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Seroprevalence of Hepatitis B Infection in Field Practice Area of Government Medical College, Srinagar Kashmir: A Community Based Cross-sectional Study

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ABSTRACT

Hepatitis B virus infection is one of the major global public health problems with nearly 2 billion people infected worldwide, 75 % of whom are Asians. There are about 350 million chronic carriers in the world.The study was planned to study the socio-demographic characteristics of study participants andto estimate the prevalence of Hepatitis-B infection in Block Hazratbal, Srinagar. A cross-sectional, community-based study in the age group of 18 years and above was conducted having sample size of 1340, obtained using formula $n=4pq/l^2$and they were screened for Hepatitis B surface antigen using Enzyme Linked Immuno-sorbent Assay kits. We had 1300 participants in our study, all Muslims. There were 970 (74.6%) females and 330 (25.4%) males. Majority of our participants (54.7%) were in the age group of 21-40 years. Most of the participants were from urban areas(68%), currently married(66.8%), illiterate(64.8), members of joint family(59%) and belonging to socio-economic class II(67.2%). The prevalence of Hepatitis B infection in Hazratbal Block was 1.2%% with higher prevalence in males (4.2%) as compared to females (0.1%).Therefore, Block Hazratbal is having low endemicity of Hepatitis B infection as per WHO classification. 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.

Keywords: *Hepatitis B, HBsAg, seroprevalence, risk factors, 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],[2],[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].An effective vaccine is available for over two decades and has brought about remarkable changes in the global epidemiology of HBV infection.

Hepatitis B infection is more communicable than HIV and HCV infection. It is 50-100 times more infectious than HIV and 10 times more infectious than hepatitis C. HBV is a silent killer disease of the liver with many carriers not realising that they are infected with the virus[5].Although anyone can get Hepatitis B, some people are at greater risk, such as those who have sex with an infected person, having multiple sex partners, sexually transmitted disease, sexual contact with other men, injecting drugs or sharing needles, syringes, or other drug equipment, living with a person who has chronic Hepatitis B, are infants born to infected mothers, exposed to blood on the job, hemodialysis patients and travel to countries with moderate to high rates of Hepatitis B infection.

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.

Hepatitis B is an important health problem in both the developed and developing countries. In developed countries where most of the major communicable diseases have been successfully controlled, hepatitis-B continues to cause considerable morbidity and mortality, and therefore, has become one of the priority public health problems in these countries. In developing countries, the prevalence is much higher and its health impact even greater. However, the significance and magnitude of problem may vary from country to country and depends on the complex mix of behavioural, environmental and host factors. The prevalence of HBV infection and the predominant mode of transmission vary greatly depending on the geographical region from 0.1% to 20% in different parts of the world.[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],[7],[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 of HBV infection at the state level, especially among otherwise healthy individuals. In Kashmir, so far no community–based study on the seroprevalence of Hepatitis B virus infection has ever been conducted. Therefore, the present study was planned to study the socio-demographic characteristics of study participants and to estimate the prevalence of Hepatitis-B infection in Block Hazratbal which is the field practice area of Government Medical College, Srinagar.

MATERIALSAND METHODS

A cross-sectional, community-based study on seroprevalence of Hepatitis B virus (HBV) infection in the age group of 18 years and above was conducted in Block Hazratbal of District Srinagar. The duration of study was 2 years from April 2011 to March 2013.

Sample size: Sample size for the study was determined using formula mentioned below:

$$n = 4\,pq / l^2$$

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].Here, 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 as follows:

Sample size = n + non-response rate (15% of 'n')

Substituiting value of 'n' as 1164, sample size for the study was calculated to be 1340.

Selection of sample: Hazratbal block is predominantly an urban block with small proportion of rural and tribal mix. The block has been divided into 4 zones-Hazratbal, Harwan, Nishatand Tailbal, comprising of 16 health centres (sub-centres, primary health centres). The sample was selected from the study population by multi-stage random sampling. Firstly, from each zone, one health centre was chosen randomly using lottery method. The four selected health centres were s/c Abi-dal (zone Nishat), s/c Theed (zone

Harwan), s/c Nandpora (zone Hazratbal) and s/c Kashipora (zone Tailbal). A list of all the households inselected sub-centre areas was obtained from the survey register (2010). After enlisting all the households, average number of adults (18 years of age and above) per household was determined. Number of households to be visited in each sub-centre area was calculated by probability proportionate to size sampling (PPS). From each of the selected sub-centre, requisite number of households were chosen randomly using random number table. The selection procedure is detailed in Table 1.

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, wererevis ited atleast 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 socio-demographic factors 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 2-8^0 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 statistical software SPSS version 16. Frequencies were obtained using descriptive statistics. Tests of proportions (Chi-square) wasused to obtain results. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 1300 participants were included in our study, out of which 970 (74.6%) were females and 330 (25.4%) males. Majority of our participants (54.7%) were in the age group of 21-40 years with a median age of 35 years and range of 18-80 years. Study participants were mostly from the urban area with only 32% belonging to rural area. About 66.8% of the participants were currently married followed by unmarried (26.3%) and others. More than half of the participants (59%) belonged to joint families and only 41 % were members of nuclear families. Majority of the participants were illiterate (64.8%) and only 6% were graduate and above. About half of the participants were housewives followed by skilled

workers (21%), students (8.4%), salaried employees (5.4%.), unskilled (5%). About 16 participants (1.2%) were health workers and therefore at risk of occupational exposure to Hepatitis B infection. According to modified BG Prasad's socioeconomic scale (modified for the year 2010), majority of the participants (67.2%) belonged to class II (i.e. having per capita monthly income of Rs. 1644 to Rs. 3287). Only 0.5% of participants belonged to socio-economic class IV (Table 2),

Regarding distribution of risk factors of Hepatitis B infection among participants, history of blood transfusion was present in 107 participants(8.2%). Ear piercing was present in more than half of the participants (59.2%)whereas nose piercing was seen in only 4.2% and in majority of them, piercing was performed by unsterilized needle at home. Only 4 participants had history of tattooing whereas one-third of the participants had a history of surgical procedure in the past. History of dental procedures was seen in 25.9% of participants with majority of them having undergone tooth extraction. As reported by the participants, some extractions, about 25 in number, were done by the quacks. Out of 1300 participants, 2 were injecting drug users and they were frequently sharing needles with other users. Therapeutic injection use was present in 62.7% of the participants with only 1.5% of participants having exposure to needle stick injury. Regarding sexual behaviour of participants, 12 of them had multiple sexual partners whereas 5 participants were involved in extra-marital sexual activity.

About 31% of participants had a history of hospitalisation in the past with majority of them being admitted for either surgical or gynaecological procedure. Previous history of jaundice was present in 10.2% of participants. Among them, Hepatitis B infection as a cause of jaundice was documented in 8 participants (6%). Out of 1300, 11 participants (0.8%) had a family history of Hepatitis B infection (Table 3).

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 4).

Table 1 Selection of sample from four zones

	s/c Abidal	**s/c Theed**	**s/c Nandpora**	**s/c Kashipora**
Total Population	6000	4008	3370	840
Population of age 18 years & above	3500	2645	2470	500
Sample size according to PPS	509	389	362	80

Number of households	600	850	674	200
Number of adults per household	5.8	3.1	3.6	2.5
Number of households enrolled for study	88	126	101	32

Table 2 Socio-demographic characteristics of participants

Characteristics	Number(n)	Percentage (%)
Sex		
Female	970	74.6
Male	330	25.4
Age(years)		
20 or less	119	9.2
21-30	393	30.2
31-40	319	24.5
41-50	117	9.0
51-60	173	30.3
61-70	133	10.2
71-80	46	3.5
Residence		
Urban	888	68
Rural	412	32
Islamic sect		
Sunni	898	69
Shia	402	31
Marital status		
Unmarried	342	26.3
Currently married	868	66.8
Widow	67	5.2
Widower	11	0.8
Divorced	12	0.9

Type of family		
Nuclear	531	41
Joint	769	59
Educational status		
Illiterate	843	64.8
Primary	52	4.0
Middle	130	10
High	126	9.7
Higher secondary	71	5.5
Graduate	54	4.2
Postgraduate and above	24	1.8
Occupation		
Housewife	659	50.7
Skilled	273	21.0
Unskilled	65	5.0
Student	109	8.4
Salaried	70	5.4
Retired employees	50	3.8
Business	32	2.5
Farmer	22	1.7
Health worker	16	1.2
Tourist guide	4	0.3
Socioeconomic class		
Class IV (Rs 493-985)	6	0.5
Class III (Rs 986-1643)	142	10.9
Class II (Rs 1644-3287)	873	67.2
Class I (Rs 3288 & above)	279	21.5
Total	1300	100

Table 3 Distribution of risk factors of Hepatitis B virus infection among study participants

Risk factors	Number (N=1300)	Percentage (%)
Blood transfusion	107	8.2
Ear piercing	770	59.2
Nose piercing	54	4.2
Tattooing	4	0.3
Surgical procedure	429	33
Dental procedure	337	25.9
Injecting drug use	2	0.2
Therapeutic injections	815	62.7
Needle stick injury	19	1.5
Multiple sexual partners	12	0.9
Extra-marital sexual activity	5	0.4
Past hospitalisation	404	31.1
Past jaundice	133	10.2
Family history of Hepatitis B	11	0.8

Table 4 Gender wise prevalence of Hepatitis B infection in participants

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, $p < 0.001$				

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].HBsAg positivity in developed countries varies from 0.6% in Wales, England, to 1.2% in Texas, USA. However, higher prevalence of infection with HBV has been reported from various parts of the developing world including 3.5% in Ghaza, Palestine[13], 1.6-7.7% in Brazil[14],[15], 19.6% in Egypt[16] and 2-10% from various parts of India[17]. Studies are too limited to give a clear picture of the prevalence of HBV infection at the state level, especially among otherwise healthy individuals. Therefore, the present study was aimed to have a better understanding of prevalence of HBV infection and distribution of risk factors in the community.

Majority of our participants were females (75%) as males used to be on their job and as such were not present in their household during day time. Despite paying repeated visits to households, where a subject of 18 years and above age could not be contacted, our sample comprised of only 25% males. More than half of our participants were in the age group of 18-40 years and about 68% were residents of urban area as our study area being predominantly urban. All participants were Muslims and belonged to either Sunni or Shia sect. About half of the participants were housewives as femalesconstituited the majority of the sample. About 21% were skilled workers and only 1.2% were at risk of occupational exposure to HBV infection. More than half of the participants were married, illiterate, belonging to joint families having 4-8 members and mostly from socio-economic class II (as per modified BG Prasad's scale for the year 2010).

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%[18]. Aggarwal et al. reported HBsAg prevalence of 2.25% in a study conducted among voluntary blood donors in Northern India[19]. In a population based study by Tandon et al., in Birbhum district of West Bengal, the HBsAg prevalence was about 2.97%[20]. 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[19]. 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[20]. 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 were housewives, so they had less exposure to various risk factors.

CONCLUSION

This study, the first community based study on Hepatitis B conducted in Srinagar indicates seroprevalence of Hepatitis B as 1.2% with higher prevalence in males (4.2%) as compared to females (0.1%). According to WHO classification, our study area qualifies as a low prevalence area (as prevalence was less than 2%).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. There is a need to strengthen routine immunization of infants and ensure regular supply of vaccines. In future, community based studies on seroprevalence of hepatitis B infection should be on a large scale and should preferably include more districts of Kashmir with fair representation of both sexes.

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