



Full Length Article

Hepatitis C Virus Infection in Pregnant Women in Lahore, Pakistan: An Analytical Cross Sectional Study

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Abstract

Epidemiology and risk factors for hepatitis C virus (HCV) infection were investigated in this study. A total of 83 antenatal care (ANC) patients, who attended public/private hospitals of Lahore during 2009 were evaluated for their anti-HCV status using the 3rd generation ELISA test, with reference to the subject's demographic and behavioral risk factors. The HCV prevalence was determined to be 10.84%. Mean age of reactive and non-reactive pregnant women was 27.55 ± 3.43 and 25.37 ± 4.24 years, respectively. Educational level (OR=3.093, 95% CI=0.167-57.2) and occupational status (OR=2.228, 95% CI=0.0844-58.75) were the important risk factors associated with HCV infection. Tattoo on the body (P=0.001, OR=11.833, 95% CI=1.94-71.89), comb sharing (OR=20.86, 95% CI=1.674-259.9) and razor sharing (P=0.038, OR=4.786, 95% CI=0.97-23.45) were significantly associated (P<0.05) with HCV infection. Pregnant women who gave the history of dental procedures and tooth brush sharing were 3.15 (95% CI=0.77-12.29) and 4.12 times (95% CI=0.860-19.791) more prone to get HCV infection, respectively. The study showed a high HCV prevalence among pregnant women in Lahore with tattooing, comb and razor sharing as the major risk factors for increased HCV prevalence. © 2014 Friends Science Publishers

Keywords: HCV; Prevalence; Risk factors; Pregnant; Lahore

Introduction

Hepatitis C virus (HCV) infection has become one of the most important public health concerns round the globe (Costa *et al.*, 2009). Prevalence of HCV infection varies from region to region and in general population it ranges from 4-25.7%. The highest prevalence rate of HCV infection has been reported in Egypt (Kumar *et al.*, 2007; Raptopoulou *et al.*, 2001). The women positive for HCV infection have 7-8% chances of transmitting HCV to their offspring with a higher rate in those who suffer from co-infection with HIV (ACOG, 1998). HCV infection during pregnancy has been reported as an independent risk factor for adverse perinatal outcome (Safir *et al.*, 2010). Transmission of HCV infection from infected mothers to their children through the vertical route is comparatively low (<10%) but cannot be overlooked (Tariq *et al.*, 1999).

During pregnancy viral hepatitis is linked with the elevated risk of maternal complications and it has been reported as the foremost reason of maternal mortality (Silverman *et al.*, 1993; Elinav *et al.*, 2006). Maternal complications leading to adverse effects, even death, have

been significantly associated with higher risk of HCV infection during pregnancy. Accurate data regarding distribution of HCV infection is hard to find due to the paucity of published data about the HCV prevalence in pregnant women of Pakistan. In developing countries HCV epidemiology and risk factors are poorly understood, especially where intravenous drug abuse in women is uncommon or unpublished. The current study was designed to determine the HCV prevalence in pregnant women in Pakistan and to find out the association of various socio-demographic and hypothesized risk factors with the occurrence of HCV infection.

Materials and Methods

Present study was carried out to estimate the laboratory based prevalence of hepatitis C in pregnant women who attended a public or private hospital of Lahore metropolitan. To estimate the prevalence of hepatitis C virus, a total of 83 pregnant women were selected using simple random sampling technique from Out Patient Departments (OPD) of different public hospitals, including Mayo Hospital, Sir

Ganga Ram Hospital, Services Hospital, Jinnah Hospital Lahore General Hospital and private hospitals including Farooq Hospital and Ghurky Trust Hospital. From each hospital equal number of females was included but the number was adjusted to fulfill the required sample size.

Blood samples were collected and processed for serum separation to confirm the anti-HCV status through 3rd generation ELISA technique. Data regarding sociodemographic features and risk factors associated with HCV infection was also collected on pretested and validated questionnaire.

Sampling Frame

All the pregnant women who came to the hospital for a checkup during 2009 (N=13312).

ELISA Kits

A third generation ELISA Kit (ETI-AB-HCVK-4, DiaSorin S.P.A. Italy) containing 96 wells was used for Enzyme Linked Immunosorbent Assay (Rebuzzini, 2008).

Spectrophotometer

The concentration of anti-HCV present in the specimen was measured by photometer (Labsytem Multiskan Biochromatic).

Ethical Consideration

The study was approved by the advanced studies and research board of the University of Veterinary and Animal Sciences, Lahore. Furthermore, an informed consent was taken from all the participants of the study.

Statistical Analysis

The data was analyzed statistically by using SPSS (version 16.0). All the quantitative data was presented in the form of frequency, the percentage and mean \pm S.D. For quantitative data *t*-test for independent sample was used for analytical statistics. The Chi-square test was used to analyze the qualitative data. A P-value<0.05 was considered to be significant. Odds Ratio with 95% Confidence interval was used to see the magnitude of dependency on various risk factors.

Results

The seroprevalence of HCV in pregnant women of Lahore metropolitan was estimated to be 10.84% (Table 1). In the group of pregnant women, the highest prevalence was estimated in Farooq Hospital (25%) followed by Ghurky Hospital (18.2%), Mayo Hospital (16.7%), Sir Ganga Ram Hospital (8.3%), and Jinnah Hospital (8.3%) while there no case was observed in Lahore General Hospital and Services

Hospital.

A total of 83 pregnant women were enrolled in this group and were tested for anti-HCV. Out of these, 9 (10.84%) were reactive to anti-HCV. The mean age of reactive and non-reactive pregnant women was 27.55 ± 3.43 and 25.37 ± 4.24 years, respectively. In terms of P-value no statistical significant difference was observed in the age of reactive and non-reactive pregnant women i.e., $P > 0.05$ (Table 2).

An overview of distribution of HCV reactive and non-reactive pregnant women according to demographic characteristics reveals that all the reactive pregnant women were illiterate, employed in private sector and their monthly income was 5,000-10,000 PKR. Their educational level (OR= 3.093, 95% CI= 0.167-57.2) and occupational status (OR= 2.228, 95% CI=0.0844-58.75) were risk factors associated with HCV occurrence (Table 3).

Various hypothesized indicators related to pregnant women, including, a visit to abroad, history of surgery, place of surgical treatment, blood transfusion, dental procedure, injection during treatment, history for the road accident, use of drugs prescribed by, the type of drugs to be used for treatment, status of injecting drug user, history of disease for any relative, type of relationship with the relative, visit to beauty salon, undergone dilation and curettage (D and C), history of abortion and history of sexually transmitted disease (STD) were insignificantly associated with anti-HCV status. A statistically significant association ($P=0.001$, OR=11.833, 95% CI=1.94-71.89) was observed for tattoo on the body with respect to anti-HCV status (Table 4).

The effect of sharing different items among pregnant women like comb ($P=0.001$, OR=20.86, 95% CI=1.674-259.9), and razor ($P=0.038$, OR=4.786, 95% CI=0.97-23.45) was found to be significantly associated with anti-HCV status. Pregnant women, who shared comb, were 20 times more prone to get HCV infection. However, sharing of other items like glass, spoon, towel, straw and nail cutter was insignificantly associated with anti-HCV status (Table 5).

Discussion

Prevalence of HCV varies region wise and in different groups of the same population (Idrees *et al.*, 2008). Hospital based studies revealed prevalence rates of 5.31% (Islamabad), 2.45% (Rawalpindi), 4.06% (Multan), 20.89% (Faisalabad), 4-6% (Karachi), 9% (Mardan), 5% (Buner, NWFP) and 25.7% (Northern Areas) (Farhana *et al.*, 2009; Chaudhary *et al.*, 2007; Jehangir *et al.*, 2006; Hashmie *et al.*, 1999; Kazmi *et al.*, 1997; Khan *et al.*, 2004; Muhammad and Jan, 2005; Tariq *et al.*, 1999). HCV infection is on the rise during pregnancy and it is an alarming issue, which needs attention. The review of different studies conducted in Pakistan reported the prevalence of HCV ranging from 0.7% to 20%

Table 1: Prevalence of hepatitis C in pregnant women presented in various public and private hospitals of Lahore during 2009

Groups of Patients	Public Hospitals								Private Hospitals				Total	
	Mayo Hospital		Sir Ganga Ram hospital		Services hospital		Lahore General hospital		Jinnah hospital		Farooq hospital		Ghurky hospital	
	T	P(%)	T	P(%)	T	P(%)	T	P(%)	T	P(%)	T	P(%)	T	P(%)

*Pregnant Women 12 2(16.7) 12 1(8.3) 12 0 12 0 12 1(8.3) 12 3(25) 11 2(18.2) 83 9(10.84)

T= Individuals tested, P=Positive

*Pregnant women were included from Lady Walingdon Hospital which is attached with Mayo Hospital Lahore

Table 2: Distribution of reactive (positive) and non-reactive (negative) pregnant women attended public/ private hospitals of Lahore metropolitan

Attributes	Anti-HCV status		Total
	Reactive (positive)	Non-reactive (negative)	
Number (%)	9 (10.84%)	74 (89.15%)	83
Mean (Age)	27.55	25.37	25.61
Std. Deviation	3.43	4.24	4.19

(Independent sample *t*-test) P-value= 0.143 statistically insignificant at 5% α level

Table 3: Distribution of hepatitis C virus reactive and non-reactive pregnant women according to their demographic features

Demographic Characteristics		Anti-HCV status		P-value	Odds ratio	Confidence interval
		Reactive	Non-reactive			
Educational Status	Illiterate	9	64	0.425	3.093	0.167-57.2
	Educated	0	10			
Occupational Status	Public Job	0	01	0.622	2.228	0.0844-58.75
	Private job	9	63			
Socioeconomic Status	5000-10000	9	44	0.057	-	-
	11000-30000	0	28			
	>30000	0	02			

Chi-Square test was applied and $P < 0.05$ at 95% confidence interval was considered as significant

(Shah and Shabbir, 2002). In our study prevalence of HCV among pregnant women was 11.68%, which lies close to the prevalence reported by Shah and Shabbir (2002). Another study conducted in Nawab Shah reported that seroprevalence of HCV was 3.44% among pregnant women, which is quite less as compared to the present study (Farhana *et al.*, 2009). Prevalence of HCV among pregnant women reported by a study in India was 1.03% which is remarkably less as compared to the current study (Kumar *et al.*, 2007). Other epidemiological studies reported the low prevalence of HCV in their respective setup at different time periods (Bohman *et al.*, 1992; Silverman *et al.*, 1993; Eriksen, 1999).

Age of pregnant women is a known risk factor for HCV infection. The high prevalence of HCV infection occurs among adult women. Up to the age of 40 years seropositivity increases and then it declines. Age has been argued as a major factor in HCV studies, with infection more predominant in older persons (Cozzolongo *et al.*, 2009; Mengal *et al.*, 2012). In the current study the mean age for HCV positive women was 27.55 ± 3.43 years with the range of 24 to 35 years. These results are in agreement with the findings of Kumar *et al.* (2007), who reported that women in the age group of 21-30 years were HCV positive. It was also observed that all the HCV reactive women had low education level. Similar findings

were reported by Kumar *et al.* (2007) in his study that women who were positive for HCV infection had low education level.

According to the results of our study history of surgical procedure, blood transfusion, dental procedure, road accident, sexually transmitted diseases were insignificantly associated with occurrence of HCV infection. A significant association ($P < 0.05$) was observed between HCV infection and risk factors like tattooing and sharing the comb and razor whereas sharing of other items like towel, nail cutter, tooth brush, glass, spoon and straw was found to be insignificantly associated. The present study recorded a higher risk of HCV infection in patients who had undergone any kind of surgical treatment. Results from the study of Farhana *et al.* (2009), showed that history of surgical procedure is the most significant risk factors for HCV infection. Similar supporting evidence was also reported by a study conducted at Shifa International Hospital Islamabad (Jaffery *et al.*, 2005).

In conclusion, a high HCV prevalence among pregnant women. Tattooing, comb and razor sharing are the major risk factors, which play an important role in HCV infection. Furthermore, a poor literacy rate, low socio-economic status and history of surgical treatment are also important risk factors contributing towards increased HCV prevalence in pregnant women in Lahore, Pakistan.

Table 4: Association between hepatitis C and various indicators among pregnant women in public/ private hospitals of Lahore metropolitan

Indicators	Response	Anti-HCV status		P-value	Odds ratio	Confidence interval
		Reactive	Non-reactive			
History of visiting abroad	Yes	0	05	0.786	0.6651	0.034-13.01
	No	9	69			
History/type of surgery before the index pregnancy	Surgical treatment	5	30	0.389	1.833	0.454-7.391
	None	4	44			
Place of surgical treatment	Private Sector	2	10	0.654	-	-
	Public Sector	3	20			
	Not applicable	4	44			
Recipient of blood transfusion	Yes	1	12	0.690	0.6458	0.073-5.649
	No	8	62			
History of Dental procedure	Yes	5	21	0.096	3.155	0.77-12.9
	No	4	53			
Tattoo on the body	Yes	3	03	0.001*	11.833	1.94-71.89
	No	6	71			
Use of injectable during treatment	Yes	8	63	0.762	1.397	0.159-12.29
	No	1	11			
History of Road Accident	Yes	0	06	0.692	0.5547	0.028-10.65
	No	9	68			
injecting drugs user	Yes	1	01	0.071	9.125	0.519-160.3
	No	8	73			
Usage of drugs prescribed by	Doctor	6	60	0.313	0.4667	0.103-2.098
	Non Doctors	3	14			
If yes what type of drugs	Oral	6	45	0.856	-	-
	Injectable	0	02			
	(Oral+Injectable)	3	27			
History of relative having	Hepatitis	3	21	0.337	-	-
	Other disease	6	53			
If yes what kind of relationship	Non Sexual	3	21	0.756	1.262	0.288-5.516
	Not Applicable	6	53			
Visit to beauty saloon	Yes	7	46	0.357	2.130	0.413-10.98
	No	2	28			
History of underwent Dilations and Curettage	Yes	0	08	0.540	0.4118	0.021-7.726
	No	9	66			
History of Abortion	Yes	0	05	0.786	0.6651	0.034-13.01
	No	9	69			
History of STD	Yes	1	05	0.634	1.725	0.179-16.67
	No	8	69			

Table 5: The effect of sharing utensils and other items by pregnant women in various public/private hospitals of Lahore metropolitan

Items shared		Anti-HCV status		P-value	Odds ratio	Confidence interval
		Reactive(n=9)	Non-reactive (n=74)			
Comb Sharing	Yes	2	01	0.001*	20.86	1.674-259.9
	No	7	73			
Glass Sharing	Yes	6	56	0.557	0.643	0.146-2.836
	No	3	18			
Spoon Sharing	Yes	6	61	0.258	0.426	0.094-1.929
	No	3	13			
Towel Sharing	Yes	6	63	0.162	0.349	0.076-1.607
	No	3	11			
Straw Sharing	Yes	4	16	0.131	2.900	0.696-12.076
	No	5	58			
Razor Sharing	Yes	3	07	0.038*	4.786	0.97-23.45
	No	6	67			
Nail Cutter Sharing	Yes	7	69	0.115	0.254	0.041-1.557
	No	2	05			
Tooth Brush Sharing	Yes	3	08	0.060	4.125	0.860-19.791
	No	6	66			

Chi-Square test was applied and P<0.05 at 95% confidence interval was considered as significant

*P-value is significant

References

- ACOG Educational Bulletin, 1998. Viral hepatitis in pregnancy. American College of Obstetricians and Gynecologists. *Int. J. Gynaecol. Obstet.*, 63: 195–202
- Bohman, V.R., W. Stettler, B.B. Little, G.D. Wendel, L.J. Sutor and F.G. Cunningham, 1992. Seroprevalence and risk factors for hepatitis C virus in pregnant women. *Obstet. Gynecol.* 80: 609–613
- Chaudhary, I.A., U. Samiullah, S.S. Khan, R. Masood, M.A. Sardar and A.A. Mallhi, 2007. Seroprevalence of hepatitis B and C among the healthy blood donors at Fauji Foundation Hospital, Rawalpindi. *Pak. J. Med. Sci.*, 23: 64–67
- Costa, Z.B., G.C. Machado, M.M. Avelino, G.F. Clidenor, V.M.F. Jose, L.M. Ana, D.T. Marilia, M.A.S. Mariane, V de S. Wayner and M.T.M. Celina, 2009. Prevalence and risk factors for Hepatitis C and HIV-1 infections among pregnant women in Central Brazil. *BMC Infect Dis.*, 9: 116
- Cozzolongo, R., A.R. Osella, S. Elba, J. Petruzzi, G. Buongiorno, V. Giannuzzi, G. Leone, C. Bonfiglio, E. Lanzilotta, O.G. Manghisi, G. Leandro, 2009. Epidemiology of HCV infection in the general population: a survey in a southern Italian town. *Amer. J. Gastroenterol.*, 104: 2740–2746
- Elinav, E., I.Z. Ben-Dov, Y. Shapira, N. Daudi, R. Adler, D. Shouval and Z. Ackerman, 2006. Acute hepatitis A infection associated with high risk of gestational complications and preterm labour. *Gastroenterology*, 130: 1129–1134
- Eriksen, N.L., 1999. Perinatal consequences of hepatitis C. *Clin. Obstet. Gynecol.*, 42: 121–133
- Farhana, M., I. Hussain and T.S. Haroon, 2009. Hepatitis C: the dermatologic profile. *J. Pak. Assoc. Derm.*, 18: 171–181
- Hashmie, Z.Y., A.H. Chaudhary, M. Ahmad and M. Ashraf, 1999. Incidence of healthy voluntary blood donors at Faisalabad. *Professional*, 6: 551–555
- Idrees, M., A. Lal, M. Naseem and M. Khalid, 2008. High prevalence of hepatitis C virus infection in the largest province of Pakistan. *J. Dig. Dis.*, 9: 95–103
- Jaffery, T., N. Tariq, R. Ayub and A. Yawar, 2005. Frequency of Hepatitis C in pregnancy and pregnancy outcome. *J. Coll. Phys. Surg. Pak.*, 15: 716–719
- Jehangir, W., F. Ali, U. Shahnawaz, T. Iqbal and H.J. Qureshi, 2006. Prevalence of hepatitis B, C and HIV in blood donors of South Punjab. *Esculapio*, 2: 6–7
- Kazmi, K., A. Sadaruddin, A.S. Dil and S.J. Zuberi, 1997. Prevalence of HCV in blood donors. *Pak. J. Med. Res.*, 36: 61–62
- Khan, M.S.A., M. Khalid, N. Ayub and M. Javed, 2004. Seroprevalence and risk factors of Hepatitis C virus (HCV) in Mardan, N.W.F.P. *Rawal. Med. J.*, 29: 57–60
- Kumar, A., K.A. Sharma, R.K. Gupta, P. Kar and A. Chakravarti, 2007. Prevalence and risk factors for hepatitis C virus among pregnant Women. *Ind. J. Med. Res.*, 126: 211–215
- Muhammad, N. and A. Jan, 2005. Frequency of hepatitis C in Bunir, NWFP. *J. Coll. Phys. Surg. Pak.*, 15: 11–14
- Mengal, M.A., F. Abbas, M.A. Mengal, M. Shafee, S. Babar, M.A. Mengal and A. Atique, 2012. Passive surveillance of anti-hepatitis C virus antibodies in human subjects of four medical units of Balochistan, Pakistan. *Int. J. Agric. Biol.*, 14: 585–589
- Raptopoulou, G.M., E. Orphanou, T.H. Lalla, A. Lita and A. Garifallos, 2001. Prevalence of Hepatitis C virus infection on cohort of pregnant women in Northern Greece and transmission of HCV from mother to child. *Eur. J. Epidemiol.*, 17: 263–266
- Rebuzzini, D.G., 2008. Study of the hepatitis C virus NS3 helicase domain for application in a chemiluminescent immunoassay. *Thesis (PhD)*, p: 30. Department of Biotechnology and Bioscience, University of Milan, Biococca, Italy
- Safir, A., A. Levy, E. Sikuler and E. Sheiner, 2010. Maternal hepatitis B virus or hepatitis C virus carrier status as an independent risk factor for adverse perinatal outcome. *Liver Int.*, 30: 765–770
- Shah, N.H. and G. Shabbir, 2002. A review of published literature on Hepatitis B and C virus prevalence in Pakistan. *J. Coll. Phys. Surg. Pak.*, 12: 368–371
- Silverman, N.S., B.K. Jenkin, C. Wu, P. McGilennen and G. Knee, 1993. Hepatitis virus in pregnancy: seroprevalence and risk factors for infection. *Amer. J. Obstet. Gynecol.*, 169: 583–587
- Tariq, W.U., A.B. Hussain, K.A. Karamat, E. Ghani, T. Hussain and S. Hussain, 1999. Demographic aspects of hepatitis C in Northern Pakistan. *J. Pak. Med. Assoc.*, 49: 198–201

(Received 13 September 2012; Accepted 23 October 2012)