in addition to prophylactic antiviral therapy, which can drastically lower the incidence of HBV reactivation, but also reduce HBV-related morbidity and mortality. Although, the use of highly sensitive screening tests and rigorous donor-selection measures have lowered the incidence of HCV infections, yet there is still a risk for HCV infection; therefore, these immunocompromised patients should also be observed for HCV.

Numerous measures are implemented in community practice to halt the rising infection rates within Pakistan, with initiatives such as immunization programs for newborns and high-risk populations, utilization of auto-disposable syringes, patient safety protocols, strict screening techniques for blood prior to donation, public health awareness and treatment that is free of cost for low-income patients (25).

Addiction which was found as the most common risk factor in hepatitis positive individuals, which can be prevented by spreading the word among general population through print and electronic media of detailing its harmful effects. Additionally, it can be prevented by raising tax prices put on tobacco and alcohol products to reduce its purchasing and usage, limiting propaganda of addiction-prone substances and restricting advertisement of addictive substances in ways that appeal to younger audiences. The practice of blood transfusion is the second most common risk factor; this could be straightforwardly prevented simply by physicians sending blood products for thorough screening of blood-borne infections and limiting transfusions of blood which is free of infection in its entirety. In addition to these, government and hospital-based strategies to screen their patients for communicable diseases such as Hepatitis B, Hepatitis C, AIDS, etc. by implementing these measures can help reduce the number of infected patients significantly.

Conclusion

Our research provides an updated provisional clinical outlook that introduces a risk-adaptive strategy to ensure screening of blood products and treating patients with HBV and HCV infection before chemotherapy to reduce their risk of hepatitis reactivation. Cancer patients undergoing chemotherapy are advised close surveillance to ensure proper safeguarding antibody levels as maintenance against HBV, and they must be enrolled in the immunization program. Their anti-HCV status is strongly advised to be checked as well.

Conflict of interest:

The authors declare no conflict of interest.

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