FREQUENCY AND RISK FACTORS FOR CHRONIC HCV IINFECTION: A COMMUNITY BASED STUDY

Muhammad Tahir, Muhammad Babar Khan*, Hassan Burair Abbas, Ghulam Mustafa

PAF Hospital Sargodha, *MH Rawalpindi

ABSTRACT

Objectives: It was a community based, cross-sectional study undertaken to assess the frequency of HCV infection and to find out the risk factors associated with its spread.

Methods: Study was carried out from Oct 2004 to Mar 2005. One hundred and twenty five apparently healthy consecutive subjects not known to be infected with HBV or HCV, between the ages 13 and 60 years with equal sex distribution were selected from the population of the Village Mera Kalan near Rawalpindi. They were screened for Anti HCV antibodies using ELISA and interviewed in detail. Subjects found positive for Anti HCV Ab were tested for ALT(Alanine aminotransferase) levels and HCV RNA by PCR.

Results: The frequency of HCV was found to be 53.6%. The most important risk factor associated with the transmission of HCV infection was unsafe injection therapy with contaminated equipment. Other risk factors include ear and nose piercing by unsterilized means in females and sharing of razors in males.

Conclusion: The prevalence of HCV infection in our population is significantly higher than in the developed world. Public awareness programs should target the identified risk factors to prevent HCV transmission.

Keywords: Enzyme linked immunosorbant assay (ELISA), Hepatitis C Virus(HCV), Prevalence, Polymerized chain reaction(PCR), Risk factors.

INTRODUCTION

Hepatitis C virus (HCV) infection is a major public health problem worldwide. It is the most common blood-borne infectious disease[1]. About 170 million people in the world, or approximately 3% of the world population is infected with HCV[2]. It is estimated that about 3 to 4 million people are newly infected each year. HCV is the leading cause of liver failure and liver transplantation in adults[3,4]. Identified risk factors for HCV infection include exposure to infected blood and blood products, injecting drug abuse, high risk sexual activity(multiple sexual partners, h/o sexually transmitted diseases), tattooing, ear/nose piercing, unsafe injections, sharing of tooth brushes, reuse of infected shaving blades, acupuncture and needle stick injury[5-7]. Nosocomial transmission has been documented such as from a patient to patient by endoscopes, hemodialysis machines, cardiac catheters, dental and surgical instruments[8]. Virus can be recovered from saliva of infected persons[9]. In some cases no risk factors can be identified[10]. The institution of blood screening measures has decreased the risk of transfusion-associated hepatitis to a negligible level (1 in 103,000 transfusion units)[11].

The prevalence of HCV infection varies throughout the world. The prevalence in developed countries amounts to 0.2 to 2.2%[12,13] while in developing countries it reaches 7%[14]. In some regions or risk groups the rate of occurrence may be as high as 30-90%[15,16]. Studies have shown a prevalence rate of 1.1 to 14.63% for HCV antibodies in Pakistan[17-21]. But most of these studies have been hospital based. Community based studies are required to find out exact prevalence. It has been observed that there are some areas in our country with exceptionally high prevalence of HCV infection. One such area is a village Mera Kalan near Rawalpindi. The current study was undertaken to find out the frequency of HCV infection in this area and the factors that have contributed to such a high prevalence rate.

MATERIAL AND METHODS

This was a cross-sectional study carried out from Oct 2004 to March 2005 in Village

Correspondence: G/Capt Muhammad Tahir, Classified Medical Specialist, PAF Hospital Sargodha
Email: mtahirfd@hotmail.com

Received: 28 April 2009; Accepted: 07 Jan 2010

Mera Kalan, Distt Rawalpindi. A camp comprising of two doctors and two nursing assistants was established in the village daily for 05 day. A questionnaire was designed to evaluate the risk factors on the basis of history and for the selection/rejection of subject. Initially a total of 140 consecutive apparently healthy subjects between the ages 13 and 60 years with equal sex distribution were selected by non-probability, convenience sampling and the questionnaire was filled for each. The subjects known to be infected with HBV or HCV and those giving history of jaundice or suffering from other chronic ailments were excluded from the study. A few refused to give blood sample thus the final study population comprised of 125 subjects. This sample size was determined keeping in view the resources and funding available for the study. Selected subjects were interviewed in detail. Written informed consent was obtained for publication of results.

Two ml of venous blood sample was collected in plain tubes & three ml in EDTA tubes from all the study subjects and the tubes were labeled. The samples were stored at 2-8 degree Centigrade & were transported to Rawalpindi collection point of Department of Pathology, Shaukat Khanum Memorial Cancer Hospital and Research Centre Lahore within 2-3 hours of collection. The EDTA samples were centrifuged withinin 06 hrs of collection to separate plasma & were stored at -20 C to be tested later for HCV RNA by PCR. All the serum samples were tested for Anti-HCV Ab using third generation ELISA kit by Abbott The cut off limit was set as per manufacturer's instructions. For all the subjects found positive for anti HCV antibody, ALT levels were done using kit by MERCK on the serum samples and the stored plasma was used for qualitative PCR for HCV RNA using the second generation 'Amplicor HCV Assay by Roche Molecular Systems'.

The data so collected was entered in SPSS Version 14 and analyzed. Chi square test was applied to evaluate the significance of the results.

RESULTS

Demographic characteristics of the study population are shown in Table 1. Mean age was 38.75±15.7 years. The overall frequency of HCV infection in the study population was found to be 53.6%. Seven (07) subjects (10.44%) out of total 67, positive for Anti HCV Ab, were found to be negative for HCV RNA using PCR. Risk factors for HCV infection in the study population are shown in Table 2. Parenteral medication from the local dispensary proved to be the most important risk factor associated with HCV in that community. Serum ALT levels of all Anti HCV Ab positive individuals were measured. A mean of 112.8 IU/L was obtained.

DISCUSSION

There have been a number of studies to find out the prevalence of HCV infection in our population[17,19,21]. Our study demonstrates a frequency rate of 53.6% for HCV infection in the village. This rate is far higher than the rate seen in other local studies[17-21]. Various local studies have shown a prevalence rate of 1.1 to 14% for anti HCV antibodies in Pakistan. This might be due to unhygienic and nonscientific practices adopted by the local dispenser and barber. About 90% of the HCV positive subjects had active viremia detected by PCR for Viral RNA. Even this rate is higher than other international studies where HCV viremia was detected in 76% to 79% of anti HCV positive subjects[22,23].

There was no significant difference in frequency of HCV in both the sexes. This is in converse with the Western studies where it is slightly more prevalent in males probably due to injection drug use and high-risk sexual behavior[5,12]. HCV infection was found in all age groups. It was slightly more prevalent in older subjects but it was not statistically significant. Factors which may contribute to high prevalence in older age group include less education, more exposure to parenteral drug therapy and probably less awareness of the disease. Older subjects may be more fond of injection drug therapy for even minor ailments. In USA the highest prevalence rate of 4.3% is seen in patients 40 to 49 years old[24].

Table-1: Demographic characteristics of the study population (n= 125)

S. No	Variable		Anti HCV +ve (n=67)	Anti HCV-ve (n=58)	Total (n=125)	P Value Chi Square Test
1.	Gender	Male	30(44.78%)	31(53.45%)	61(48.8%)	>0.05
		Female	37(55.22%)	27(46.55%)	64(51.2%)	
2.	Age Group	13-30 Yrs	28(41.79%)	34(58.62%)	62(49.6%)	>0.05
		31-45 Yrs	20(29.85%)	15(25.86%)	35(28.0%)	
		46-60 Yrs	19(28.36%)	09(15.52%)	28(22.4%)	
3.	Marital status	Married	62(92.54%)	33(56.90%)	95(76.0%)	<0.05
		Unmarried	05(07.46%)	25(43.10%)	30(24.0%)	
4.	Literacy	Illiterate	25(37.31%)	13(22.41%)	38(30.4%)	<0.05
		<10 yr Education	18(26.87%)	10(17.24%)	28(22.4%)	
		≥10 yr Education	24(35.82%)	35(60.35%)	59(47.2%)	
5.	Socioeconomic Status	Low	63(94.03%)	37(63.80%)	100(80.0%)	<0.001
		Middle	04(05.97%)	21(36.20%)	25(20.0%)	

Table-2: Risk factors for hcv infection

S.NO	Risk Factor		Anti HCV +ve (n=67)	Anti HCV-ve (n=58)	Total (n=125)	P value Chi-square test
1.	H/O parenteral Rx at local dispensary	Yes	65(97.01%)	25(43.10%)	90(72.0%)	<0.05
		No	02(02.99%)	33(56.90%)	35(28.0%)	
2.	H/O sharing razors	Yes	16(23.88%)	00	16(12.8%)	<0.05
		No	51(76.20%)	58(100.0%)	109(87.2%)	
3.	H/O surgery in past	Yes	04(05.97%)	02(03.45%)	06(04.8%)	>0.05
		No	63(94.03%)	56(96.55%)	119(95.2%)	
4.	H/O dental Rx	Yes	07(10.45%)	03(05.17%)	10(08.0%)	>0.05
		No	60(89.55%)	55(94.83%)	115(92.0%)	
5.	H/O sharing beds/clothing	Yes	24(35.82%)	13(22.41%)	37(29.6%)	>0.05
		No	43(64.18%)	45(77.59%)	88(70.4%)	
6.	H/O jaundice in past	Yes	07(10.45%)	04(06.90%)	11(08.8%)	>0.05
		No	60(89.55%)	54(93.10%)	114(91.2%)	
7.	Subjects with spouse HCV+	Yes	07(10.45%)	01(01.72%)	08(06.4%)	<0.05
		No	60(89.55%)	57(98.28%)	117(93.6%)	
8.	Close non-sexual contact with HCV+	Yes	23(34.33%)	08(13.79%)	31(24.8%)	<0.05
		No	44(65.67%)	50(86.21%)	94(75.2%)	
9.	H/O tattooing	Yes	01(01.49%)	00	01(00.8%)	>0.05
		No	66(98.51%)	58(100.0%)	124(99.2%)	
10.	H/O ear/nose piercing	Yes	35(52.24%)	17(29.31%)	52(41.6%)	0.008
		No	32(47.76%)	41(70.69%)	73(58.4%)	
11.	H/O circumcision by village barber	Yes	25(37.31%)	23(39.65%)	48(38.4%)	>0.05
		No	42(62.69%)	35(60.35%)	77(61.6%)	
12.	H/O blood transfusion	Yes	02(02.99%)	00	02(01.6%)	>0.05
		No	65(97.01%)	58(100.0%)	123(98.4%)	

HCV was found to be more prevalent in the married than unmarried persons which was significant statistically (p value <0.05). Spouses of HCV positive individuals were more likely to be positive for anti HCV antibodies. There is conflicting data in literature concerning the role of sexual contact in the spread of HCV infection. A study carried out by Hajiani E et al in Southern Iran revealed increased HCV antibody positivity among spouses of HCV positive patients than other family members and the infection rate increased with duration of marriage[10]. Marriage usually include a sexual relationship but also other kinds of body contacts and exposure to same risk factors (i.e. sharing the same personal tools such as tooth brushes, razors, dental appliances, etc). However in a study by Bresters D et al and published in Lancet, sexual contact did not seem to be important in HCV transmission[25].

Homology analysis of HCV nucleotide sequence is important in the study of sexual transmission of HCV. But we did not perform homology analysis in our cases. Although most of the subjects in our study were from lower class, we divided them in low class and middle class. Subjects from lower class had a higher proportion of Anti HCV Ab-positivity, compared to subjects from middle class. This observation is consistent with the previous studies carried out[24]. The exact reasons for this association are not clear. Low socioeconomic status might represent unidentified factors that enhance the exposure to infection. It was also noted that the subjects having less years of education were also more prone to get HCV infection. This might be due to ignorance about the risk factors involved in the spread of hepatitis C.

Blood transfusion was once thought to be the most important mode of HCV transmission. But with the newer screening tests it has become less common. Only two patients in our study had prior history of blood transfusion. Although both subjects were positive for Anti HCV Ab and PCR for HCV RNA, the presence of other important risk factors prevent us from assuming with certainty that HCV infection was acquired due to blood transfusion. Since 1990, HCV has rarely been transmitted by blood transfusion in the United States[24].

Inadvertent and unsafe use of parenteral medication proved to be a major risk factor for the spread of HCV infection in our population. A similar observation was made by different authors in various local studies[26-28]. Although most of the subjects reported having regular injections from the local village dispenser, the exposure was significantly greater in the HCV-positive group. Only 2 subjects positive for Anti HCV Ab denied any parenteral drug administered to them in the village or elsewhere. This was statistically significant with a p value <0.05. We approached the dispenser. He accepted that until a few years ago he had been using the glass syringes after boiling. Unsafe parenteral medication becomes synonymous with injection-drug abuse, which remains the major risk factor in the developed countries in the spread of HCV infection[12,13,24].

A total of 16 subjects reported to have been using common razors by the village barber. All 16 were HCV positive. This was significant statistically with p-value<0.05. Relatively few subjects gave prior history of surgery of any sort. Although most of those were positive for Anti HCV Ab, the presence of other strong risk factors decreases the significance of exposure to surgical intervention. None of the subjects had undergone any invasive procedure like endoscopy, bronchoscopy or haemodialysis. All subjects denied any kind of extramarital sexual relations.

Ear and nose piercing in females by unsafe and unsterilized means was found to be a significant risk factor for HCV infection. Most females in the study had got their ears and nose pierced by a vendor who was found to be using a single needle for every customer. Circumcisions of the male by the village barber was not a significant risk factor for the spread of HCV. Close, non-sexual contact for a long period of time with a HCV-positive individual also predisposed the subjects to acquire HCV infection. A similar observation was made by Akhtar H et al in a local study[29] and Mazzeo C et al in Italy[23]. The exact mechanism and the risk factors involved are not clear in this regard.

CONCLUSION

The prevalence of HCV infection in our population is significantly greater than in the developed countries. Parenteral drug therapy using unsterilized equipment was the major risk factor responsible for HCV transmission. Primary prevention programs focused on identified risk factors might help to curtail the spread of HCV infection in the community.

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