

Review article

Epidemiological patterns and risk factors associated with hepatitis B virus in Pakistani population

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Hepatitis B virus prevalence is increasing in Pakistani population. National level estimates regarding the prevalence are missing. People are unaware of the risk factors involved in HBV transmission. The objective of the study was to review the prevalence, genotypes, and risk factors associated with HBV transmission in Pakistani Population. Literature search was done by using keyword HBV prevalence, genotypes and risk factors from Pakistani population at Pubmed, PakMediNet and Google scholar. Six different studies showed that the percentage prevalence of HBV in general population was $4.61 \pm 0.73\%$, and 21 different studies showed the percentage prevalence of $2.33 \pm 0.46\%$ in blood donors. High prevalence of $7.94 \pm 1.49\%$ and $12.86 \pm 4.52\%$ were observed in multi transfused and IDU populations. Six different studies showed that the major prevalent genotype was D. Awareness regarding various risk factors involved in-viral transmission was very low. Prevalence of HBV was very high in multi-transfused populations due to non-implementations of international standards regarding blood transfusions. Barbers were unaware of the risk factors associated with their shops in viral transmission. Practices of unsterilized dental and surgical instruments and recycling of syringes were major factors in viral transmission. Massive awareness and vaccination programs are required to decrease the future burden of HBV from Pakistani population.

Keywords: Genotypes, HBV, Pakistan, prevalence, risk factors

Hepatitis B virus (HBV) infection is one of the most prevalent public health problems, especially in developing countries [1]. Two billion people are infected with HBV worldwide, out of which 350 million are chronic HBV patients. It is the tenth leading cause of deaths worldwide, with 500,000 to 1.2 million deaths per year caused by chronic hepatitis and cirrhosis, whereas 320,000 deaths per year are due to hepatocellular carcinoma [2]. In Pakistan, the prevalence of HBV is 3-4% and is considered an area of low endemicity [3, 4].

Pakistan is a developing country of 180 million people with low health and educational standard. According to the human development index of United Nations, it was ranked 134th out of 174 countries [5]. In Pakistan, HBV infection rate is increasing daily.

This might be due to lack of proper health facilities, poor economic status and lack of awareness about the transmission of HBV. Public health authorities are creating awareness about hepatitis through print and electronic media [6, 7], but tremendous efforts are still needed to increase the awareness regarding various risk factors involved in HBV transmission. In developing countries, due to non implementation of international standards regarding blood transfusion, reuse of injections, reuse of needles for ear and nose piercing, tattooing, injecting drug users, shaving from barbers, and unsterilized dental and surgical instruments are the main source of transmission of viral hepatitis [8]. This article briefly describes the prevalence, genotypes, and risk factors associated with HBV transmission in Pakistani population.

Material and methods

Literature search

Articles were searched in Pubmed, Google scholar and PakMediNet (for non-index Pakistani journals),

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by using key words such as Prevalence of HBV in Pakistan, epidemiological patterns of HBV in Pakistan, HBV in general Pakistani population, HBV in Pediatric population, HBV virus in young population applied for recruitment, HBV in blood donors, HBV virus in pregnant women, HBV in multi-transfused Pakistani population, HBV in IDU Pakistani population, HBV in Pakistani health care workers, injection use in Pakistan, role of barbers in viral transmission, HBV induce HCC, awareness about HBV in Pakistani population and HBV genotypes in Pakistan. Inclusion criteria entailed the studies demonstrating the

prevalence, genotypes, and risk factors associated with transmission of HBV in Pakistani population while the studies with incomplete references were excluded. One hundred eighty nine different articles/abstracts/reports were obtained from the literature search, out of which 83 published between 1996 and November 2009 were included in this study.

Analysis

Table 1 includes various reports showing the percent prevalence of HBV in different groups.

Table 1. Studies showing the prevalence of hepatitis B virus in different population groups.

	1st author	Region	Method	Population	%age
General population	Alam et al. [9]	Different localities	MEIA	1300	4%
	Abdulla et al. [10]	Karachi	EIA	35257	4.92%
	Abdulla et al. [10]	Sindh	EIA	1776	2.19%
	Chaudhari et al. [11]	Rawalpindi	ELISA	2056	2.28%
	Tanvir et al. [12]	Lahore	ICT	203	2.46%
	Noorali et al. [13]	Karachi	ELISA/ICT	4000	4.50%
Peds	Agboatwala et al. [14]	Karachi	ELISA	236	2.97%
	Khan et al. [15]	Lahore	ELISA	538	3.35%
	Jafri et al. [16]	Karachi	ELISA	3533	1.80%
	Aziz et al. [17]	Karachi	EIA	380	1.90%
Recruitment	Ali et al. [18]	Pakistan	ELISA	5371	3.53%
	Mirza et al. [19]	Pakistan	ELISA	15550	3.24%
	Sharif et al. [20]	Pakistan	ELISA	2558	2.80%
	Alam et al. [21]	Punjab	ELISA	2038	4.86%
	Altaf et al [22]	Sindh,	ELISA	2835	7.30%
	Butt et al. [23]	Pakistan	ELISA	5707	2.90%
	Azam et al. [24]	Pakistan	ELISA	3320	4.80%
Blood Trnasmfusion	Mujeeb et al. [25]	Karachi	ELISA	839	4.90%
	Syed AM [26]	Karachi	—	18448	2.20%
	Mujeeb et al. [27]	Karachi	ELISA	612	2.21%
	Ahmad et al. [28]	Abbotabad	ELISA	960	1.55%
	Khattak MF [29]	Rawalpindi	ELISA	103858	3.30%
	Mumtaz et al. [30]	Rawalpindi	ICT	580	5.86%
	Rehman et al. [31]	Punjab	—	1176284	2.26%
	Khan et al. [32]	Liaquatpur	—	1426	5.40%
	Asif et al. [33]	Northern Pakistan	MEIA	3187	2.51%
	Ahmad et al.[34]	Peshawar	MEIA	4000	1.90%
	Asif et al.[33]	Northern Pakistan	MEIA	243	0.82%
	Aktar et al. [35]	Karachi	ELISA	351309	2.00%
	Fayyaz et al. [36]	Bahawalpur	ELISA	27938	2.69%
	Jehangir et al. [37]	Multan	ELISA	25631	4.93%
	Chaudhary et al. [38]	Rawalpindi	MEIA	1428	2.45%
	Aziz MS [39]	Baltistan	MEIA	850	8.40%
Mujeeb et al. [40]	Karachi	ELISA	7325	4.70%	
khan et al.[41]	Abbotabad	ELISA	1630	2.02%	

Table 1. Studies showing the prevalence of hepatitis B virus in different population groups (continued).

	1st author	Region	Method	Population	%age
Pregnant woman	Khan et al. [42]	Rawalpindi	ICT	140,369	2.31%
	Khan et al. [43]	Quetta	MEIA	1474	4.80%
	Bhatti et al. [44]	Karachi	ELISA	966	2.16%
	Mehnaz et al. [45]	Karachi	ICT	245	3.26%
	Kazmi et al. [46]	Islamabad	RPHA/RIA/ELISA	6225	4.00%
	Hakeem et al. [47]	Rahim Yar Khan	ELISA	450	12%
	Rana et al. [48]	Lahore		1000	1.80%
	Yousafani et al. [49]	Hyderabad	ELISA/ICT	103	12.62%
	Ahmad et al. [50]	Bahawalpur	ELISA	300	12.30%
	Ali et al. [51]	Karachi	ELISA/EIA	25482	1.57%
Health care workers	Sami et al. [52]	Karachi	EIA	5902	4.60%
	Sheikh SM [53]	Karachi	ICT	2592	0.34%
	Mujeeb et al. [54]	Karachi	ELISA	114	7.50%
	Rehman et al. [55]	Lahore	ELISA	95	5%
	Naz et al. [56]	Muzaffar abad	ELISA	199	4.10%
Multi transfused	Aziz et al. [57]	Karachi	ELISA	250	2.40%
	Sarwar et al. [58]	Abbottabad	ELISA	125	2.40%
	Muhammad et al. [59]	Peshawar	ELISA	80	7.50%
	Hussain et al. [60]	Peshawar	ELISA	40	5%
	Khokher et al. [61]	Islamabad	ELISA	97	12.40%
	Shah et al. [62]	NWFP	ELISA	250	8.40%
IDUs	Malik et al. [63]	Lahore	ELISA	100	4%
	Rehman et al. [64]	Lahore	ELISA	60	1.7%
	Ghauri et al. [65]	Karachi	ELISA	133	4%
	Altaf et al. [66]	Sindh	ELISA	161	7.50%
	Achakzai et al. [67]		ELISA	50	6%
	Alam et al. [68]	Karachi	ELISA	250	22.40%

In the present analysis, we calculated weighted mean of each population using formula:

$$\bar{x} = \frac{\sum_{i=1}^n w_i x_i}{\sum_{i=1}^n w_i}$$

where x_i and w_i represent weighted mean and weights. Standard error of mean (SE) was calculated as follows:

$$SE_{\bar{x}} = \frac{s}{\sqrt{n}}$$

where s and n indicate standard deviation and number of studies. Result of each population group is presented in the form of mean SE with 95% confidence interval (CI).

Prevalence of hepatitis B virus

Six different studies showed the percentage prevalence of HBV is $4.61 \pm 0.73\%$ in general adult population [9-13], four different studies showed a percentage prevalence of $2.04 \pm 0.47\%$ in pediatrics [14-17]. In Pakistan, military recruits undergo HBV screening before induction. Seven different studies showed the percentage prevalence of $3.73 \pm 0.63\%$ in young population applied for military recruitment [18-24]. Blood donations are usually taken from young and healthy individuals, twenty-one different studies showed the percentage prevalence of $2.33 \pm 0.46\%$ in blood donors [25-44]. Nine different studies showed the percentage prevalence of $2.5 \pm 2.04\%$ in pregnant women [45-53].

Health care workers are usually dealing with blood and blood related product and are at high-risk of getting infections. Five different studies showed the percentage prevalence of $3.89 \pm 0.97\%$ in health care workers [54-58]. Hemophilic and thalassemic patients are exposed to multiple transfusions during their life; five different studies showed the percentage prevalence of $7.94 \pm 1.49\%$ in multi-transfused population [59-64]. Injecting drug users extensively exchange needles and are at high risk of getting infections by needle sharing, four different studies showed the percentage prevalence of 12.86–4.52% in injecting drug users [65-68].

Genotypes

HBV is classified into eight genotypes (A-H) based on nucleotides sequence comparison of whole genome and there is 8% or more sequence divergence between these genotypes. In 2007, it was reported in two different studies that 62.5% and 65.34% of HBV patients had genotype D [9, 68]. Three different studies in 2008 showed that 64%, 83.3%, and 93.2% of HBV patients had genotype D [13, 69, 70]. Baig et al in 2009 reported that 70% of HBV patients had genotype D [71]. Three different studies showed that the most dominant co-infection is of genotype A and D [9, 69, 71].

Risk factors

Transfusions

Proper selection and screening of donor is a key factor to ensure a safe blood supply. Incidence of HBV, HCV, and HIV is higher in hidden paid or professional donors. Safe donors are those who had no risk factor in their medical history and are repeatedly negative on screening [11]. The dangers of blood transfusions are compounded by poverty. Safe blood transfusions require organized infrastructure, well-educated staff, continuous supply of electricity and availability of expensive equipments and reagents. All these things are usually lacking at a majority of blood banks in developing countries, which was the reason that many blood banks were storing the blood outside the WHO recommended conditions. At some blood banks, the screening of the selective blood samples takes place and is dependent upon the recipient's willingness to pay for the cost of the screening tests. It is reported in 2000, that 95% of blood banks have proper facilities for the screening of Hepatitis B virus, 55% have HIV screening, and

23% have HCV screening system [72]. It is likely that the condition is improved nowadays.

Needles

The number of estimated injections per person per year ranged from 8.2 to 13.6 in Pakistani population, which are highest among the developing countries, out of which 94.2% are unnecessary [73]. In 2000, WHO recommended that the countries should design the strategies to change the behavior of both patients and health care workers to decrease the overuse of injections [74]. Numerous factors are linked with incidence of needle injuries from the health care workers. The most common factors are two-handed recapping and the unsafe collection and disposal of sharp waste. Between 2002 and 2007, 1382 needle stick injuries were observed at Aga Khan University hospital Pakistan. The highest number of injuries were observed from junior doctors (28.5%) followed by registered nurses (20.4%). Nineteen percent of injuries were reported during blood collection [75].

Barbers

It is reported from Bangladesh, Pakistan, India, Iran, Israel and Italy that HBV can be transferred by blade sharing and barber related instruments [76]. In developing countries like Pakistan, most of the barbers have weak educational background and they are unaware of transmission of diseases from their shops [77]. Janjua and Nizamy reported that Barbers have very weak or no sterilization practice, yet they are involved in circumcision and minor surgeries, and playing a key role in transmission of HBV [78]. Barbers are accidently exposed to blood and bodily fluids of their customers and have high-risk of getting infections [79]. It was reported from Casablanca in 2001 that 2% of barbers were HBV and 5% of them were HCV positive [80].

Awareness

Knowledge about risk factors, vaccination, and treatment of HBV was very poor. It was reported by Alum et al. that only 10.5% of people knew that HBV can be spread by toothbrush sharing, 4.9% knew that it can be transmitted by tattooing or ear/nose piercing, and only 20.3% knew that vaccine for HBV is available. Forty percent of people have heard advertisement about a hepatitis cure from homeopathic doctors. Concrete efforts are required,

both at local and national level, to educate the masses about the various risk factors associated with hepatitis B transmission [81-83].

Vaccination

Developed countries have succeeded in reducing the risk of Hepatitis B virus spread by interrupting some of the known risk factors involved in its transmission and through massive HBV vaccinations. The vaccine against HBV is available in most of developing countries including Pakistan, but its high cost limits the widespread use. Pakistan has also initiated the universal HBV vaccination for neonates through its expanded program of immunization with the assistance of Global Alliance for Vaccines and Immunization [84]. According to WHO-UNICEF estimates, 73% of neonates were vaccinated against HBV in 2008 [85]. Efforts are needed to start vaccination programs in adults to decrease the future burden of HBV from Pakistani population.

Hepatocellular carcinoma

Hepatocellular carcinoma (HCC) represents approximately 6% of all new cancer cases diagnosed worldwide with relative high incidence rates in Asia and Africa. Chronic hepatitis B and C are strongly linked with the development of HCC [86]. HCC is more prevalent in men than in women. This suggests that estrogen play an important role in its development [87]. Baig et al. [88, 89] reported in 2007 that 4.7% of HBV positive patients had cirrhosis/HCC, while in 2009, it was reported that 3% of HBV patients had HCC.

Conclusion

This article reviews the prevalence, genotypes and risk factors associated with Hepatitis B virus in Pakistani Population. The prevalence of HBV was 2 to 5% in different general population groups, while high prevalence was observed in multi-transfused and IDU groups. This high prevalence was due to lack of proper screening for blood transfusions and reuse of needles. Most dominant genotype of HBV was D. Vaccination program is only for neonates. Many blood banks were storing the blood outside the WHO recommended conditions. Unnecessary injection use and needle stick injuries were very high. Barbers have weak or no sterilization practice yet, they were involved in minor surgeries. Awareness regarding various risk factors involved in HBV transmission was very weak.

Massive awareness and vaccination programs are required to decrease the future burden of HBV from Pakistani population

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