Seroprevalence and Risk Factors of Hepatitis B Virus Infection among General Population of Srinagar Kashmir

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ABSTRACT

Introduction: About 2 billion people in the world are infected with Hepatitis B virus. The objectives of our study were to find out the prevalence of Hepatitis-B infection, to determine its socio-demographic corelates and to know about the risk factors of Hepatitis B infection in the study population.

Material and methods: A cross-sectional, community-based study in the age group of 18 years and above was conducted in Block Hazratbal of District Srinagar. The sample size of 1340 was derived using formula $n=4pq/l^2$ After informed consent, 1300 subjects agreed to participate in the study and they were screened for HBsAg using ELISA kits. Relevant information about their demography, socio-economic status and risk factors of Hepatitis B infection was collected on a pre-tested, semi-structured proforma. Statistical analysis was performed using SPSS version 16.

Results: There were 1300 participants in our study, out of which 74.6% were females and 25.4% were males. It was a Muslim community with majority(69%) representing the Sunni group. Most of the participants were in the age group of 21-40 years with a median age of 35 years. The prevalence of Hepatitis B infection was found to be 1.2%, with higher prevalence among males. The risk factors such as tattooing, dental procedure, injecting drug use, extra-marital sexual activity, having multiple sexual partners, past history of jaundice and family history of Hepatitis B infection were significantly associated with Hepatitis B infection.

Conclusion: According to WHO classification, our study area qualifies as a low prevalence area. Significant risk factors of Hepatitis B infection observed in our study population give us a clue that if timely measures are not taken, we may have to face the epidemic of this deadly disease in the near future.

Keywords: Community, HBsAg, Hepatitis B, risk factors, seroprevalence, sociodemography, Srinagar

INTRODUCTION

Hepatitis B virus (HBV) infection is one of the major global public health problems with nearly 2 billion people infected worldwide, 75 % of whom are Asians.[1] There are about 350 million chronic carriers in the world.[1-3] Atleast 15-25% of chronically HBV infected people will die due to liver disease, including cirrhosis of the liver and hepatocellular carcinoma worldwide. HBV infection accounts for 5,00,000 to 1.2 million deaths each year. The virus causes 60-80 % of all primary liver cancers, which is one of the three top causes of cancer deaths in the East and SEAR, the Pacific Basin and Sub-Saharan Africa.[4]

HBV is a silent killer disease of the liver with many carriers not realising that they are infected with the virus.[5] Diagnosis is based on clinical, laboratory, and epidemiologic findings. HBV infection cannot be differentiated on the basis of clinical symptoms alone, and definitive diagnosis depends on the results of serologic testing. Serologic markers of HBV infection vary depending on whether the infection is acute or chronic. HBsAg is the most commonly used test for diagnosing acute HBV infections or detecting carriers.

This viral infection is seen in both the developed and developing regions of the world, with prevalence varying from 0.1% to 20% in different countries.[3] In areas of high endemicity, most people are infected early in life, and the prevalence of hepatitis B surface antigen (HBsAg) carriage is 8% to 20%. In most areas of the world (East and South Europe, South America, the Middle East, Middle Asia, Japan, and Turkey), HBV infection is of intermediate endemicity with HBsAg carriage rate of 2% to 7%. Areas with low endemicity (0.1% to 2%) include the United States, Canada, Western Europe, New Zealand and Australia, where only a minority of people come into contact with the virus, usually as a result of horizontal transmission among young adults.[6-8]

India has intermediate endemicity of Hepatitis B with HBsAg carrier rate between 2-7%. In India, there are 40 million HBsAg carriers and every year about 1,00,000 Indians die due to illness related to HBV infection.[9] This, in the context of large population would spell off a projected increasing burden of infection and liver disease due to HBV in this country in the years to come. In this perspective, the HBV epidemiology becomes relevant not only nationally, but also internationally, because of the possibility that India may soon have the largest HBV infection pool in the world. Hepatitis B virus (HBV) infection is the most common cause of chronic liver disease in the Asia-Pacific region.

Studies are too limited to give a clear picture of the prevalence and pattern of HBV infection at the state level, especially among otherwise healthy individuals. Therefore, the present study was planned to estimate the prevalence of Hepatitis-B infection, to determine its socio-demographic correlates and to know about the risk factors of Hepatitis B infection in the study population.

MATERIAL AND METHODS

A cross-sectional study on seroprevalence and risk factors of Hepatitis B virus (HBV) infection was conducted in the

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age group of 18 years and above among general population of Block Hazratbal. Block Hazratbal is the field practice area of Government Medical College Srinagar. The duration of study was 2 years from April 2011 to March 2013.

Statistical methodology: Sample size for the study was determined using formula, $n = 4\ pq / l^2$ where, 'n' is the sample size, 'p' is the estimated prevalence based on previous studies, 'q' = (1-p) and 'l' is the allowable error. Here, p = 3% or 0.03. This was taken from the community based study reported by Chowdhury et al. (2005) in West Bengal[10], q= (1-0.03) and l =1% (absolute error). Substituting these values in the above formula, 'n' was found equal to 1164. Based on the findings of pilot study, a non-response rate of 15% was taken into consideration. Then, sample size was calculated to be 1340.

Hazratbal is mostly an urban area with small pockets of rural and tribal communities. For administrative convenience, the block is divided into 4 zones namely Hazratbal, Harwan, Nishat and Tailbal. The sample was chosen using multi-stage random sampling. In the first stage, one health centre area was chosen randomly using lottery method from each zone. After using the survey register of year 2010, all the households in selected sub-centre areas were enlisted. Number of households to be enrolled in each area was calculated by probability proportionate to size sampling (PPS). In the second stage, from each of the selected area, requisite number of households were chosen randomly using random number table.

Each selected household was visited and all members of age 18 years and above were enrolled for the study. The households in which the enrolled member was not present at the time of visit, were revisited at least twice to ensure participation. First of all, informed consent was obtained from the participants. A total of 1340 subjects were enrolled, out of which only 1300 agreed to participate in the study. Relevant information about their demography, socio-economic status and risk factors of Hepatitis B infection was collected on a pre-tested, semi-structured proforma. Modified BG Prasad's scale (2010) which is based on per capita monthly income was used for socio-economic status.[11] From each subject, about 3 ml of venous blood sample was taken under all aseptic precautions. The samples were then transported in vaccine carriers to the nearest Primary Health Centre (PHC) having supportive laboratory services within 3 hours. The whole blood samples were centrifuged at 3ooo r.p.m for 15 minutes the same day. The serum samples were stored in the Ice-lined Refrigerator (ILR) in the PHC maintaining temperature of $2\text{-}8^0$ C. The sera were then transported weekly to the Blood Bank of SMHS Hospital, maintaining cold-chain. The samples were tested for Hepatitis-B surface antigen (HBsAg) using commercial Enzyme-Linked Immuno-Sorbent Assay (ELISA) kits namely Microscreen kits.

Statistical analysis**:** The data obtained was entered into Microsoft Excel and analysed using SPSS 16. Frequencies were obtained using descriptive statistics. Tests of proportions (Chi-square) was used to obtain results. A *P*-value of less than 0.05 was considered statistically significant.

RESULTS

There were 1300 participants in our study, out of which 74.6% were females and 25.4% were males. It was a Muslim community with majority(69%) representing the Sunni group. Most of the participants were in the age group of 21-40 years with a median age of 35 years. They were mostly from urban areas and about 66.8% were currently married.64.8% of the participants were illiterate with majority being housewives. About 16 participants (1.2%) were health workers and therefore at risk of occupational exposure to Hepatitis B infection. Majority of the participants (67.2%) belonged to class II (i.e. having per capita monthly income of Rs. 1644 to Rs. 3287) of modified BG Prasdad's scale for socio-economic class.

Prevalence of HBsAg among participants was 1.2%. Out of 15 cases of Hepatitis B infection, 14 were males and only 1 was female. Therefore, HBsAg positivity among males was higher (4.2%) as compared to females (0.1%) and it was found to be statistically significant ($P< 0.05$) (Table 1).

Among the socio-demographic corelates, being a member of Shia sect and unmarried were found to be significantly associated with Hepatitis B infection with *PS*-values of less than 0.05. Prevalence was more in rural(1.4%) as compared to urban areas (1%) but the difference was not statistically significant. None of the participants having a high risk job had Hepatitis B infection (Table 2).

Regarding the risk factors, tattooing, dental procedure, injecting drug use, extra-marital sexual activity, having multiple sexual partners, past history of jaundice and family history of Hepatitis B infection were significantly associated with Hepatitis B infection with *P*-values of less than 0.05. Risk factors such as history of blood transfusion, surgical procedure, needle stick injury, therapeutic injection use, reproductive tract infections and hospitalisation did not show statistically significant relationship with Hepatitis B infection (Table 3).

DISCUSSION

Hepatitis B is the most common chronic viral infection in humans. Inspite of a vaccine available since 1982, the hepatitis B virus (HBV) remains a serious global public health problem. Nearly 350 to 400 million people suffer from this infection globally, and 1 million people per year lose their lives due to complications of this infection.[12]

In our study, about 75% of the participants were females. This could be explained by the fact that males were not present during day time as they were at their places of work. De-

Gender		HBsAg		Total
		Present	Absent	
Male	n	14	316	330
	%	4.2	95.8	100
Female	n	1	969	970
	%	0.1	99.9	100
Total	n	15	1285	1300
	%	1.2	98.8	100
χ^2 (corrected) =33.451, df=1, $P< 0.001$				

Table-1: Gender wise prevalence of Hepatitis B infection in participants

Socio-demographic characteristics	Number(%)	HBsAg + (%)	HBsAg- (%)	Chisquare (x^2)	P-value
Residence	1300 (100)				
Rural	412 (31.7)	6 (1.4)	406 (98.6)	0.173	0.677
Urban	888 (68.3)	9 (1)	879 (99)		
Islamic sect	1300 (100)				
Sunni	898 (69)	6 (0.7)	892 (99.3)	4.708	0.03
Shia	402 (31)	9 (2.3)	393 (97.7)		
Marital status	1300 (100)				
Unmarried	342 (26.3)	8 (2.3)	334 (97.7)	4.394	0.036
Married/widow/widower/divorced	958 (73.7)	7 (0.7)	951 (99.3)		
High risk job	1300 (100)				
Present	6 (0.5)	0 (0)	6 (100)	0.001	1.00
Absent	1294 (99.5)	15 (1.2)	1279 (98.8)		

Table-2: Socio-demographic correlates of Hepatitis B infection

Risk factors	Number (%)	HBsAg + (%)	HBsAg- (%)	Chisquare (x^2)	*P*-value
Blood transfusion	1300 (100)				
Present	107 (8.2)	2 (1.9)	105 (98.1)	0.063	0.802
Absent	1193 (91.8)	13 (1.1)	1180 (98.9)		
Tattooing	1300 (100)				
Present	4 (0.3)	2 (50)	2 (50)	46.474	<0.001
Absent	1296 (99.7)	13 (1)	1283 (99)		
Surgical procedure	1300 (100)				
Present	429 (33)	2 (0.5)	427 (99.5)	1.831	0.176
Absent	871 (67)	13 (1.5)	858 (98.5)		
Dental procedure	1300 (100)				
Present	337 (25.9)	11 (3.3)	326 (96.7)	15.353	<0.001
Absent	963 (74.1)	4 (0.4)	959 (99.6)		
Injecting drug use	1300 (100)				
Present	2 (0.2)	2 (100)	0 (0)	95.774	<0.001
Absent	1298 (99.8)	13 (1)	1285 (99)		
Needle stick injury	1300 (100)				
Present	19 (1.5)	0 (0)	19 (100)	0.369	0.543
Absent	1281 (98.5)	15 (1.2)	1266 (98.8)		
Therapeutic injection use	1300 (100)				
Present	815 (62.7)	9 (1.1)	806 (98.9)	0.003	0.959
Absent	485 (37.3)	6 (1.2)	479 (98.8)		
Extra marital sexual activity	1300 (100)				
Present	5 (0.4)	3 (60)	2 (40)	105.002	<0.001
Absent	1295 (99.6)	12 (1)	1283 (99)		
Multiple sexual partners	1300 (100)				
Present					
Absent	12 (0.9)	3 (25.0)	9 (75.0)	41.127	<0.001
	1288 (99.1)	12 (0.9)	1276 (99.1)		
Reproductive tract infection	1300 (100)				
Present	70 (5.4)	0 (0)	70 (100)	0.125	0.723
Absent	1230 (94.6)	15 (1.2)	1215 (98.8)		
Hospitalisation	1300 (100)				
Present	404 (31.1)	6 (15)	398 (98.5)	0.221	0.638
Absent	896 (68.9)	9 (1.0)	887 (99.0)		
Past history of jaundice	1300 (100)				
Present	133 (10.2)	8 (6.0)	125 (94.0)	26.133	<0.001
Absent	1167 (89.8)	7 (0.6)	1160 (99.4)		
Family history of Hepatitis B	1300 (100)				
Present	11 (0.8)	2 (18.2)	9 (81.8)	15.156	<0.001
Absent	1289 (99.2)	13 (1.0)	1276 (99.0)		

Table-3: Risk factors of Hepatitis B infection in study participants

spite paying repeated visits to households, our sample comprised of only 25% males. More than half of our participants were in the sexually active age group of 18-40 years. It was a Muslim community and the participants represented either Sunni or Shia group. Only 1.2% were at risk of occupational exposure to HBV infection.

Many studies on the epidemiology of HBV infection have been carried out in India and based on these data, between

3-4% of the Indian population are HBV infected (HBsAg positive). In our study the prevalence of HBsAg was found to be 1.2 %. According to WHO classification, our study area qualifies as a low prevalence area (as prevalence was less than 2%). Our finding was almost similar to a study conducted by Ghadir et al. in the general population of Central Iran where the prevalence of HBsAg was 1.3%.[13] Aggarwal et al. reported HBsAg prevalence of 2.25% in a study conducted among voluntary blood donors in Northern India.[14] In a population based study by Tandon et al., in Birbhum district of West Bengal, the HBsAg prevalence was about 2.97%.[15] Therefore, low prevalence in our area may be due to the fact that people have low level of exposure to various risk factors of hepatitis B infection. Our study revealed that prevalence of HBsAg was significantly higher in males as compared to females ($P < 0.001$). A study by Aggarwal et al. also reported higher positivity among males.[14] This finding was consistent with the study conducted by Khan et al. in Pakistani Punjab where males were more frequently infected than females with a positivity ratio of 2.14:1.[15] Higher infection in males may be due to their frequent exposure to risk factors such as injecting drug use and multiple sexual partners because of their employment away from their homes. As majority of the female participants are housewives, so they have less exposure to various risk factors.

More than half of our cases were of the age of 18- 40 years. Khan et al. also observed higher rates of infection in the age-group of 21-40 years.[15] HBV infection being higher in young respondents may be due to their greater exposures and interaction in society as compared to elders. All the participants were Muslims by religion and majority of them belonged to the Sunni sect (69%) and only 31% were from the Shia sect. However, the prevalence of HBsAg was significantly higher in Shia sect as compared to Sunni sect. This difference could be due to the practice of self-flagellation by the Shia Muslims in the holy Islamic month of Muharram. A metallic chain with multiple knife-lets attached to one end, is used to repeatedly inflict injuries on body. These blood contaminated knife-lets are then dipped in a bucket full of water and many persons may use the same water to remove the blood and then re-use them again. Some participants even shared their knife-lets with other members of their family/community especially during Muharram procession. Same was observed by Iqbal Wani in Kargil, Ladakh where prevalence was 8.2% in Shia Muslims as compared to 4.7% in Sunni Muslims (OR=1.65; P=0.347).[16] Unmarried participants had significantly higher HBsAg positivity as compared to married. Similar finding was reported from Bangalore where about 65% of the cases were unmarried.[17] An epidemiological study in Anhui Province of China by Li et al showed higher prevalence among married (7.9%) as compared to unmarried (7.4%).[18] It was seen that unmarried participants especially males had a high risk behaviour of having multiple sexual partners and injecting drug use and as such were more exposed to risk of acquiring hepatitis B infection.

Median per capita monthly income was significantly higher among cases as compared to those with HBsAg negative status. A study from South India reported that about half of the cases were from high socio-economic status.[17] Most of our cases (7 out of 15) were illiterate and only 5 were high school certified. But relationship of educational status with hepatitis B positivity was not found to be significant. A study by Gadhir et al showed significant relationship with education and highest prevalence was reported among illiterates.[13] Occupation-wise, majority of our hepatitis B cases were skilled workers followed by tourist guides and students. None of our case was involved in a high risk job. It was observed that skilled workers (i.e. carpet weavers, embroidery workers etc.) belonged mostly to rural areas and had frequent contacts with quacks for injections and other procedures such as tattooing. Tourist guides had a history of having multiple sexual partners and injecting drug use was seen among students.

Our study found that the prevalence of HBsAg was 50% in those with history of tattooing and it was significantly higher than those who had no exposure (P<0.001). Leila M.M.B. Pereira et al. reported tattooing as a significant risk factor (OR=2.24; P=0.015) in Northeast region of Brazil.[19] Similar findings were reported in Nigeria where HBsAg prevalence was 40% in those with tattooing.[20] History of dental procedures was a significant risk factor for hepatitis B in our study population (P<0.001). About 25% of our subjects were exposed to dental procedures and some of them had even visited the quacks (unqualified practitioners) for the same. Khan et al. observed that about 11.2% respondents were exposed to dental procedures in Pakistani Punjab.[15] Another study from Pakistan by Qureshi et al.[21] pointed that dental procedure was a significant risk factor for HBV infection (OR= 2.3; 95% CI: 1.8-3.0). In our study, significant relationship was observed between injecting drug use and seropositivity, with needle sharing present in all users. Alam et al reported the prevalence of HBsAg as 22.4% in IDUs of North West Frontier Province of Pakistan.[22] Needle sharing was observed as a significant risk factor by Eke et al (P=0.062).[20] Prevalence of HBsAg was found to be 25% in participants with multiple sexual partners. About 62.5% of hepatitis B cases from Pakistan[23] had more than one sexual partner (0R=1.6; CI:0.9-3.0) and a study from Bangalore also reported multiple sexual partners as a significant risk factor (OR=5.26; CI:1.66-16.64) for hepatitis B.[17] Family history was a significant risk factor for hepatitis B in our study (P <0.001). Similar finding was reported by Li et al. (OR=2.04; P<0.001).[18]

CONCLUSION

This study, the first community based study on Hepatitis B performed in Srinagar, Kashmir clearly indicates that our community too is no exception to this infection with a prevalence of 1.2% in adults. Therefore, as per WHO classification our study area is a low prevalence area. Significant risk factors observed in our study such as injecting drug use, multiple sexual partners, dental procedures, tattooing etc. give us a clue that we may have to face the epidemic of this deadly disease in the near future, if timely measures are not taken. Keeping in view, the increasing burden of this disease, there is a need to organise health education campaigns targetting both health care workers as well as public, so that they adopt all possible measures to prevent the spread of this fatal infection. Our communication strategy should be effective

enough to bring about change in the behaviour of young and productive population so that they would refrain themselves from adopting such behaviours that make them vulnerable to hepatitis B infection.

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