

Seroprevalence of hepatitis B and C infections among young adult males in Pakistan

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معدلات الانتشار المصلي للعدوى بالالتهاب الكبدي "بي" و"سي" بين صغار الشبان في باكستان
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الخلاصة: أجرى الباحثان هذه الدراسة الوصفية المستعرضة في مستشفيين عسكريين في باكستان، من كانون الثاني/يناير 2004 إلى كانون الأول/ديسمبر 2005؛ وذلك بتحري صغار الشبان ممن تتراوح أعمارهم بين 16 – 22 عاماً من مختلف المقاطعات الباكستانية بحثاً عن المستضد السطحي للالتهاب الكبدي "بي" وعن الأضداد للالتهاب الكبدي "سي". وبلغ عدد الشبان المدروسين 5707، من بينهم 95 شاباً (1.70%) إيجابيون لفيروس الالتهاب الكبدي "سي" و167 شاباً (2.93%) إيجابيون للمستضد السطحي للالتهاب الكبدي "بي". ورغم التوزيع المتماثل للفيروسين "بي" و"سي" في جميع أرجاء باكستان، إلا أن معدل الانتشار المصلي كان أعلى في مقاطعات البنجاب والسند منه في مقاطعات الحدود الشمالية الغربية وبلوشستان وآزاد كشمير. ويعد التثقيف الصحي لعامة الناس، ولاسيما للحلاقين، من الوسائل البالغة الأهمية في إجراءات الوقاية والمكافحة.

ABSTRACT This descriptive, cross-sectional study was conducted at 2 military hospitals in Pakistan from January 2004 to December 2005. Young adult males with age range 17–22 years from different districts of Pakistan were screened for hepatitis B surface antigens (HBsAg) and anti-hepatitis C antibodies (anti-HCV). Out of 5707 young men tested, 95 (1.70%) were positive for anti-HCV and 167 (2.93%) for HBsAg. Although both viruses were distributed evenly throughout Pakistan, seroprevalence was higher in the provinces of Punjab and Sindh than in North-West Frontier province and Baluchistan and Azad Kashmir provinces. Health education to the general public, including barbers, would be an important tool for control/preventive measures.

Séroprévalence des infections dues aux virus des hépatites B et C chez de jeunes hommes adultes au Pakistan

RÉSUMÉ Cette étude descriptive transversale a été menée dans deux hôpitaux militaires du Pakistan de janvier 2004 à décembre 2005. Une recherche de l'antigène de surface de l'hépatite B (Ag HBs) et des anticorps dirigés contre le virus de l'hépatite C (anti-VHC) a été effectuée sur de jeunes hommes adultes âgés de 17 à 22 ans et provenant de différentes régions du Pakistan. Sur les 5707 sujets soumis au dépistage, 95 (1,70 %) étaient positifs pour les anticorps anti-VHC et 167 (2,93 %) pour l'Ag HBs. Bien que les deux virus aient été uniformément répartis dans tout le Pakistan, leur séroprévalence était plus élevée dans les provinces du Pendjab et du Sindh que dans la Province frontrière du Nord-Ouest et les provinces du Baloutchistan et de l'Azad Cachemire. L'éducation sanitaire de la population, notamment des coiffeurs-barbiers, pourrait être un moyen efficace de prévention et de lutte.

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Introduction

Viral hepatitis due to hepatitis B and C is widespread: 350 million people worldwide are infected with hepatitis B virus (HBV) [1,2] and about 170 million with hepatitis C virus (HCV) [3]. Both these diseases are present in the population of Pakistan, yet there are varying reports of their prevalence. HCV is one of the silent killer diseases which are spreading undetected in Pakistan. It appears to be more dangerous than HBV because there are often no clinical symptoms and, when HCV is diagnosed, considerable damage has already been done to the patient. According to an estimate there are about 9 million HBV carriers in Pakistan and over 14 million HCV carriers [4,5]. These figures may not be accurate, however, because in most studies, particularly in Pakistan, the population sample selected is limited to a particular area or segment or high-risk group. In different studies the prevalence has been estimated as 3%–10% for hepatitis B surface antigens (HBsAg) and 2.2%–14% for HCV antibodies [6–9].

There is an urgent need to assess the actual prevalence of these infections in order to adopt preventive strategies. In Pakistan young males 17–22 years of age apply for recruitment as soldiers in the armed forces from all over the country. They are usually from lower socioeconomic groups. This study was planned to estimate the prevalence of HBsAg and HCV antibodies in these young males from different districts of Pakistan.

Methods

The sample comprised 5707 young adults who reported over a period of 2 years from January 2004 to December 2005 for recruitment to different branches of the Pakistani armed forces (fighting soldiers

or soldiers in services groups including the engineering branch, army medical corps, clerks, supply units and signals branch). All of them reported to the combined military hospital in Dera Ismail Khan or in Peshawar for medical examination. These individuals came from all 4 provinces of Pakistan including Azad Kashmir.

Inclusion criteria were: healthy unmarried males, 17–22 years of age, minimum height 5 feet 6 inches, with minimum educational qualification of matriculation (equivalent to GCE “O” level). Exclusion criteria were: individuals with a history of hepatitis B vaccination, prior hospital admission, blood transfusion or intravenous drug abuse and having physical body defects or systemic or local diseases/conditions such as fever, perforation of tympanic membrane, diabetes mellitus, hypertension, lymphadenopathy, hepatosplenomegaly, cardiac valvular defects or any other systemic disease.

All the individuals were given a thorough physical examination, complete blood counts, routine blood chemistry, urine examination and chest radiography. All of them were screened for HBV using an HBsAg test device (IND Diagnostic Inc., Delta, Canada) and for HCV by an anti-HCV rapid test (Maxi-test, IND Diagnostic Inc., Delta, Canada), both of which are based on immunochromatographic principles. Positive tests were confirmed by enzyme-linked immunosorbent assay (ELISA) methods using HBsAg ELISA test kits (CDC Diagnostics, Los Angeles) and HCV ELISA test kit (CDC Diagnostics).

Demographic data were collected about age, province of origin and family income and participants were asked about risk factors for HBV and HCV transmission.

SPSS for Windows, version 10 was used for data compilation and calculations and the chi-squared test was used to determine

the significance of difference between categorical variables. P -values < 0.05 were taken as significant.

Results

A total of 5707 males were included in the study, age range 17–22 years, with a mean age (standard deviation) of 18.72 (1.43) years. There were 2296 individuals from Punjab province, 700 from Sindh province, 2378 from North-West Frontier province and 333 from Baluchistan and Azad Kashmir province (Table 1). They all belonged to lower middle [$< \text{Rs } 10\,000$ (US\$ 167)] or poor [$< \text{Rs } 4500$ (US\$ 75)] socioeconomic groups based on their monthly family income.

A further 1802 applicants were excluded from the study owing to over or under age, height less than 5 feet 6 inches, history of prior hospital admission or blood transfusion and having physical defects such as bow legs, flat foot, knock knee, chest deformities and systemic or local diseases/conditions such as tympanic membrane perforation, diabetes mellitus, lymphadenopathy, hepatosplenomegaly and cardiac valvular defects.

Out of 5707 cases tested, 97 (1.7%) were confirmed to be positive for anti-HCV and 167 (2.9%) for HBsAg. The distribution of positive cases for anti-HCV and HBsAg by district is depicted in Table 1. There was no case with both the infections.

None of the study sample reported a history of administration of hepatitis B vaccination or intravenous drug abuse. They all denied any sexual contact except 11 of them. These 11 males gave a history of infrequent sexual contact but all were negative for HBsAg and anti-HCV. A past history of jaundice was reported by 26 men but all of them were negative for HBsAg and anti-HCV. Some ($n = 15$) had

received dental treatment/extraction in their village but only 1 of those was positive for HBsAg.

The prevalences of HBsAg in Punjab and Sindh provinces (3.70% and 5.00% respectively) were significantly higher than in North-West Frontier province (1.81%) and Baluchistan and Azad Kashmir (1.20%) ($P < 0.0001$). The prevalences of anti-HCV were also significantly higher in Punjab and Sindh provinces than other provinces ($P < 0.001$). However, the prevalence of anti-HCV in Punjab (1.92%) was lower than in Sindh (4.14%) ($P = 0.0012$).

In Punjab, North-West Frontier province, Baluchistan and Kashmir the prevalences were evenly distributed and there was no significant difference of prevalence for both HBsAg and anti-HCV among the population of different districts in each province (Table 1). In Sindh, however, while there was no significant difference of HBsAg prevalence among various district population ($P = 0.6773$), there was a significantly higher prevalence of anti-HCV (9.68%) among the population of Nawabshah district compared with other districts ($P = 0.0353$).

Discussion

HBV and HCV infections have significant morbidity and mortality worldwide. The global prevalence of HCV is 3% [3] and the carrier rate of HBsAg varies from 0.1% to 0.2% in Britain and the USA, 3% in Greece and southern Italy and up to 15% in Africa and the Asia [10]. In Pakistan, a prevalence of 10% has been estimated [11]. Different reports have estimated the prevalence of HBsAg in voluntary blood donors from 0.82% to 5% [6–8, 12, 13]. An estimated one-third of the world's population has serologic evidence of past infection, and the virus causes more than 1 million deaths annually [14]. In the USA, the incidence of

Table 1 Distribution of hepatitis B surface antigen (HBsAg) carriers and anti-hepatitis C virus (anti-HCV) positive cases among young adult males of Pakistan

Province/district	Total tested No.	HBsAg positive No.	%	P-value	Anti-HCV positive No.	%	P-value		
Punjab									
Bhakkar	367	6	1.63	0.34	5	1.36	0.47		
Chakwal	206	7	3.40		3	1.46			
Dera Ghazi Khan	71	4	5.63		1	1.41			
Gujrat	55	1	1.82		0	0.00			
Jehlem	83	3	3.61		2	2.41			
Jhang	92	8	8.70		2	2.17			
Khushab	168	4	2.38		1	0.60			
Multan	109	5	4.59		1	0.92			
Mianwali	399	13	3.26		8	2.01			
Pak Pattan	53	2	3.77		1	1.89			
Rawalpindi	120	5	4.17		5	4.17			
Sargodha	185	8	4.32		5	2.70			
Sialkot	38	2	5.26		0	0.00			
Toba Tek Singh	49	3	6.12		0	0.00			
Others ^a	301	14	4.65		10	3.32			
Total	2296	85	3.70	44	1.92				
Sindh									
Karachi	111	3	2.70	0.68	1	0.90	0.04		
Khaipur Merus	158	7	4.43		7	4.43			
Larkana	76	4	5.26		3	3.95			
Nawabshah	93	4	4.30		9	9.68			
Sukhar	120	9	7.50		6	5.00			
Others ^a	142	8	5.63		3	2.11			
Total	700	35	5.00		29	4.14			
North-West Frontier									
Charsadda	94	2	2.13	0.80	2	2.13	0.63		
Chitral	192	5	2.60		1	0.52			
Dera Ismail Khan	198	5	2.53		3	1.52			
Karak	101	2	1.98		0	0.00			
Kohat	102	1	0.98		1	0.98			
Mardan	274	4	1.46		2	0.73			
Nowshera	151	4	2.65		1	0.66			
Peshawar	194	5	2.58		4	2.06			
Swabi	331	5	1.51		2	0.60			
Tank	81	3	3.70		1	1.23			
Others ^a	660	7	1.06		4	0.61			
Total	2378	43	1.81		21	0.88			
Baluchistan & Azad Kashmir									
Azad Kashmir	104	1	0.96			1		0.96	
Loralai	79	1	1.27			1		1.27	
Quetta	126	2	1.59	1		0.79			

Table 1 Distribution of hepatitis B surface antigen (HBsAg) carriers and anti-hepatitis C virus (anti-HCV) positive cases among young adult males of Pakistan (concluded)

Province/district	Total tested	HBsAg positive		P -value	Anti-HCV positive		P -value
	No.	No.	%		No.	%	
Others ^a	24	0	0.00		0	0.00	
Total	333	4	1.20	0.92	3	0.90	0.95
Total	5707	167	2.93	< 0.0001 ^b	97	1.70	< 0.0001 ^b

^aOther districts of the province.^bIndicates a significant difference between all positive cases in all the provinces.

HBV infection declined from about 14 cases per 100 000 population in the mid-1980s to about 3 cases per 100 000 population in 1998 [15]. However, there are still 1.25 million adults and children in the USA with chronic HBV infection.

The World Health Organization has estimated that 170 million people worldwide are infected with HCV [16]. The prevalence in the USA is estimated at 3.9 million, approximately 4 times the current number of those infected with the HIV virus. Due to the latent nature of the disease (infection may precede symptoms by an average of 25 years) only 1 million of these individuals have actually been diagnosed [17].

HCV mortality figures are expected to triple by the year 2010, giving HCV a resultant mortality that may rival HIV. Internationally, 90% of those infected cannot afford treatment and due to the specific characteristics of the virus, a vaccine is not expected [18]. HCV has been estimated to be the most common cause of chronic liver disease, cirrhosis and liver cancer worldwide [3,16,19]. The current incubation time of HCV is 12–27 weeks, although 80%–90% of cases occur within 5–12 weeks post-transfusion [1,16]. Most patients with acute hepatitis C do not have demonstrable signs or symptoms at the onset of infection. Only about 25% of patients will have the

appearance of jaundice [16]. In South-East Asia, China, and sub-Saharan Africa, HBV infection usually is acquired perinatally or in early childhood, leading to a high prevalence of chronic infection (5% to 20%). In contrast, 80% of infections in the USA, Canada and western Europe occur in adults via sexual contact or intravenous drug use, leading to a much lower baseline prevalence (0.1%). In the USA, groups at increased risk for HBV infection have been identified [20]

Earlier studies done in Pakistan used different methods of selection of the subjects. Khattak et al. reported a 6.2% prevalence of anti-HCV in professional blood donors [21] and Bhopal et al. a rate of 16.3% in admitted patients [22]. Farooq et al. estimated a prevalence of 3.3% and 3.0% for HCV antibodies and HBsAg respectively among young soldiers [23]. Qasmi et al. reported an HBsAg carrier rate of 3% among the population of Karachi [24]. In the present study the prevalence of both of the infections, HCV antibodies (1.70%) and HBsAg (2.93%), differed significantly ($P < 0.0001$). Similar results have been reported by Zakaria et al. with a 2.2% prevalence of HCV antibodies and 3.2% prevalence of HBsAg among naval recruits of Pakistan armed forces [25]. The study population mimics that of the present study, although the population in our study was younger,

belonging to the general public of rural and urban areas and moreover our study sample was larger.

HCV infection is known to have significant associations with a history of blood transfusion at least 6 months previously, direct patient care or laboratory work, intravenous drug use, multiple sexual partners and sexual or household contact with an infected person. The highest prevalence is among haemophiliacs who received factor concentrate transfusions before 1992 [26]. Persons with a history of intravenous drug use account for more than 50% of HCV transmission [16]. Perinatal spread is uncommon and, when it occurs, rarely leads to chronic infection of the child unless the mother is coinfectd with HIV [16]. Prior hospitalization is a risk factor (prevalence in hospitalized patients is 2%–20%) [26]. All these factors appear to be excluded in the present study. Although all but 11 of the young men denied having any sexual contacts, this may be an underestimate because the social and religious taboos in Pakistan mean they may not admit to having sexual contacts. Barbers could be a source of infection in positive cases.

No specific reasons can be identified for the higher prevalence of HBsAg carrier

rate and HCV antibodies in the provinces of Punjab and Sindh or the high prevalence of HCV antibodies in residents of Nawabshah district of Sindh because all the relevant factors appear to be the same throughout Pakistan. There is a need to adopt strict control/preventive measures against HBV and HCV infections. However, as the mode of transmission and risk factors are the same for both conditions, preventive and control measures should be planned to tackle them simultaneously.

Conclusions

In Pakistan, the prevalence of both HBsAg carrier rate (2.93%) and anti-HCV positive cases (1.70%) differed significantly among a sample of the young adult male population. Although both viruses are distributed evenly throughout Pakistan, the prevalence was greater in the provinces of Punjab and Sindh compared with North-West Frontier province, Baluchistan and Azad Kashmir. Health education to the general public, including barbers, would be an important tool of control/preventive measures.

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