

# Determinants for transmission of hepatitis B and C

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**Objective:** To find out the determinants of transmission of hepatitis B and C in patients admitted in medical wards and to assess the knowledge and practices of the patient regarding transmission of hepatitis B and C infection.

**Design:** A case-control study.

**Place and Duration of the Study:** In Gastroenterology ward Medical Unit 1 Punjab Medical College and Allied Hospital Faisalabad and Plastic Surgery Ward, KEMU, Lahore. Duration of the study is one year and started in May 2006.

**Patients and Methods:** Patients of hepatitis B and C admitted in Gastroenterology ward Medical unit 1 were interviewed and data was collected using a structured proforma. The study controls were selected who were negative for Hepatitis B and C on ELIZA method and were admitted in same ward. At 95% confidence interval the sample size was calculated as 230, 115 cases and 115 controls. Statistical analysis was done using SPSS version 13.

**Results:** Total number of the patients that participated in the study was 230 i.e., 55 with Hepatitis B, 60 with Hepatitis C and 115 in control group. The determinant of transmission of Hepatitis B found statistically significant included age, socio-economic status, occupations like health care workers, barbers, business owners with frequent travels, sex workers and sanitary workers, reuse of syringes, surgical and dental procedures, cesarean section in females, accidents and blood loss, parenteral drugs and drips, I/V drug abuse, ear and nose piercing, tattooing, getting shave and hair cut from barbers, sharing of tooth brush, contact and family history of hepatitis, extra marital sex, lack of knowledge about transmission of Hepatitis, and non-practicing of active and passive immunization. The variables found statistically significant in Hepatitis C infection included reuse of the syringes, blood transfusions, surgical and dental procedures, accidents and blood loss, parenteral drugs and drips, I/V drug abuse, getting shave and hair cut from barbers, sharing of razors, contact and family history of hepatitis. The knowledge and practices regarding spread of Hepatitis B and C were poor.

**Conclusion:** There is a need to create awareness about determinants and transmission of Hepatitis B and C in our community. The professions at risk should be investigated for Hepatitis periodically and both active and passive immunization should be available to them. The vaccination against Hepatitis B should be strongly recommended for high risk groups. Proper screening of the blood products, sterilization of surgical instruments and universal precautions against the spread of infection should be implemented

**Key Words:** Determinants, Hepatitis B, Hepatitis C, transmission.

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## Introduction

Hepatitis B and C infection is a serious Public health problem which is easily preventable by awareness in the community. One-third of the global population, i.e. 2 billion approximately, is infected with HBV, and 350 million people are lifelong carriers and mostly the carriers are in the Asian subcontinent.<sup>1-2</sup>

Pakistan is in the high prevalence areas. While few population-based studies are available, the estimate is 4.5 million carriers with a carrier rate of 3-4% for HBV, 12.8 million infected patients with HBV based on an average sero-prevalence of 6-8%. Approximately 10% of HBV infected persons develop chronic hepatitis, about 15% - 25% develop cirrhosis of liver, and about half of these individuals develop hepatic decompensation or hepatocellular carcinoma.<sup>3</sup>

The prevalence of Hepatitis C in the community is 4-5%. Long standing Infection of Hepatitis C leads to chronic liver disease in 80-80% and 50% of them develops Hepatocellular carcinoma.<sup>4</sup>

Transmission results from exposure to infectious secretions, needles, blood or body fluids. Other modes of transmission include unprotected sexual contact, blood transfusions, re-use of contaminated needles & syringes, and vertical transmission from mother to child during childbirth. Without intervention, a mother who is positive for the hepatitis B surface antigen confers a 20% risk of passing the infection to her offspring at the time of birth. This risk is as high as 90% if the mother is also positive for the HBeAg. Hepatitis can be transmitted between family members within households, possibly by contact of non-intact skin or mucous membrane with secretions or saliva. However, at least 30% of reported hepatitis among adults cannot be associated with an identifiable risk factor.<sup>5</sup> In low prevalence areas such as the continental United States and Western Europe, where less than 2% of the population is chronically infected, injection drug abuse and unprotected sex are the primary methods of transmission of the infection.<sup>6-7</sup> In moderate prevalence areas, which include Eastern Europe, Russia, and Japan, where 2-7% of the population is

chronically infected, the disease is predominantly spread among children.<sup>8</sup> In high prevalence areas such as China, India and Pakistan, transmission through contamination of needles, instruments and blood was most important.<sup>9</sup> Several vaccines have been developed for the prevention of hepatitis B virus infection. These rely on the use of one of the viral envelope proteins (hepatitis B surface antigen or HBsAg).

But unfortunately vaccine for active immunization of Hepatitis C has not been produced. The passive immunization by immunoglobulins has been available to decrease transmission after exposure. Mass vaccination program introduced in the mid 1990s in most East and South-East Asian countries to combat Hepatitis infection has resulted in decline in HBV carrier rate and number of patients with hepatocellular carcinoma. But such mass vaccination programs are not getting enough attention in Pakistan.<sup>10-11</sup> The precious lives of the community are at risk as they are constantly exposed to the dangers of acquiring hepatitis B and C due to living in high prevalence region. It is a need of the hour to launch educational and preventive programs to increase the awareness against the deadly disease of hepatitis. More over due to the costly treatment of Hepatitis B and C infection and life threatening complications, the preventive aspect is most important in combating the infection that should include creating awareness, early diagnosis and immunization, compliance with universal precautions. This study about the determinants of transmission of Hepatitis B and C would be useful in providing the info-kit containing health education, life style modifications and interventional plans to prevent the transmission of Hepatitis B and C.<sup>12</sup>

### Patients and Methods

This study was conducted in Gastroenterology ward Medical unit 1 Punjab Medical College and Allied Hospital Faisalabad. Informed consent was taken. The risks and benefits were explained and all the personal information of the study subjects was kept confidential. At 95% confidence level the sample size was calculated to be 230. The sample consisted of 115 cases and controls. The 115 cases were selected on ELIZA test and they were positive for HBsAg, HBeAg or anti-HBcAg in Hepatitis B group (group 1) and positive for anti-HCV in Hepatitis C group (group 2). The patients of comparable age and education level and who were found negative on ELIZA test were taken as control.

Demographic data included age, gender, marital status, education status, monthly family income, profession, and duration of work. The proforma variables associated with risk factors included reuse of the syringes, blood transfusion, surgical procedure, dental procedure, accident and blood loss, parenteral drugs and drips, ear and nose piercing, tattooing, getting shaved and hair cut from barbers, sharing of tooth brush, family history of hepatitis, contact with hepatitis patient, extramarital sexual contacts, active immunization against Hepatitis B, passive immunization against Hepatitis, Knowledge about spread of Hepatitis Band C.

Gynecological and obstetric history from the females were also noted.

Data analysis was done through SPSS version13. The quantitative data was presented in frequency, percentage, mean and standard deviations. The qualitative data was analyzed using chi-square test. The p value less than 0.05 was considered as significant.

### Results

In the study total 230 patients participated, 55 were the cases of Hepatitis B, 60 were the cases of Hepatitis C and 115 were negative for Hepatitis B and C, thus they were

**Table 1: demographic features of study subjects**

Serial No.	Demographic Features	Distribution
1	Total number of patients	230
	Hepatitis B	55
	Hepatitis C	60
	Control	115
2	Sex	230
	Male	156
	Hepatitis B	38
	Hepatitis C	42
	Control	76
	Female	74
	Hepatitis B	17
	Hepatitis C	18
Control	39	
3	Socioeconomic status	230
	Monthly income<10,000	143
	Monthly income>10,000	87
4	Persons living in a house	
	Hepatitis B (mean ± SD)	9.54 ± 5.47
	Hepatitis C (mean ± SD)	8.08 ± 5.2
	Controls (mean ± SD)	8.68 ± 6.5
5	Education	
	Less or equal to matric	180
	Above Matric	26
6	Others	24
	Profession/occupation	
	Health Care Workers	114
	Barbers	05
	Business	92
	Unemployed	09
	Others	10

**Table 2:** Comparison of Hepatitis B and C Cases with Controls.

	Hepatitis B (Group 1)	Hepatitis C (Group 2)	Control	P-value Group 1 vs control	P-value Group 2 vs control
1: Age (mean $\pm$ SD)	34.7 $\pm$ 11.4	37.2 $\pm$ 10.5	40.2 $\pm$ 10.5	0.045	0.202
2: Education					
> Matric	6	18	24	0.175	0.298
< Matric	48	40	94	0.786	0.40
3: Socioeconomic monthly income					
< 10,000	07	40	96	0.00001	0.361
> 10,000	48	20	19	0.0000	0.04
4: Occupation					
Health Care workers					
Barbers	05	45	65	0.00004	0.25
Business	04	01	00	0.004	0.168
Unemployed	40	10	42	0.0116	0.03
Others	01	01	07	0.237	0.201
5: Reuse of the syringes	05	03	02	0.0302	0.232
6: Blood transfusion	45	55	15	0.000	0.000
7: Surgical procedure					
8: Dental procedure	5	45	20	0.211	0.000
9: Accident and blood loss,	50	38	11	0.000	0.000
10: Parenteral drugs and drips, drug abuse	48	56	4	0.000	0.000
11: Ear and nose piercing, tattooing,	7	32	2	0.005	0.000
12: Getting shave and hair cut from barbers,					
13: Sharing of tooth brush,	38	55	6	0.000	0.000
14: Sharing of razors					
15: Family history of hepatitis,	20	11	12	0.001	0.203
16: Contact with hepatitis patient,					
17: Extramarital sexual contacts,	20	14	6	0.000	0.0009
18: Active immunization against Hepatitis B					
19: Passive immunization against Hepatitis B and C.	8	1	4	0.015	0.505
20: Obstetric History					
Normal Vaginal delivery	12	1	13	0.124	0.0365
Cesarean section	44	54	8	0.000	0.000
Abortion and dilatation and curettage	44	55	8	0.000	0.000
21: Knowledge about spread of Hepatitis B,C	2	0	0	0.04	
	4	0	50	0.0002	0.000
	0	0	11	0.023	0.018
	3	17	11	0.507	0.110
	1	6	14	0.06	0.895
	1	4	5	0.41	0.446
	14	11	75	0.004	0.000

included in control group. The demographic features were summarized in table 1.

The comparison of group 1 and 2 with control had shown that the young patients are in group 1 (age = 34.7  $\pm$

11.4,  $p=0.04$ ). The determinant of transmission of Hepatitis B found statistically significant included socioeconomic status, occupations like health care workers, barbers, business owners with frequent travels, and others including sex workers and sanitary workers, reuse of syringes, surgical and dental procedures, cesarean section in females, accidents and blood loss, parenteral drugs and drips, I/V drug abuse, ear and nose piercing, tattooing, getting shave and hair cut from barbers, sharing of tooth brush, contact and family history of hepatitis, extra marital sex, lack of knowledge about transmission of Hepatitis, and non-practicing of active and passive immunization.

The variables found statistically significant in Hepatitis C infection were business owners, reuse of the syringes, blood transfusions, surgical and dental procedures, accidents and blood loss, parenteral drugs and drips, I/V drug abuse, getting shave and hair cut from barbers, sharing of razors, contact and family history of hepatitis, lack of knowledge about transmission of Hepatitis, and no awareness about passive immunization. The results of comparison of Hepatitis B and C with control are summarized in table 2.

## Discussion

Pakistan remains in the high seroprevalence area of Hepatitis B i.e. 6-8% and the carrier rate of 3-4%. The prevalence of Hepatitis C in the community is 4-5%. Nearly 60-70% patients with CLD and 50% patients with Hepatocellular carcinoma are HCV positive.<sup>13</sup>

The important determinants identified for the transmission of hepatitis B are socioeconomic status, occupations like health care workers, barbers, business owners with frequent travels, sex workers and sanitary workers, reuse of syringes, surgical and dental procedures, cesarean section in females, accidents and blood loss, parenteral drugs and drips, I/V drug abuse, ear and nose piercing, tattooing, getting shave and hair cut from barbers, sharing of tooth brush, contact and family history of hepatitis, extra marital sex, lack of knowledge about transmission of Hepatitis, and non-practicing of active and passive immunization.

The determinants of transmission of Hepatitis C infection are reuse of the syringes, blood transfusions, surgical and dental procedures, accidents and blood loss, parenteral drugs and drips, I/V drug abuse, getting shave and hair cut from barbers, sharing of razors, contact and family history of hepatitis, lack of knowledge about transmission of Hepatitis, and non-practicing of passive immunization.

In international studies the important determinants of transmission of Hepatitis B and C are high risk sexual behaviors, I/V drug abuse, and transmission from mother to child during pregnancy and child birth.<sup>6-8</sup> The local studies have shown that the determinants of spread of Hepatitis B and C in South East Asia are different from those in developed countries like United States and Europe. The reasons are the difference in cultural trends, social practices, economical status, education and awareness standard. In local studies the risk factors are high poverty level, unnecessary use of

syringes, parenteral drugs, unnecessary I/V drips, I/V drug abuse, reuse of the syringes and unawareness of the ways of transmission of Hepatitis infection are strong risk factors for the spread of infection in this region. Moreover in most of the Hepatitis patients more than one determinant is found.<sup>14</sup>

In the study it is found that the patients of Hepatitis B were younger than the patients of Hepatitis C and control. That is explained on the fact that the Hepatitis B leads to wide spectrum of the disease than Hepatitis C i.e., the cases of acute hepatitis B, carrier of Hepatitis B, chronic Hepatitis B are included in Hepatitis B prevalence. More over number of determinants of spread of Hepatitis B are more than C so it occurs early in life and leads to more spread due to unawareness. In an international study it is found that Risks of acquiring hepatitis B are far more than HCV infection.<sup>15</sup>

In this study it is found that the low socioeconomic status is associated with spread of Hepatitis B infection. Thus poverty elimination not only decreases the transmission of Hepatitis B infection but also helps in early diagnosis and prompt management of the condition. It is alarming that immunization status is poor among the hepatitis patients than the control group. More efforts should be undertaken to achieve better immunity in our community especially in high risk professions. The professions like health care workers including nurses, laboratory technicians, phlebotomists in blood transfusion centres, dialysis unit staff are more at risk of developing Hepatitis B thus periodical examination and immunization is strongly recommended. The Occupational Safety and Health Administration (OSHA) requires that hepatitis B vaccine be offered to healthcare providers who have a reasonable expectation of being exposed to blood on the job. This requirement does not include health care providers who would not be expected to have occupational risk, such as receptionists, billing staff, and general office workers. All health care providers who have a reasonable risk of exposure to blood or body fluids containing blood (e.g., health care providers with direct patient contact, health care providers who have the risk of needle stick or sharps injury, laboratory workers who draw or test blood) should have post-vaccination testing for antibody to hepatitis B surface antigen (anti-HBs). Post-vaccination testing should be done 1-2 months after the last dose.<sup>16-21</sup>

Fortunately HBV infection is largely preventable by vaccination. The reasons for non-vaccination may be the high cost of vaccine, lack of education / knowledge and belief that they are not at increased risk. Higher prevalence of HBsAg among health care providers i.e., 8% found in local studies may also be explained on this basis. Their knowledge should be better than the community in general and it must be required to speed up the health intervention program in risky profession.<sup>20</sup>

Needle stick injury was reported by 78% in a local study, mostly nurses. Needle prick is one of the most significant modes of transmission of hepatitis and precautions to

contaminated needles and syringes should be strictly observed.<sup>22</sup>

Having hair cuts and shaves from the barber has been identified as risk factor for the development of Hepatitis B. It is due to the fact that most of the barbers used same blades and scissor for every customer that increases the transmission of Hepatitis to both customers and Barbers. A study in barbers in China had shown the prevalence of HBsAg and anti-HBsAg was 16.8% and 67.1% respectively that was higher than found in subjects of other professions such as employees of departmental store. Thus barbers shops are leading to occupational hazards and potential source of transmission of infection to the customers.<sup>23</sup> This study has shown that the knowledge and practices of the patients are not up to the mark leading to practices like sharing of the tooth brushes, razors, reuse of needles and syringes, unsterilized instrument, unscreened blood transfusions, ear and nose piercing and unsafe sex. The same results are shown in local studies on hepatitis patients.<sup>24-26</sup>

### Conclusions

We should aim at creating awareness in the community about the determinants of Hepatitis B and C, its spread and transmission, developing info kit for professions at risk containing basic information on Hepatitis, preventive measures, immunization, screening of blood products, sterilization of instruments, disposable syringes, gloves and instruments, religious beliefs and teachings that helps to promote hygienic practices, safe sexual practices to reduce disease transmission in the communities. All individuals who receive blood or blood products, multiple injections, surgical and dental treatment should be screened for Hepatitis B and C infection. Carriers and patients with chronic HBV and HCV infections should be properly counseled regarding lifestyle modifications and prevention of transmission. Program of HBV vaccination of children, high risk professionals, sex partners of Hepatitis B patient should be strictly implemented.

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