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Research Article

Prevalence and Factors Associated with Hepatitis B Infection in the General Population: A Cross Sectional Study

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ABSTRACT
Background: Chronic infection with heptitis B virus (HBV) leading to cirrhosis, cancer, premature death and consequent economic burden is a global problem. Prevention is a public health challenge especially in unvaccinated and disadvantaged populations with unknown risk factors. Majority of Uttar Pradesh population is rural, whose risk factors have not been studied earlier. The objective was to study the risk factors of HBV infection in the rural adult population of Uttar Pradesh with aim of identifying target group for prevention.
Methods: Analytic case-control study in which health camps were organized in villages of Hapur block of Hapur district to screen adults and identify cases and controls.
Results: H/o jaundice 6 months or more (p=0.00, OR=3.58); contact with HBV (p=0.00, OR=4.17), family H/o HBV (p=0.00 OR=5.41); blood transfusion (p=0.00, OR=6), H/o hospitalization (p=0.001, OR=2.36), surgery (p=0.003, OR=2.17) and migration (p=0.018, OR=1.95) were significant risk factors. Lack of knowledge about HBV was significant (p<0.030). About 40% and 20% of both cases and controls were aware of parenteral and sexual transmission respectively; 4% cases vs. 13% controls knew about preventive vaccination. Logistic regression revealed that H/o jaundice, family H/o hepatitis B, blood transfusion, hospitalization and migration were independent risk factors for HBV transmission (OR=4.69, 6.55, 3.89. 2.49 and 2.76 respectively)
Conclusions: Screening and awareness programs for rural adults necessary to identify and follow up those with H/o jaundice, HBV+ contacts and migrant population. Infection control and biomedical waste management need strengthening.

Keywords: Hepatitis B, Risk Factors, Adult, Rural.

INTRODUCTION

Globally 325 million people are HBsAg positive hence carriers of hepatitis B Virus (HBV).[1] This is a public health challenge as majority of them have poor access to testing and treatment facilities. With a prevalence of 3 - 4.2%, India is in the intermediate endemic zone but has around 40 million HBV carriers.[2] Annually around 7,80,000 people die due to consequences of chronic HBV.[2] Among those with infection, chances of becoming HBV carriers are 90% in infants, 30% in early childhood and upto 5% in adults.[2] In persons with chronic HBV infection, risk of dying prematurely due to liver cirrhosis and hepatocellular carcinoma (HCC) is 15-25%; one in every 26 infants born run the life-time risk of developing chronic HBV infection.[3] Chronic infection with HBV is responsible for 80% of cirrhosis, and about 60% of HCC in India.[4] HBV is resilient and can survive outside the body for at least 7 days at room temperature without losing its infectivity. This virus is 100 times more infectious than HIV.3 The risk of infection with HBV after single needle- stick injury is 30%.[5] The 5-year survival rate of HCC is only about 1-4% for developing countries.[6] Chronic infection also results in loss of work related productivity, premature death and economic burden on individuals and healthcare system. Economic evaluation of societal costs of hepatitis B is equivalent to 3.2% of national healthcare expenditure.[7] Although HBV has considerable morbidity and mortality, it can be prevented by awareness and vaccination. The vaccine against hepatitis B is 95% effective in preventing infection and hence development of chronic liver disease and cancer. WHO recommended global vaccination against hepatitis B in 1992. From 2002 till 2012, Government of India included hepatitis B vaccine in its National Universal Immunization

Programme all over the country in phased manner. This is likely to reduce HBV carrier state from 4 to 1.15%.[8] However it is an optional vaccine for adults. Uttar Pradesh is a state with 88.7% rural population and average literacy rate of 60%.[9] Lack of awareness and accessibility to healthcare is typical. The present cohort of adults did not come under the ambit of childhood vaccination. Against this backdrop the only way of preventing the disease and its sequel in adults is awareness. Preventive strategies will depend on knowledge of risk factors operating in that area. Given the paucity of data regarding the many modes of transmission of HBV, it was aimed to study the risk factors operating in rural Uttar Pradesh which could play a major role in reducing the prevalence.

METHODS

Analytical case control study design was used to study risk factors responsible for transmission of Hepatitis B in the villages of Hapur block of Hapur district which is the field practice area of the Department of Community Medicine, Saraswathi Institute of Medical Sciences, Hapur. It was part of a rural screening programme using health camp approach. Health camps were organized in 2 randomly selected villages of all 17 subcentres of Hapur block between June 2022 to May 2023. Villagers availed general health check-up and were offered screening test for several diseases including HBsAg for HBV. HbsAg testing was done using standard Eliza kits at SIMS lab. Positive samples were rechecked by different kit. Ethical clearance obtained from Institutional Ethics Committee of Saraswathi Institute of Medical Sciences, Hapur and study conducted after informed consent.

Study Participants

All consenting adults above 20 years of age, testing positive for HbsAg in the health camps were selected as cases. Persons below the age of 20 years, having chronic disease, seriously ill, and non-consenting were excluded from the study. Controls were chosen amongst other attendees of health camp who were serologically negative for HBsAg but matched for age (±3 years), sex, marital status and social class using updated BG Prasad method of social classification.[10] Per capita income was calculated using average consumer price index (CPI) Uttar Pradesh 2014 for agricultural rural workers who formed our study population.[11] Cases & controls were chosen in ratio of 1:2 to increase power of the study.

Data Collection and Tools

Following the health camp, the villages were revisited on a pre-fixed dates by team from SIMS who administered a pre-tested structured questionnaire on all selected cases and controls. Data collected pertained to background characteristics of the participants, H/o jaundice 6 months ago or more in the past, contact with HBV+ person, and family history of HBV. Risk factors for HBV related to health care services and personal behaviour were enquired for and noted. Awareness about hepatitis B transmission and prevention were other variables studied. Data analysis was done using STATA 12.0. Levels of significance and odds ratio of risk factors calculated at 95% confidence interval. P-value of less than 0.05 was considered to indicate statistical significance. Risk factors found significant were put to multiple regression model to determine which characters were independent predictors of hepatitis B.

RESULTS

Among 105 persons found HbsAg positive, 4 were excluded as per exclusion criteria. One did not turn up for the interview. Finally 100 cases and 200 matching controls identified as per methodology enrolled for the study.

Background Characteristics of Cases and Controls

Among the cases maximum (32%) were in age group 20–30 years, 62% were males and 90% were married. Maximum no (55%) belonged to lower social class followed by lower middle class (32%). There was no significant difference between cases and controls with respect to age, gender, marital status and social class ($p \geq 0.05$). H/o jaundice 6 months ago or more in past in 52% cases and 25% of controls ($p=0.00$, OR=3.58); contact with hepatitis B in 18% cases vs 5% controls ($p=0.00$, OR=4.17), family history of Hepatitis B in 32% cases and 8% controls ($p=0.00$, OR=5.41) was present. (Table 1). Risk factors for transmission of Hepatitis B were analyzed with respect to (A) Health care services availed, (B) Personal behaviour (C) Awarness about hepatitis B (Table 2).

Table 1: Background Characteristics of Cases and Control.

Variable	Cases (n=100) n (%)	Cases (n=200) n (%)	P value	Odds ratio (95% CL)
Age (years)				
20- 30	32 (32)	52 (26)		
31-40	24 (24)	42 (21)	0.470	
41-50	18 (18)	38 (19)		
>51	26 (26)	68 (34)		
Sex				
Male	62 (62)	130 (65)	0.610	
Female	38 (38)	70 (35)		
Marital status				
Single/widowed	10 (10)	36 (18)	0.121	
Married	90 (90)	164 (82)		
SES*				
Upper class	0	0	0.762	
Upper middle class	0	0		
Middle class	13 (13)	29 (14.5)		
Lower middle class	32 (32)	70 (35.0)		
Lower class	55 (55)	101 (50.50)		
H/o Jaundice				
Present	52 (52)	50 (25)	<0.00	3.25
Absent	48 (48)	150 (75)		(1.90-5.56)
Contact with hep B				
Yes	18 (18)	10 (05)	<0.00	4.17
No	82 (82)	190 (95)		(1.73-10.52)
Family history of hep B				
Yes	32 (32)	16 (08)	<0.00	5.41
No	68 (68)	184 (92)		(2.68-11.21)

Table 2: Analysis of Risk Factors of HBV Transmission.

Variable	Cases (n=100) n (%)	Cases (n=200) n (%)	P value	Odds ratio (95% CL)
(A) Related to health care services				
History of blood transfusion				
Yes	20 (20)	8 (4)	6	<0.00
No	80 (80)	192 (96)	(2.40-16.31)	
History of hospitalization				
Yes	44 (44)	50 (25)	2.360	0.001
No	56 (56)	150 (75)	(1.37-4.04)	
History of surgery				
Yes	38 (38)	44 (22)	2.17	0.003
No	62 (62)	156 (78)	(1.24-3.79)	
History of needle stick injury				
Yes	10 (10)	0 (0)		<0.00*

No	90 (90)	200 (100)		
History of dentist visit				
Yes	34 (34)	62 (31)	1	0.6
No	66 (66)	138 (69)	(0.59-1.71)	
(B) Related to personal behavior				
History of HRB#				
Yes	4 (4)	0 (0)		0.007*
No	96 (96)	200 (100)		
History of STD T/t				
Yes	12 (12)	0 (0)		<0.00*
No	88 (88)	200 (100)		
History of ear nose piercing (female)				
Yes	32 (84.2)	68 (97.1)	0.16	0.022*
No	6 (15.8)	2 (2.9)	(0.02-0.96)	
History of shaving at barber ever (male)				
Yes	60 (96.77)	130 (100)		0.103*
No	2 (3.23)	0 (0.00)		
History of migration				
Yes	30 (30)	36 (18)	1.95	0.018
No	70 (70)	164 (82)	(1.07-3.54)	
(C) Awareness about hepatitis B				
Awareness about hepatitis B				
Heard about Hep B	52 (52)	130 (65)		0.03
Transmission through blood	40 (40)	86 (43)		0.62
Transmission through sexual contact	20 (20)	46 (23)		0.55
Knowledge about Prevention/ vaccination	4 (4)	26 (13)		0.083

Table 3: Final Model of Logistic Regression Analysis of Factors Associated with Hepatitis B.

	Adjusted Odds Ratio (95% Confidence Interval)	**P value**
Family H/o hepatitis B	6.55 (2.76-15.52)	<0.00
History of jaundice	4.69 (2.35-9.35)	<0.00
History of blood transfusion	3.89 (1.08-14.08)	0.04
History of hospitalization	2.49 (1.08-5.72)	0.03
History of migration	2.76 (1.28-5.96)	0.01

It was observed that 20% cases had history of transfusion of blood or blood products while only 4% controls ever had transfusion. The observed difference was significant (p=0.00, OR=6). Forty-four% cases and 25% controls gave history of hospitalization (p=0.001, OR=2.36). Difference of proportion between cases (38%) and controls (22%) was significant with respect to H/o past surgery (p=0.003, OR=2.17). Only 10% of the cases and none of the controls gave history of needle stick injury, hence the difference was significant (p=0.00).

The study didn't report significant difference in history of visit to dentist between cases and controls. *Personal behaviour related risk factors* Four among the cases and none of the controls admitted to high-risk behaviour, hence the observation was significant (p=0.007). Twelve cases gave history of sexually transmitted diseases (STDs) but none among controls, which was significant (p=0.00). Almost all females (84.2% cases and 97.1% controls) had undergone ear/ nose piercing, the difference was found to be significant (p=0.022,

OR=0.16). Almost all the male participants had ever visited barber and thus the difference between cases and controls was insignificant. Thirty percent cases and 18% controls gave history of migration and the observed difference was found to be significant (p=0.018, OR=1.95). *Awareness about hepatitis B* Fifty-two percent cases and 65% controls knew about hepatitis B (p<0.030); 40% cases and 43% controls were aware of its transmission through blood and blood products; 20% cases vs 23% controls knew it was transmitted sexually; 4% cases vs 13% controls knew about preventive vaccination against hepatitis B. Finally, adjusted odds ratio calculated using logistic regression STATA 12.0. In the final model (p<0.00, 95% CI 0.035-0.20) it was found that family history of hepatitis B, history of jaundice, blood transfusion, hospitalization and migration were independent risk factors for the occurrence of hepatitis B (Table 3).

DISCUSSION

This study was conducted in rural Uttar Pradesh, a predominantly agricultural state with low per capital income[9]. The study population comprised almost entirely of poor agricultural labourers belonging to lower or lower middle classes. No study hitherto has been conducted in such a population to know the factors concerned in transmission of HBV. Some studies have shown that men were at higher risk.[12-15] However, this was not found in our study and also in the study conducted in South India.[16] History of jaundice more than 6 months ago, family history and contact with hepatitis B patient were significantly related to seropositivity. Whereas 52% cases in this study were preceded by jaundice >6 months ago, a study conducted in Italy reported 80% of cases were preceded with history of jaundice.[17] This points to lack of follow up after an episode of jaundice or in contacts to pre-empt the dreadful complications of HBV. It may be noted that 48% cases did not report earlier episode of jaundice (anicteric jaundice). Being asymptomatic may preclude detection and follow up action hence a greater public health risk. The low status of the study population may be the cause of their inability to seek proper advice treatment for themselves and preventive vaccine for contacts. Family history for hepatitis B was significantly associated with cases in our study. Of the various modes of non-sexual horizontal transmission, intra familial, inapparent transmission through saliva, blood-tinged fluid, and fluid from open sores, skin lesions, or scratches are common modes especially in developing countries of the world.[13,18] Our study corroborates that contact with chronic carrier, predisposes the family members to the risk of developing Hepatitis B.[19-21] Among health care service related risk factors, past history of blood transfusion, hospitalization, surgery and needle stick injury were significant risk factors for HBV infection. This has been corroborated by many other studies.[15,18,22] Tandon et al observed that transfusion is one of the major routes of transmission of in adults in India. However, it was not so in studies conducted in Iran and Saudi Arabia which concluded that past history of hospitalization and injections given in health care settings were more important risk factors.[21,23] The history of exposure to either minor or major surgery is significantly associated with HBV infection in our study and also in others.[15,17] The probable reason could be deficient sterilizing practices and hygiene in the hospitals frequented by our study population and presents a window of opportunity to reduce infection by implementation of standard sterilization measures and infection control measures. Needle prick is one of the common modes of parenteral transmission. A study in rural Gujarat underlined the role of inadequately sterilized needles in transmission of Hepatitis B.[24] Similarly, a study in Uganda documented the risk factors involved with positive hepatitis serology in health workers, concluded needle stick injury as the most common risk factor.[25] The predisposition to seropositivity following exposure to health care related services can be attributed to ignorance about proper bio medical waste management among the health workers and waste handlers across the country.[26,27] Adherence to the standard protocols of biomedical waste management, sterilization of instruments and equipment can help to reduce incidence of hepatitis. Sexual promiscuity, intravenous drug abuse, homosexuality are risk behaviors predisposing to increased risk of HBV. Since the study was conducted in a conservative rural set-up the participants rarely responded to this question. Only 4% of our study population admitted to high risk behavior which became significant. A cross-sectional study conducted in Southern Iran reported that unsafe sex exposes a person to higher-than average probability of acquiring HBV.[28] Twelve percent of our study population admitted to have been treated for sexually transmitted diseases (STDs). A study

done in Mwanza, by Jacob et al concluded that there is high prevalence of HBV in STD patients.[29] However, in this conservative rural population, health camps would give better yield in screening for STDs, as a proxy for high risk behavior. Shaving by barbers among males and ear/ nose piercing by females with instruments of questionable sterility are common in rural set ups. Tattooing has been reported as a risk factor some studies.12 Practice of ear/nose piercing among females was weakly associated; barber visit among males not associated with occurrence of HBV. However, apart from ear nose piercing, body tattooing and scarification is also practiced in modern societies and forms a major risk factor for hepatitis B. Few studies have focused on body piercing, but the importance of percutaneous exposure, including body piercing and ear nose piercing cannot be ignored, the risk profile is similar to needle prick.[30] Migration which is the bane was significantly associated with HBV infection. Living away from home for more than one year was a risk factor in some studies. This study identifies a new risk group for preventive intervention as migration for better livelihood is a reality. The role of awareness and knowledge about modes of transmission in preventing spread of infection needs to be emphasised. In the rural set-up, about 60% individual had heard about the disease and this proportion is almost equal to the average literacy rate. However, only around 40% individuals were aware of the transmission through blood products and 20% about sexual contact. A study conducted among Vietnamese Americans has shown that majority of them were aware of the disease and its mode of transmission.[31] Unfortunately only 4% cases and 26% of controls knew about preventive vaccination. This difference points to lack of awareness and breach in health care delivery system. However, in our study lack of awareness was not a significant risk factor. Finally in this study it was found that family history of hepatitis B, history of jaundice, blood transfusion, hospitalization and migration were independent risk factors for the occurrence of HBV infection.

CONCLUSION

Several social, environmental and behavioral risk factors were significant in transmission of HBV in rural agricultural workers who form the bulk of the population in Uttar Pradesh. However target population for preventive action identified in the study as migrants, persons with H/o jaundice and their contacts for screening and follow up. Migrants should undergo screening and efforts made to increase awareness. Our study shows that non sexual horizontal transmission such as persistent contact with a chronic carrier though less known than other modes also occurs in Uttar Pradesh. This observation needs to be studied further. Against the convention of screening for HBV in STD clinics, camp approach is more suitable for rural populations. Improving infection control in our rural hospitals is a priority.

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